Unified Patent Court
Einheitliches Patentgericht
Juridiction unifiée du brevet

The Hague - Local Division
UPC_CFI_620/2025
UPC_CFI_1509/2025
UPC_CFI_1511/2025

Decision
of the Court of First Instance of the Unified Patent Court
delivered on 10 November 2026

HEADNOTES

1. Patent on liposomes for RNA vaccine delivery held (mostly) valid and infringed.

2. The claimed range of pKa 5.0-6.8 is not to be interpreted as containing rigid cut-off limits in the present case. The claim, which includes a specific measurement method, should be read together with the description which contains a reference to a measurement imprecision for this method of +-0.2 pKa units.

3. The patent is entitled to partial priorities. The patent may rely on P1 (US830) for the range of pKa 5.0-6.7 (so partially according to G1/15), with date 6 July 2010 and for the claim with upper pKa limit 6.8 on P2 (US 837), dated 31 August 2010.

4. WO799 which discloses DLinDMA (pKa 5.8) is not intervening prior art in the sense of Art. 54.3 EPC for the relevant range of pKa 5.0-6.7. Both the patent (in view of P1) and WO799 can invoke as earliest date 6 July 2010. This means that WO799 does not have a date prior to the (partial) priority date of the patent.

5. For the assessment of novelty, the claims of a prior art patent or patent application form an integral part of its technical disclosure and must be read together with the description. This does however not mean that any combination of (features from) claims of a prior art patent necessarily forms a direct and unambiguous disclosure of the subject-matter of this combination, in particular if the combination implies a(n arbitrary) selection. When the combination is not unambiguously derivable for the skilled person, it is not an enabling disclosure that anticipates the patent at issue. What matters is whether the skilled person understands that such an assembly of (features from) claims is disclosed and reflects the technical teaching of the document (see EPO BoA T 1658/12).

6. Common General Knowledge (CGK) is not primarily related to a specific document, but rather to a specific knowledge. This knowledge is typically found in textbooks that introduce the field of technology in question. For information to qualify as CGK, it should be present in more than one document. In highly specialised areas, the document may be a review article, handbook or handbook chapter. However, the issue is not whether the information asserted to be CGK is contained in a well-known and widely accepted document. To determine the scope of CGK, the real issue is whether the relevant factual information is so elementary, convincing and consensual that a person skilled in the

relevant field will necessarily know it and whether the relevant community has accepted it as an established empirical fact.

7. The interdependent, integrated and centrally controlled operational structure of PBNT means that individual subsidiaries, including the (thirty) Defendants, perform or contribute as joint infringers, to infringing acts which concern various jurisdictions, without the precise scope of the infringing or contributory act of each individual Defendant being distinguishable. Infringing acts in the Relevant Territory are however, jointly attributable to the Defendants.

8. Jurisdiction and territorial scope of the injunction and other measures extend to all EPC countries where the patent is valid, with the exception of Ireland and the UK.

KEYWORDS : RNA vaccines, partial priority, common general knowledge, joint infringement, long-arm jurisdiction.

CLAIMANT/DEFENDANT IN THE COUNTERCLAIM

1)	**GlaxoSmithKline Biologicals SA** (Claimant) - Rue de l'Institut 89 - 1330 - Rixensart - BE	**Represented by** Tjibbe Douma, Carlos van Staveren, Nicole Jadeja and Emilia Zalewska of Bird & Bird LLP

DEFENDANTS/COUNTERCLAIMANTS

1. **C.P. Pharmaceuticals International C.V**., Rivium Westlaan 142, 2909LD Capelle aan den Ijssel, the Netherlands
2. **Pfizer Export B.V.,** Rivium Westlaan 142, 2909 LD Capelle aan den IJssel, the Netherlands
3. **Pfizer B.V.,** Rivium Westlaan 142, 2909 LD Capelle aan den IJssel, the Netherlands
4. **Pfizer Manufacturing Belgium N.V.,** Rijksweg 12, 2870 Puurs-Sint-Amands, Belgium
5. **Pfizer Service Company B.V./S.r.l.,** Hoge Wei 10, 1930 Zaventem, Belgium
6. **Pfizer S.A./N.V.,** Boulevard de la Plaine 17, 1050 Brussels, Belgium
7. **Pfizer Luxembourg SARL,** Rond-Point du Kirchberg 51, Avenue J.F. Kennedy, L-1855 Luxembourg, Luxembourg
8. **Pfizer Inc.,** 66 Hudson Boulevard East, New York, 10001-2192, the United States of America
9. **Pfizer Corporation Austria Gesellschaft m.b.H,** Floridsdorfer Hauptstraße 1, 1210 Vienna, Austria
10. **Pfizer ApS,** Lautrupvang 8, 2750 Ballerup, Denmark
11. **Pfizer Oy,** Tietokuja 4, 00330 Helsinki, Finland
12. **Pfizer S.A.S.,** 23-25 avenue du Docteur Lannelongue, 75014 Paris, France
13. **Pfizer Pharma GmbH,** Friedrichstraße 110, 10117 Berlin, Germany
14. **Pfizer S.r.l.,** Via Isonzo 71, 04100 Latina LT, Italy
15. **Laboratórios Pfizer, Lda.,** Lagoas Park – Building 10, 2740 271 Porto Salvo, Portugal
16. **Pfizer Romania S.R.L.,** Șoseaua București-Ploiești 172-176 (Willbrook Platinum Business and Convention Center), 013697 Bucharest, Romania
17. **Pfizer AB,** Solnavägen 3H, 113 63 Stockholm, Sweden
18. **Pfizer, spol. S.r.o.,** Stroupežnického 3191/17, 150 00 Prague 5, Czech Republic
19. **Pfizer Hellas A.E.,** Mesoghion Ave 243, Neo Psychiko 154 51, Athens, Greece

20. **Pfizer, S.L.,** Avenida de Europa, 20-B, Parque empresarial, La Moraleja, 28108 Alcobendas Madrid, Spain
21. **Pfizer Croatia d.o.o.,** Slavonska avenija 6, 10 000 Zagreb, Croatia
22. **Pfizer Gyógyszerkereskedelmi Kft**., Alkotás utca 53, H-1123 Budapest,
23. **Pfizer Polska Sp. Z.o.o.,** ul. Żwirki I Wigury 16b, Warsaw 02-092, Poland
24. **Pfizer Trading Polska Sp. Z.o.o.,** ul. Żwirki I Wigury 16b, Warsaw 02-092, Poland
25. **Pfizer AG,** Schärenmoosstrasse 99, 8052 Zurich, Switzerland
26. **Pfizer AS,** Drammensveien 288, 0283 Oslo, Norway
27. **BioNTech SE,** An der Goldgrube 12, 55131 Mainz, Germany
28. **BioNTech Europe GmbH,** An der Goldgrube 12, 55131 Mainz, Germany
29. **BioNTech Manufacturing GmbH,** Emil-von-Behring-Straße 76, 35041 Marburg, Germany
30. **BioNTech Manufacturing Marburg GmbH,** Emil-von-Behring-Straße 76, 35041 Marburg, Germany

Defendants 1-26, collectively also "**Pfizer**", are represented by Christian Dekoninck, Geert Theuws, Pauline Springorum, Thomas Witte, Simon Cohen, Ed Vickers and others (Winston Taylor).

Defendants 27-30, together also "**BioNTech**", are represented by Tess Waldron, Penny Gilbert, Joel Coles, Peter FitzPatrick, Daniel Brown, Gabriella Simon and Abraham Darby-Zaier and others (Powell Gilbert) Cooperative counsel for BioNTech include Theo Blomme and Christine Kanz (Hoyng Rokh Monegier) and Georg Schnappauf and Sebastian Höpfner (Zwicher Schnappauf & Partner).

Defendants 1-30 are collectively referred to as "defendants" or as "**PBNT**".

PATENT AT ISSUE

EP2590626 B1	GlaxoSmithKline Biologicals SA

The panel/deciding judge
The composition of the panel is as follows:

Edger Brinkman	presiding judge
Stefan Schilling	legally qualified judge
Martin Schmidt	technically qualified judge
Margot Kokke	judge-rapporteur

This decision is issued by panel.

Language of the proceedings: English

Subject matter of the proceedings: Infringement action, counterclaim for revocation and application to amend the patent.

I. SUMMARY OF FACTS AND PROCEDURE

I.A THE PARTIES

1. The claimant, hereafter: **GSK**, is a global biopharmaceutical company with headquarters in London, UK.

2. The Defendants 1-26 **("Pfizer)** are part of the Pfizer group of companies, a global pharmaceutical company headed by **Pfizer Inc** (defendant 8 with its headquarters in New York, US). The defendants are individually referred to either as defendant 1, 2 etc or as follows (with the number referring to the defendant number):
   1. **Pfizer CV NL**
   2. **Pfizer Export NL**
   3. **Pfizer NL**
   4. **Pfizer Manufacturing Belgium**
   5. **Pfizer Service Belgium**
   6. **Pfizer Belgium**
   7. **Pfizer Luxembourg**
   8. **Pfizer Inc.**
   9. **Pfizer Austria**
   10. **Pfizer Denmark**
   11. **Pfizer Finland**
   12. **Pfizer France**
   13. **Pfizer Germany**
   14. **Pfizer Italy**
   15. **Pfizer Portugal**
   16. **Pfizer Romania**
   17. **Pfizer Sweden**
   18. **Pfizer Check Republic**
   19. **Pfizer Greece**
   20. **Pfizer Spain**
   21. **Pfizer Croatia**
   22. **Pfizer Hungary**
   23. **Pfizer Poland**
   24. **Pfizer Trading Poland**
   25. **Pfizer Switzerland**
   26. **Pfizer Norway**

   All Pfizer defendants, apart from Pfizer Inc, are part of Pfizer's European network. Pfizer CV NL is a holding company for in any case all European Pfizer companies. Pfizer Manufacturing Belgium is a manufacturing location for the allegedly infringing products.

3. The Defendants 27-30 **(BioNTech)** are part of the BioNTech group of companies. BioNTech is a global pharmaceutical company, focussing on the use of mRNA for both therapeutics and vaccines. **BioNTech SE** (defendant 27) heads the group, with headquarters in Mainz, Germany. Defendant 28 (**BioNTech EU)**, 29 (**BioNTech Manufacturing Germany**) and 30 (**BioNTech Marburg**) are 100% subsidiaries of BioNTech SE.

4. BioNTech and the Pfizer group partnered together to develop, manufacture, and secure regulatory approval for a vaccine that proved to be effective in preventing severe disease,

hospitalisation, and death from COVID-19 infection. This Covid-19-mRNA-vaccine is marketed worldwide by PBNT as Comirnaty, the allegedly infringing product. It is BioNTech's first marketed product.

5. On 18 June 2020, Pfizer Inc and BioNTech Manufacturing Germany signed an Advance Purchase Agreement (APA) with the European Union for the delivery of Covid-19 vaccines to all Member States of the European Union. The supply agreement was extended several times.

6. BioNTech Marburg manufactures the biological active substance of the product, the mRNA. BioNTech Manufacturing Germany holds the European Marketing Authorisation (MA) for Comirnaty for the EMA region (the EU Member States as well as Liechtenstein, Iceland, Norway and the UK). It is also a manufacturing entity for Comirnaty. Pfizer Manufacturing Belgium is manufacturer of vaccines. Both BioNTech Manufacturing Germany and Pfizer Manufacturing Belgium are responsible for batch releases of Comirnaty.

I.B THE PATENT

7. GSK is the registered proprietor of European bundle patent EP 2 590 626 for "*Liposomes with lipids having an advantageous pKa-value for RNA delivery*" (**EP626** or **the patent**), which it acquired from Novartis in 2015 as part of a package concerning Novartis' global vaccine business, including the Mandl Team's inventions (see below). The patent is based on an international PCT application of 6 July 2011, first published as WO 2012/006378 (**WO378**), and claims the priority of US 61/361830 of 6 July 2010 and US 61/378837 of 31 August 2010. The grant of EP626 was published on 28 October 2015.

8. The patent, which was granted in the English language, is inter alia valid in the entire UPCA territory. It has thirteen claims, including the following:

    1. A liposome for in vivo delivery of RNA to a vertebrate cell, the liposome having a lipid bilayer encapsulating an aqueous core, wherein: (i) the lipid bilayer comprises a lipid having a pKa in the range of 5.0 to 6.8 when measured as described in the section "pKa measurement" of the description; and (ii) the aqueous core includes a RNA which encodes an immunogen.
    2. The liposome of claim 1, wherein the lipid having a pKa in the range of 5.0 to 6.8 has a tertiary amine.
    3. The liposome of any preceding claim, wherein pKa in the range of 5.0 to 6.8 is between 5.6 and 6.8.
    4. The liposome of any preceding claim, wherein pKa in the range of 5.0 to 6.8 is between 5.7 and 5.9.

    (…)

    6. The liposome of any preceding claim, having a diameter in the range of 20-220nm.

    (...)

    10. The liposome of any preceding claim, wherein the immunogen elicits an immune response in vivo against a bacterium, a virus, a fungus or a parasite.

    (...)

    12. A pharmaceutical composition comprising the liposome of any preceding claim.
    13. The liposome of claims 1-11, or the pharmaceutical composition of claim 12, for use in a method for raising a protective immune response in a vertebrate, comprising the step of administering to the vertebrate an effective amount of said liposome, or said pharmaceutical composition.

9. The patent was the subject of opposition proceedings at the European Patent Office (**EPO**). By decision of 13 April 2018, the Opposition Division (**OD**) revoked the patent for lack of novelty over documents WO2005/120152 (**WO152**) and WO98/10748 (**WO748**). The OD's decision

was appealed by GSK. The opponent filed its reply to GSK's appeal but later withdrew the opposition. The Technical Board of Appeal (**TBA**) issued its decision on 16 December 2020 without holding an oral hearing and held that the alleged lack of novelty was not found. Since the OD had revoked the opposed patent solely based on lack of novelty, the TBA remitted the case back to the OD for the assessment of the further requirements for patentability. Pfizer subsequently filed third party observations. The OD, after the withdrawal of the opposition, decided not to continue with the proceedings and the patent was maintained as granted.

I.C THE ALLEGEDLY INFRINGING PRODUCTS

10. The messenger RNA (mRNA) vaccines, in particular its Covid-19 mRNA vaccines referred to as Comirnaty, that PBNT commercialise and its various variants, including Original Monovalent, Bivalent Original and Omicron KP.2 monovalent, are collectively also referred to as the **Infringing Products**[1] or **Comirnaty products/vaccines**.

11. The first MA for Comirnaty was received for the Original Monovalent variant "**Comirnaty Original"** on 21 December 2020, as follows from the Summary of Product Characteristics (the "**SmPC**", exhibit B09). All PBNT's subsequently authorised Covid-vaccines fall under the same EU MA for Comirnaty Original. The variants differ only in the sequence of the RNA encoding the SARS-CoV-immunogen. In section 6.1 (p.9) the SmPC contains the following information:

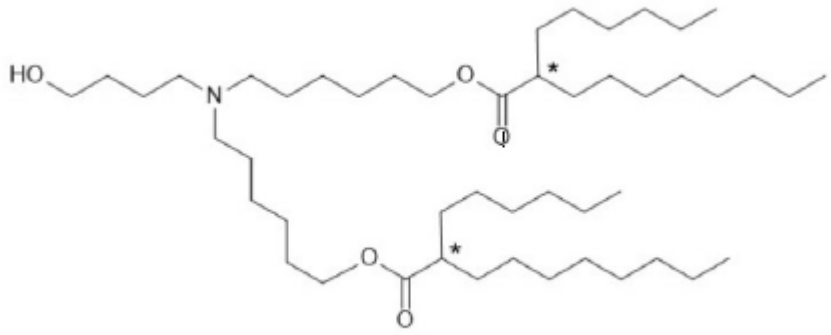
> **6.1 List of excipients**
>
> ((4-hydroxybutyl)azanediyl)bis(hexane-6,1-diyl)bis(2-hexyldecanoate) (ALC-0315)
> 2-[(polyethylene glycol)-2000]-N,N-ditetradecylacetamide (ALC-0159)
> 1,2-Distearoyl-sn-glycero-3-phosphocholine (DSPC)
> Cholesterol
> Potassium chloride
> Potassium dihydrogen phosphate
> Sodium chloride
> Disodium phosphate dihydrate
> Sucrose
> Water for injections

12. The European Public Assessment Report for Comirnaty Original ("EPAR") contains the following (emphasis added by the Court):

> (on p. 12)
> BNT162b is a mRNA vaccine for prevention of COVID-19. The vaccine is made of a mRNA encoding for the full-length SARS-CoV-2 spike glycoprotein (S) encapsulated in lipid nanoparticles (LNPs).
> (on p. 14/15)
> The finished product is presented as a concentrate for dispersion for injection containing 225 µg/ 0.45 mL (prior to dilution) of BNT162b2 (5'capped mRNA encoding full length SARS-CoV-2 Spike protein) as active substance (AS).
> Other ingredients are: ALC-0315 (4-hydroxybutyl)azanediyl)bis(hexane-6,1-diyl)bis(2-hexyldecanoate), ALC-0159 (2-[(polyethylene glycol)-2000]-N,N-ditetradecylacetamide), 1,2- Distearoyl-sn-glycero-3-phosphocholine (DSPC), cholesterol, potassium chloride, potassium dihydrogen phosphate, sodium chloride, disodium phosphate dihydrate, sucrose and water for injections.
> The product is available in a 2 mL clear vial (type I glass) with a stopper (synthetic bromobutyl rubber) and a flip-off plastic cap with aluminium seal. (...)

[1] For the sake of brevity, the Court will not use "allegedly".

After dilution with 1.8 mL sodium chloride (0.9%) solution (not supplied), one dose (0.3 mL) contains 30 micrograms of COVID-19 mRNA Vaccine (embedded in lipid nanoparticles).
(on p. 23/24)
Novel excipients
Two novel excipients are included in the finished product, the cationic lipid ALC-0315 and the PEGylated lipid ALC-0159. Limited information regarding the novel excipients are provided.
ALC-0315 (cationic lipid)
The ALC-0315 novel excipient is a cationic lipid containing a tertiary amine and two ester moieties, ((4-hydroxybutyl)azanediyl)bis(hexane-6,1-diyl)bis(2-hexyldecanoate).
Figure 1 ALC-0315 structure



Asterisks (*) indicate chiral centers.

(...)
ALC-0159 (PEGylated lipid)
The ALC-0159 novel excipient is a PEGylated lipid, 2 [(polyethylene glycol)-2000]-N,N-ditetra-decylacetamide.

(on p. 42 regarding Pharmacology)
The potency of the RNA vaccine is further optimised by encapsulation of the RNA into lipid nano particles (LNPs), which protects the RNA from degradation by RNAses and enable transfection of host cells after intramuscular (i.m.) delivery. The functional and ionizable lipid, ALC-0315, is identified as the primary driver of delivery as it allows the LNPs to have a neutral charge in a physiological environment to facilitate internalization; the endosomal environment exhibits a positive charge and therefore triggers the translocation of RNA into the cytosol (Midoux & Pichon, 2015; Hassett et al, 2019; Patel et al, 2019); ALC-0159 is included in the formulation to provide a steric barrier to: 1) facilitate the control of particle size and homogeneity during manufacturing and product storage, and 2) regulate the association of plasma and proteins with the LNP surface. The composition of the LNPs may also affect the distribution of injected BNT162b2. In addition, it cannot be excluded the LNP composition contributes to the overall immunogenicity.

13. GSK submitted (as exhibit BB52) a report by the Cayman Chemical Company dated 4 October 2025 on the analysis of the pKa value of the ionisable cationic lipid **ALC-0315** of the allegedly infringing products (the **Cayman Report**). The analysis was carried out using TNS fluorescence. The conclusions of the report are copied below:

Literature has shown that when ALC-0315 is formulated into lipid nanoparticles (LNPs), the apparent pKa of those particles by the TNS method was 6.09[1]. As shown in Table 3, in this assay, the pKa of the ALC-0315 lipid in aqueous buffer was calculated to be 6.825, 6.813 and 6.617 by Scientist I, for a mean (+/- SD) of 6.752 (+/- 0.117). In the assays run by Scientist II, the apparent pKa of ALC-0315 in aqueous buffer was calculated to be 6.809, 6.801 and 6.805 for a mean (+/- SD) apparent pKa of 6.805 (+/- 0.004).

Table 3. Apparent pKa values calculated from each run.

	Run 1	Run 2	Run 3	Mean	SD
Scientist I	6.825	6.813	6.617	6.752	0.117
Scientist II	6.809	6.801	6.805	6.805	0.004

14. GSK submitted a report prepared by ATEM Structural Recovery dated 2 January 2026 as exhibits BB96A-D (the **First ATEM Report**). It contains cryogenic transmission electron microscopy (Cryo-TEM) images of the allegedly infringing products, obtained using a low-temperature transmission electron microscope. The example below, taken from exhibit BB96A, shows Comirnaty sample 3a with overlaid masks for particle characterization:

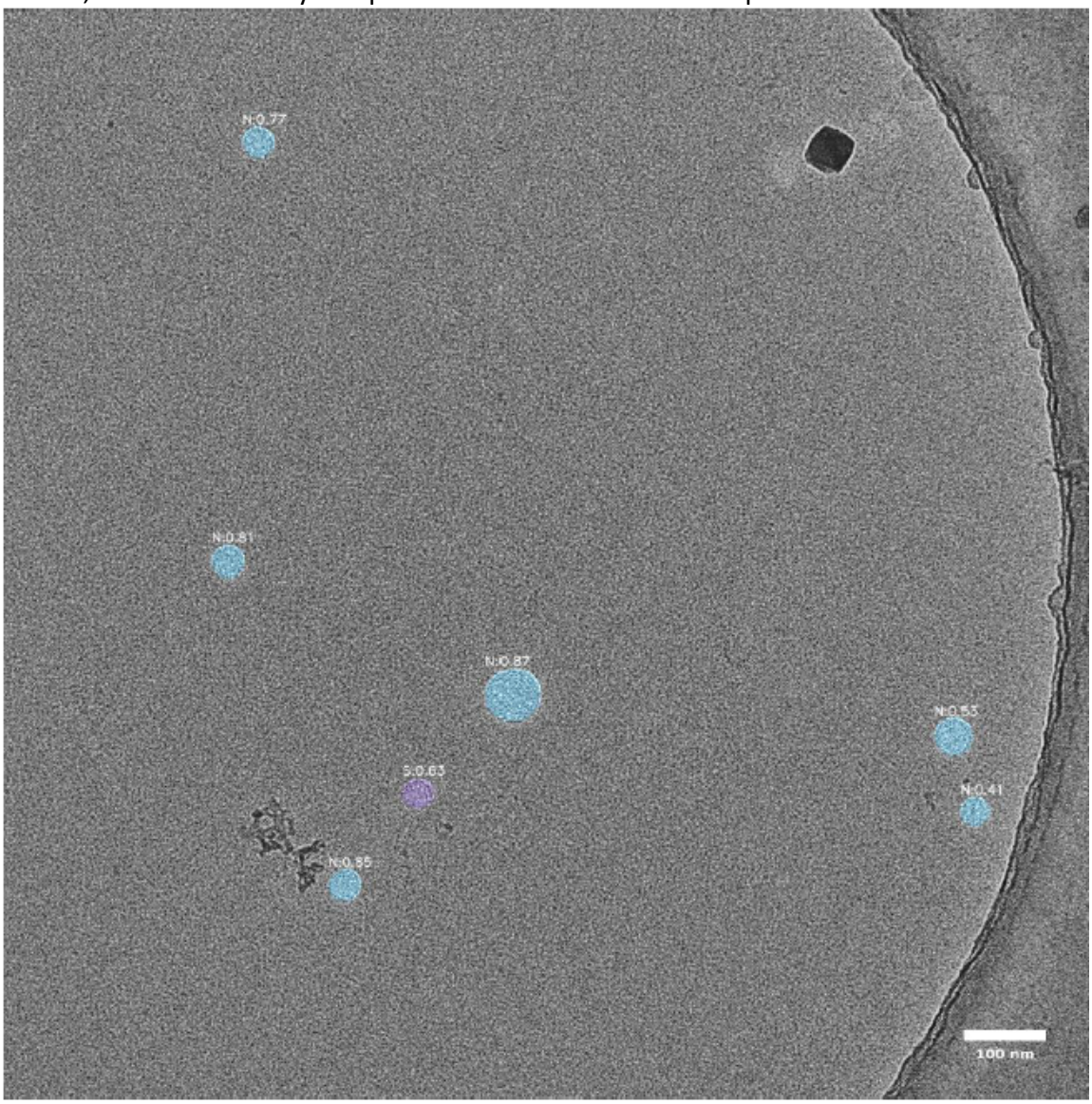


Figure 2: The same micrograph as depicted to the left with overlaid sperical masks for particle characterization. N: Solid Core Particle, S: Biphasic Split Particle, B: Biphasic Dense Particle. Scale bar bottom right: 100 nm

15. Cryo-TEM Images of a second Comirnaty sample was also prepared; a Cryo-TEM image obtained from sample 3b is shown below.

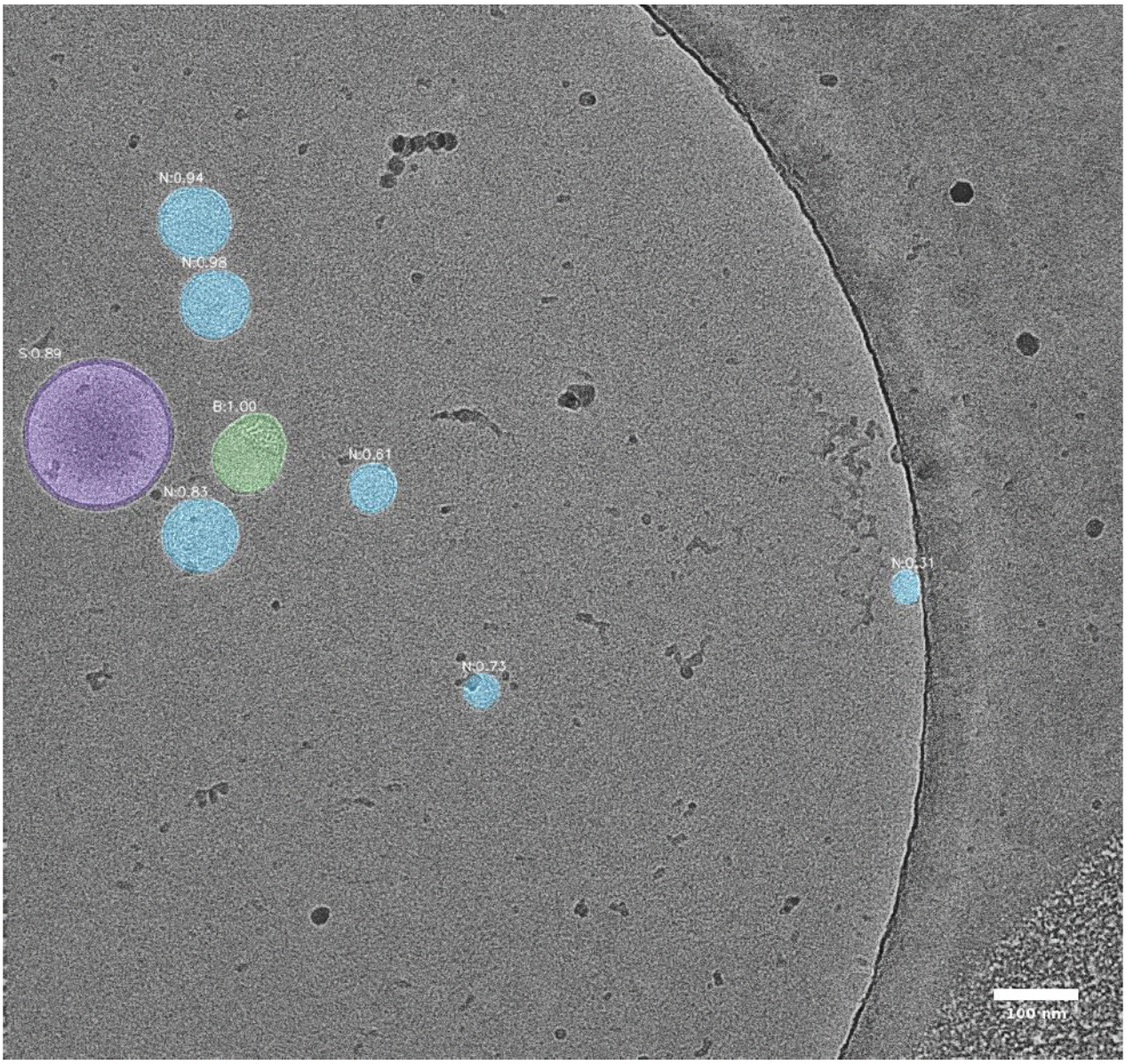


Figure 2: The same micrograph as depicted to the left with overlaid sperical masks for particle characterization. N: Solid Core Particle, S: Biphasic Split Particle, B: Biphasic Dense Particle. Scale bar bottom right: 100 nm

16. The report contains a summary of the samples (exhibit BB96C). Parts of this summary are copied below:

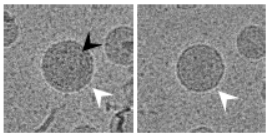
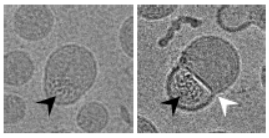
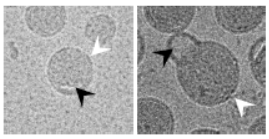
Customer Sample ID	Diameter (Projected Area Diameter)			Morphology Distribution (Morphology Class, relative abundance)		
	Average (nm)	Median (nm)	Standard Deviation (nm)	Solid Core (%)	Biphasic Split (%)	Biphasic Dense (%)
Sample 3a	49,6	44,1	17,6	73,4%	19,7%	6,9%
Sample 3b	60,2	51,0	28,7	60,2%	15,9%	23,9%

The number or particles evaluated is listed in the same table (which is too wide to include as a whole):

Report Date	Number of evaluated Particles
2-Jan-2026	1169
2-Jan-2026	3417

17. Appendix 2 to the First ATEM report (BB96A.1) contains the following:

Morphology Classification

Morphology Classes	Description	100% Example Crops
Solid Core	Solid Core particles usually represent the major population of typical LNP preparations. The particles exhibit a near spherical appearance and an overall homogeneous, solid core central density. The outermost lipid layer(s) (white arrow) are typically visible. Inner density fluctuations that account for an accumulation of electron dense mass (i.e. nucleic acids) are sometimes visible (black arrow).	
Biphasic Dense	Biphasic Dense or "blebbed" particles exhibit two or more clearly separated, densely filled compartments in one LNP. Individual compartments are often enclosed by a clearly discernible electron dense layer (white arrow). Current scientific literature[1] suggests that the mottled density (black arrow) represents accumulated nucleic acids, while the second phase consists of morphologically more homogeneous solid core LNP material.	
Biphasic Split	Biphasic Split or "split" particles exhibit two or more clearly separated compartments in one LNP. Each compartment is typically not separated by a prominent electron dense layer and may consist of solid core LNP material (white arrow) and very low density material (i.e. buffer) (black arrow), respectively. The Split in the particle may be small (left image), hence, hardly modifying the spherical appearance of the LNP, or more pronounced (right image), hence, introducing large bulges into the particle.	

18. A **Second ATEM Report** dated 2 March 2026, was resubmitted after the oral hearing (see Section I.E below) as Exhibits BB156A and B. In this report, Cryo-TEM images are shown of the Infringing Products whereby mRNA was stained with thionine, a soluble, membrane permeable, nucleic acid binding dye. The following images are copied from this report:

SAMPLE 1: DESM-250005-A0100 (Comirnaty prefilled syringe – batch NA4457)

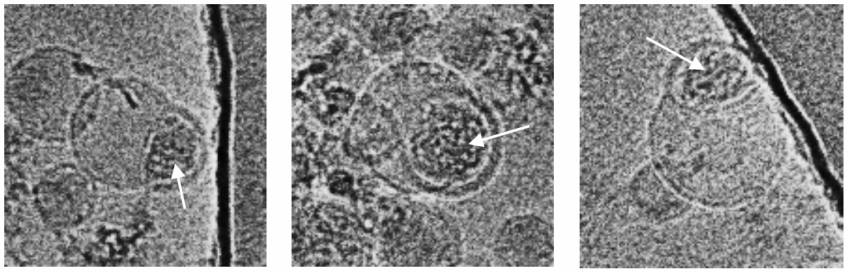


Fig. 1: LNP with condensed and contrast enhanced (i.e. dark) nucleic acids-like structures in sample DESM-250005-A0100. Scale: The edge length of each cropped image corresponds to 175 nm on specimen level.

Thionin staining typically induces condensation (i.e. contrast enhancement) of RNA molecules in LNP samples (Fig. 1, white arrow). Furthermore, the staining procedure can induce a (partial) externalization of nucleic acid strands from the particles. This externalization may lead to deformation and/or aggregation of individual LNP, as partially observable in this dataset.

SAMPLE 1: DESM-250006-A0100 (Comirnaty prefilled syringe – batch NA4459)

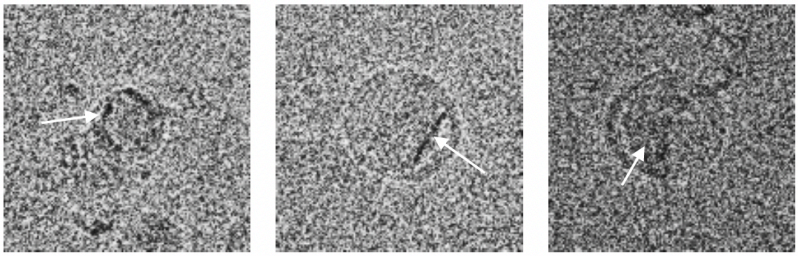


Fig. 1: LNP with condensed and contrast enhanced (i.e. dark) nucleic acid-like structures in sample DESM-250006-A0100. Scale: The edge length of each cropped image corresponds to 175 nm on specimen level.

Thionin staining typically induces condensation (i.e. contrast enhancement) of RNA molecules in LNP samples (Fig. 1, white arrow). Furthermore, the staining

I.D – POST-FILING PUBLICATIONS

19. On 4 September 2012, the so-called Mandl team, a team within Novartis that worked on the development of lipid-based formulations capable of delivering RNA molecules for vaccination/immunisation purposes, published an article entitled '*Nonviral delivery of self-amplifying RNA vaccines*' in PNAS, authored by Geall and others, including Mandl, referred to as **Geall 2012**[2], after its first author who is also the only named inventor of the patent. The summary at the start of this article reads as follows:

> *Despite more than two decades of research and development on nucleic acid vaccines, there is still no commercial product for human use. Taking advantage of the recent innovations in systemic delivery of short interfering RNA (siRNA) using lipid nanoparticles (LNPs), we developed a self-amplifying RNA vaccine. Here we show that nonviral delivery of a 9-kb self-amplifying RNA encapsulated within an LNP substantially increased immunogenicity compared with delivery of*

[2] A.J. Geall et al, Nonviral delivery of self-amplifying RNA vaccines, Proc. Natl. Acad. Sci. U.S.A. 109 (36) 14604-14609, https://doi.org/10.1073/pnas.1209367109 (2012). (Exhibit BB39)

unformulated RNA. This unique vaccine technology was found to elicit broad, potent, and protective immune responses, that were comparable to a viral delivery technology, but without the inherent limitations of viral vectors. Given the many positive attributes of nucleic acid vaccines, our results suggest that a comprehensive evaluation of nonviral technologies to deliver self-amplifying RNA vaccines is warranted.

20. On 20 July 2021 a publication entitled 'Encapsulation state of messenger RNA inside lipid nanoparticles' was published in Biophysical Journal (2021, 120: 2766-2770, Exhibit BB43) by Brader et al (**Brader 2021**). Brader and some of the other authors were employed at Moderna, another company that produces mRNA-vaccines, at the time. The article contains inter alia the following information:

ABSTRACT Understanding the structure of messenger RNA (mRNA) lipid nanoparticles, and specifically the microenvironment of the mRNA molecules within these entities, is fundamental to advancing their biomedical potential. Here, we show that a permeating cationic dye, thionine, can serve as a cryogenic electron microscopy contrasting agent by binding selectively to encapsulated mRNA without disturbing lipid nanoparticle morphology. Cryo-electron microscopy images identify the mRNA location, revealing that mRNA may exist within solvent-filled cavities or may be substantially lipid associated.

SIGNIFICANCE The clinical utility of messenger RNA (mRNA) vaccines delivered in lipid nanoparticles has recently been highlighted by their use in SARS-CoV-2 vaccines from Pfizer-BioNTech (BNT162b2) and Moderna (mRNA-1273). The lipid nanoparticle is a complex entity in terms of structural and physical attributes that influence biological efficacy and pharmaceutics. One of the most fundamental yet elusive questions has been the nature and location of the mRNA payload inside the lipid nanoparticle. Elucidating this detail via direct experimental methods has been a major objective in the field of RNA delivery. Here, we show that a combination of dye-binding and cryo-electron microscopy pinpoints the mRNA location, providing new insights into its encapsulation state and chemical microenvironment.

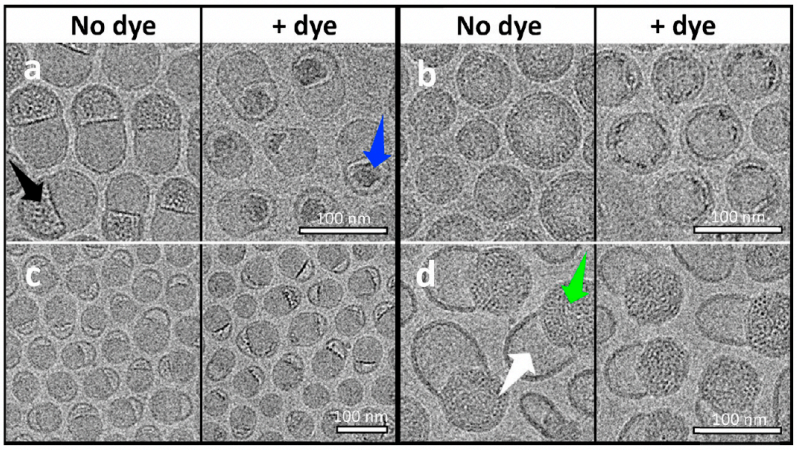


FIGURE 3 Locating encapsulated mRNA in LNPs by cryo-EM. The effect of thionine on mRNA-LNPs of different morphologies reveals that lipid-dissociated mRNA may reside in bleb compartments (*a*) or may be more lipid-associated in spherical (*b*) or less prominently blebbed particles (*c*). The black arrow in (*a*) indicates the distinctive mottled mass density of mRNA inside the bleb cavity, which itself is distinguished by a thick, dark periphery. The blue arrow indicates the significant contrast enhancement that occurs when thionine dye is present, thereby identifying mRNA within the bleb. (*d*) Charge-driven migration of mRNA from the bleb into the body of the LNP. When the mRNA-LNP sample of (*a*) (no dye) was dialyzed into pH 5 buffer, the images of (*d*) resulted. The mottled density is now associated with the body of the LNP (*green arrow*), leaving the bleb cavity devoid of mRNA (*white arrow*). Addition of thionine to this sample produced no notable contrast change (*right*), indicating that thionine did not displace lipid.

assembly at low pH—evidently, adjustment to pH 5 has caused the amino lipid to become positively charged, thereby driving reassociation with the negatively charged mRNA. Addition of thionine to the pH 5 sample caused no discernable contrast enhancement (Fig. 3 *d*), indicating that mRNA is complexed with charged lipid at this pH and thionine does not displace it. It is now apparent that mRNA may exist fully encapsulated within the spherical particle (Fig. 3 *b*) or dissociated within a large bleb in the highly nonspherical particle (Fig. 3 *a*) or, alternatively, may be in an intermediate state (Fig. 3 *c*). The cryo-EM images also indicate that blebs may be empty or mRNA loaded, but without the benefit of mRNA-specific contrast enhancement, it has not previously been possible to recognize these distinctions. Although blebs have been widely

21. On 7 July 2023 a publication entitled '*Insights into the Structure of Comirnaty Covid-19 Vaccine: A Theory on Soft, Partially Bilayer-Covered Nanoparticles with Hydrogen Bond-Stabilized mRNA–Lipid Complexes*' was published[3] by Szebeni et al (**Szebeni 2023**, PBNT-C19). This publication contains inter alia the following information:

The worldwide use of Pfizer/BioNTech's Comirnaty (BNT162b2) and Moderna's Spikevax (mRNA-1273) vaccines against Covid-19 has brought substantial public and scientific interest and scrutiny. This approach of immunization is based on mRNA-containing lipid nanoparticles (mRNA-LNPs), wherein the mRNA encodes the virus's spike protein (S-protein).[1,2] Following translation, the protein presents an antigen for the immune system to develop specific immunity against the virus. This approach of vaccination stems from the success of LNPs in gene therapy and lipophilic drug delivery that utilizes ionizable lipids

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displaying positive charge at low pH (IPC lipids), neutral PEGylated lipids, neutral membrane-forming phospholipids, and cholesterol.[3−6] These compact nanoparticles (NPs) are very different from the clinically applied bilayer liposomes with a clearly discernible internal aqueous compartment. Yet, there is little information about the molecular buildup of fully filled LNPs in general and Comirnaty, in particular. Accordingly, the goal of the present study was to employ a combination of state-of-the-art nanostructure analysis techniques to better understand the structure of Comirnaty in comparison with Doxil, a well-characterized liposome control, whose chemical composition is compared to that of Comirnaty in Supplement Table 1. We focus on the structure of vaccine NPs as administered to people, also noting changes observed after 1 day storage of diluted stock at 4 °C, which is irrelevant regarding the human application of Comirnaty but reveals information that helps understand the structure of these NPs.

(...)

Cryo-TEM of Comirnaty. Consistent with the AFM images of fresh Comirnaty (Figure 1A) cryo-TEM images of the freshly diluted vaccine (Figure 3A−C) showed spherical NPs. These NPs exhibit a relatively broad size distribution having about 50 to 200 nm diameter. However, mostly, NPs

[3] ACS Nano 2023, 17, 13147−13157

having 50−80 nm diameters were observed, which may suggest a bimodal distribution. Many of the NPs have a solid core with an electron-dense interior, distinct from the diffused aqueous background. This appearance is similar to cryo-TEM images of LNPs filled with siRNA (with RNA-to-ionizable lipid ratio identical to Comirnaty)[5] or mRNA (1.9 kb).[27] Note that this interior is different from that in the anticancer nanodrug Doxil, where a low-density intra-liposome aqueous phase, similar to the background outside the liposome, is surrounding the nanorod-like doxorubicin-sulfate crystal inside the liposome (Figure 3D).

The cryo-TEM images of Comirnaty NPs highlight another phenomenon: the presence of electron-dense surface "caps" covering parts of the NPs (orange arrows), which resemble a bilayer coating, as in Doxil (Figure 3D). Thus, we hypothesize that these thick semicircle lines are phospholipid bilayers and that Comirnaty NPs are intermittently coated with phospholipid bilayers. In bilayer-free surface areas the IPC lipids and cholesterol should, of necessity, form monolayers.[5] PEG lipids may also be present in these regions, as with lack of proper PEG surface coverage LNPs would quickly fuse.[27] These observations are in keeping with the lack of clear signs of the lipid bilayer envelope by AFM force spectroscopy. Additionally, cryo-TEM images of all samples also included particles having a bicompartmental structure with a bilayer-coated bulge showing "grain-like" nanostructures related to mRNA (blue arrows in Figure 3A−C).[28] It was suggested previously that these water-containing "blebs" may form upon segregation of DSPC from other lipids to form HSPC-enriched membranes/envelopes.[29]

Negative Staining TEM of Comirnaty Enhances the Contrast of the Core Structure in Stored NPs. The AFM force spectroscopy data suggested that mRNA is associated with lipids within the LNP core. This led us to hypothesize that the electron-dense gritty texture of LNP cores in cryo-TEM images (Figures 3A, B) reflects lipid-bound, condensed state mRNA mingled with the excess of ionizable lipids. This hypothesis was further supported by TEM of a sample stored for a week in the refrigerator and then subjected to negative staining with pH 4.5 uranyl acetate. This dried and stained sample (Figure 4) showed a wide variety of odd-shaped LNPs and some molecular details not seen with cryo-TEM. Higher magnification of some of the globular structures (Figure 4B) shows circular and semicircular chains of ∼2−3 nm dots lined up in balls of yarn-like lumps. These may be rationalized as mRNA "supercoils" held tightly together by intra- and interchain forces. Zooming into some structures (red arrows)

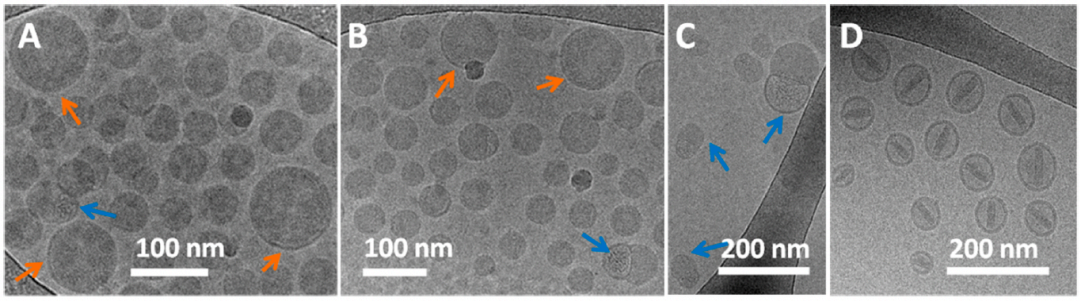


Figure 3. Cryo-TEM images of Comirnaty (A, C) and of Doxil (D). Comirnaty samples for cryo-TEM (A–C) were processed immediately after thawing the vaccine vial from −80 °C and dilution with saline, as instructed by the manufacturer for human application. Orange arrows show the bilayer coating of the NPs. Blue arrows point at bicompartmental NPs with an mRNA-containing bleb. (D) Cryo-TEM image of Doxil showing the rod-like doxoribicin-sulfate crystal inside the intra-liposome aqueous phase.

CONCLUSIONS

One insight into the nanostructure of the Comirnaty Covid-19 vaccine concerns the tertiary structure of mRNA within the LNPs and its interaction with IPC lipids. Our experimental data and theoretical considerations suggest that the highly convoluted mRNA strains are condensed in the core of NPs primarily by temperature-dependent weak inter- and intramolecular interactions, involving hydrogen bonds and, depending on the actual pH, ionic bonds with IPC lipids. However, ionic interactions between the nucleic acid and IPC lipids may be insignificant or absent at neutral pH in the vaccine's saline-diluted formulation for human use. The predominance of hydrogen bonds and lack of a continuous bilayer around the mRNA–lipid matrix offer an explanation for the soft and compliant structure of Comirnaty LNPs, as well as the vaccine's limited stability in ambient temperature.

22. On 16 September 2021, after the approval of mRNA-based COVID-19 vaccines, an article entitled "*The tangled history of mRNA vaccines*" was published in Nature (Vol 597, p318-324), authored by science journalist Elie Dolgin (the article is hereafter referred to as **Dolgin 2021,** exhibit BB104). Some quotes from the article are copied below:

> medical development. In reality, the path to mRNA vaccines drew on the work of hundreds of researchers over more than 30 years. (on p.319)

Continuous struggle

In the 1990s and for most of the 2000s, nearly every vaccine company that considered working on mRNA opted to invest its resources elsewhere. The conventional wisdom held that mRNA was too prone to degradation, and its production too expensive. "It was a continuous struggle," says Peter Liljeström, a virologist at the Karolinska Institute in Stockholm, who 30 years ago pioneered a type of 'self-amplifying' RNA vaccine.

"RNA was so hard to work with," says Matt Winkler, who founded one of the first RNA-focused lab supplies companies, Ambion, in Austin, Texas, in 1989. "If you had asked me (on p.320)

Fat breakthrough

As for linchpin technologies, many experts highlight another innovation that was crucial for mRNA vaccines – one that has nothing to do with the mRNA. It is the tiny fat bubbles known as lipid nanoparticles, or LNPs, that protect the mRNA and shuttle it into cells.

This technology comes from the laboratory of Pieter Cullis, a biochemist at the University of British Columbia in Vancouver, Canada, and several companies that he founded or led. Beginning in the late 1990s, they pioneered LNPs for delivering strands of nucleic acids that silence gene activity. One such treatment, (on p. 322)

Once all the pieces came together, "it was like, holy smoke, finally we've got a process we can scale", says Andrew Geall, now chief development officer at Replicate Bioscience in San Diego. Geall led the first team to combine LNPs with an RNA vaccine[22], at Novartis's US hub in Cambridge in 2012. Every mRNA company now uses some variation of this LNP delivery platform and manufacturing system – although who owns the relevant patents remains the subject of legal dispute. Moderna, for example, is locked in a battle with one Cullis-affiliated business – Arbutus Biopharma in Vancouver – over who holds the rights to the LNP technology found in Moderna's COVID-19 jab. (on p. 323)

I.E – PROCEDURE

23. The parties' submissions and applications and mentioned in interim orders. PBNT filed joint pleadings starting from the Statement of Defence (SoD). Pfizer and BioNTech did submit the combined pleadings as separate counterclaims for revocation: files UPC_CFI_1509/2025 and UPC_CFI_1511/2025. The content of those files is identical and will be treated as one.

24. An interim conference (IC) was held on 17 June 2026 to prepare the case for the oral hearing. Reference is made to the R.105.5 order of 17 June 2026 for the decisions taken there. Inter

alia, GSK's exhibits BB156A-B were rejected as late-flied and GSK was ordered to submit a redacted version of the second declaration of its expert professor Laird Forrest ("Forrest", exhibit, BB153A,"), from which parts addressing these exhibits were removed (paragraphs 7.1-7.4 and exhibit BB153B.22).

25. As instructed during the IC, the parties subsequently focussed their case on their five most promising attacks and ten (maximum) most promising auxiliary requests (**ARs**), respectively. Pursuant to several further submissions (both solicited and unsolicited, filed after the IC, and issues that consequently arose, a procedural order was issued on 21 August 2026 clarifying/deciding inter alia the following before the upcoming oral hearing (OH):
    a. the following documents were admitted into the proceedings:
        - exhibit PBNT C73 and GSK's response thereto of 15 July 2026
        - exhibit PBNT C84 (Cayman 2004 Report) and
        - GSK's exhibit Annex I to its R.36 application filed on 24 July 2026;
    b. It was confirmed that the validity attacks relied on by PBNT are the following:
        i. Lack of novelty over WO98/10748 (" **WO748")**;
        ii. Lack of novelty over WO 2011/005799 A2 ("**WO799")**;
        iii. Lack of inventive step over WO748 (combined with CGK) ;
        iv. Lack of inventive step over WO 2005/120152 A2 ("**WO152**) (combined with CGK); and
        v. Lack of inventive step over Martinon et al., "*Induction of virus-specific cytotoxic T lymphocytes in vivo by liposome-entrapped mRNA*", Eur. J. Immunol. 1993, 23, 1719-1722 ("**Martinon")** (combined with CGK).
    c. It was confirmed that the ARs relied on by GSK are: AR1, AR2, AR10, AR13, AR16. AR25, AR27, AR31B, AR36 and AR40.

26. At the request of the Court, the parties provided summaries of their arguments on 15 July 2026.

27. Before the OH, the Court sent the following communication to the parties, referred to as the TQJ's questions.

> *It is our understanding that in an aqueous environment amphiphilic lipid molecules form bilayers spontaneously (provided that their concentration is sufficiently high), and that in vesicles containing an aqueous core surrounded by an amphiphilic lipid, said amphiphilic lipid molecules would (under appropriate conditions) form at least one bilayer.*
> *The court would like you to address (concisely, not exceeding five minutes for the whole set of questions and separately from addressing the concept of a liposome) the following:*
> - *Under which conditions would amphiphilic lipid molecules form monolayers?*
> - *Under which conditions would mixtures comprising amphiphilic and non-amphiphilic lipid molecules form bilayers or monolayers?*
> - *Would (dry) particles having a hydrophilic surface be surrounded by a monolayer or by a bilayer of amphiphilic lipid molecules?*
> - *Would the natural hydration layer (typically two or three monolayers of water molecules) surrounding an RNA molecule be sufficient to trigger the formation of a bilayer of amphiphilic lipid molecules?*
> - *Is there any evidence for bilayers forming a vesicle that are "discontinuous" in the sense that certain portions of the lipid surface are bilayers while others are monolayers?*
> - *Would these answers be the same for PEGylated lipid molecules?*

28. The OH took place on 3 September 2026. After the hearing, the presiding judge sent the following communication via the CMS on behalf of the panel:

> *The panel is contemplating to revoke the order of the JR regarding the admissibility of the stained/dyed Cryo-TEM images of the attack*[*ed*] *product in view of the arguments made and positions taken by the respective parties during the OH (R.335 RoP). Pursuant to R.337 RoP parties are herewith given the opportunity to comment ultimately on Monday 7 September 2026 (maximum 600 words).*

29. In response, GSK asked the Court to partially revoke the R.105.5 order (sub I) and admit the exhibits at issue (the New ATEM reports), whereas PBNT urged the Court not to do so.

30. By order of 11 September 2026, the panel revoked the R.105.5 order insofar as it rejected the New ATEM reports. It ordered GSK to re-submit exhibits BB156A-B and BB153B.22, accompanied by a concise explanation of no more than 600 words. PBNT was allowed to respond within one week of the re-submission, in no more than 900 words. GSK re-submitted the specified exhibits with a short submission on 16 September 2026. PBNT responded on 23 September 2026.

II. REMEDIES SOUGHT AND SUBMISSIONS

II.A – INFRINGEMENT ACTION

31. Asserting that PBNT infringe the patent with the Infringing Products, GSK, after amendments during the proceedings, requests that the Court:

1. Prohibit PBNT, each separately, from directly infringing claims 1, 2, 3, 6, 10, 12 and 13 of EP 626 in the EPC Member States in which the patent is valid with the exception of Ireland and the UK, provided that this injunction shall only become enforceable after a final decision on appeal by the UPC, if and in so far as PBNT have not entered into a licence agreement with GSK within three months following such final decision, and GSK providing a notice under Rule 118.8 RoP.
2. in the alternative: prohibit PBNT – and in particular Pfizer Inc, Pfizer CV NL, Pfizer Manufacturing Belgium, Pfizer Luxembourg and BioNTech Marburg - each separately as intermediary or intermediaries to provide services to any third party (including Pfizer NL, Pfizer Export NL, Pfizer Service Belgium, Pfizer Belgium, Pfizer Germany, Pfizer Austria, Pfizer Denmark, Pfizer Finland, Pfizer France, Pfizer Italy, Pfizer Portugal, Pfizer Romania, Pfizer Sweden, Pfizer Czech Republic, Pfizer Greece, Pfizer Spain, Pfizer Croatia, Pfizer Poland, Pfizer Trading Poland, Pfizer Switzerland, Pfizer Norway, BioNTech SE, BioNTech EU and BioNTech Manufacturing Germany) that directly infringe claims 1, 2, 3, 6, 10, 12 and 13 of EP 626, such as Comirnaty and/or further versions thereof under the same conditions as set out above. This includes providing services to any third party for offering, placing on the market, using, importing or storing for the aforementioned purposes in the Contracting Member States in which the Patent is valid and where the Unified Patent Court has jurisdiction;
3. declare that PBNT, each separately and/or jointly, have directly infringed claims 1, 2, 3, 6, 10, 12 and 13 of EP 2 590 626 in the EPC Member States in which the Patent is valid;
4. order PBNT, each separately, to provide the representatives of GSK within 30 days after service of the judgment with the information specified in the SoC and enforceable upon notification to the Court by GSK pursuant to R.118.8 RoP;
5. order PBNT jointly and severally to comply with the orders subject to the same conditions of enforce-ability as the underlying orders to which the penalties relate, and to pay:

1) a recurring immediately payable penalty payment of EUR 250.000 for each separate instance of non-compliance, with each Infringing Product considered one instance; or
2) a recurring immediately payable penalty payment of EUR 5.000.000 per day of continuing non-compliance, with half days counted as full days;

or such other amount(s) as the Court considers reasonable;

6. order PBNT jointly and severally to pay to GSK damages resulting from the infringement, to be further assessed in separate proceedings under Rule 125 RoP, and to pay GSK an interim award of damages in the amount of EUR 2.000.000, expected to cover the expected costs of the procedure for the award of damages;
7. order PBNT jointly and severally to pay GSK's reasonable and proportionate costs and other expenses incurred in these proceedings.

32. In these proceedings, PBNT request the Court to dismiss the infringement action in its entirety and to order GSK to bear the costs of the proceedings incurred by PBNT. In the alternative, PBNT request that:
    - any injunction granted shall only become enforceable after the expiry of a six-month period following the final decision on appeal, unless both parties have confirmed to the Court within that period that a licence agreement has been concluded, and that during this period:
        (ii) Both parties shall use their best efforts in good faith to reach such agreement; and
        (ii) GSK shall make a fair and reasonable licence offer within 1 month after the final decision;

33. In these proceedings, PBNT request the Court to dismiss the infringement action in its entirety and to order GSK to bear the costs of the proceedings incurred by PBNT. In the alternative, PBNT request that:
    - any injunction granted shall only become enforceable after the expiry of a six-month period following the final decision on appeal, unless both parties have confirmed to the Court within that period that a licence agreement has been concluded, and that during this period:
        (ii) Both parties shall use their best efforts in good faith to reach such agreement; and
        (ii) GSK shall make a fair and reasonable licence offer within 1 month after the final decision;

    and
    - any order to provide information is conditional upon a confidentiality order against GSK to be effect that (i) the access to the information is restricted to GSK's outside counsels and two representatives of GSK who are named to PBNT in advance, and who cannot have marketing, financial, pricing or other business competitive decision-making and cannot play any role in an eventual licence agreement negotiation and should be bound by confidentiality restrictions, subject to a penalty; and (ii) the information may be used only for the purposes of calculating potential damage and compensation claims against PBNT and identifying other third parties involved in the supply or distribution of the accused products for the purpose of asserting claims for alleged patent infringement against them.
    - Any order to provide information shall grant PBNT a period of 90 days following the date of the final decision to comply with such order.

34. PBNT assert that their products do not fulfil all features of claim 1 or of the other claims dependent on or related to it. Specifically, they contend that the products do not contain a liposome according to claim 1 because they:
    - lack a lipid bilayer comprising a lipid with a pKa in the claimed range; and
    - do not meet the requirement of an aqueous core including RNA.

PBNT also argue that there can be no infringement because the patent is invalid. Their specific requests concerning the scope, terms and confidentiality of the relief sought are addressed in Section III.G on the legal consequences of the outcome.

II.B – PRELIMINARY OBJECTIONS

35. With preliminary objections filed on 8 September 2025, Pfizer and BioNTech objected against the jurisdiction and competence of the Court and the competence of the division indicated by GSK. They argued that jurisdiction on the basis of Article 4(1) Brussels I Regulation ((EU) No 1215/2012, in the following "BR") exists, if at all, only for defendants which are sued before their "home state court", i.e., the Local Division (LD) of the country in which they are domiciled. This leaves only defendants Pfizer CV NL, Pfizer Export NL and Pfizer NL. In the event that the Court is not inclined to follow this interpretation of the Article 4 BR jurisdiction in the context of the UPC, Pfizer submit that the interrelation between the Brussels I Regulation and the UPCA is far from acte clair, and request to make a preliminary reference to the CJEU pursuant to Article 21 UPCA.

36. PBNT is of the opinion that, whereas GSK relies on six potential anchor defendants ("spider(s) in the web") without further explanation: Pfizer CV NL, Pfizer Manufacturing Belgium, Pfizer Service Belgium, BioNTech SE, BioNTech Manufacturing Germany, and BioNTech Marburg, non-Dutch Defendants cannot serve as anchor defendants. They argue that only Pfizer CV NL can qualify as an anchor defendant. They assert, however, that Pfizer CV NL is primarily a holding company which is not involved in the financial supply chain and does not manufacture, purchase or sell Comirnaty products anywhere. As in their view GSK has not pleaded, in a sufficiently substantiated way, infringement by Dutch Defendants in non-UPC countries where co-defendants are domiciled, Pfizer request that the Court deny jurisdiction on the basis of Article 8(1) BR vis-a-vis Defendants domiciled outside of UPC territory (i.e., Pfizer Czech Republic, Pfizer Spain, Pfizer Hungary, Pfizer Poland, Pfizer Trading Poland, Pfizer Switzerland, and Pfizer Norway).

37. They argue that also with respect to the other potential anchor defendants GSK's pleadings are insufficient. At the very least, GSK has not specified which countries exactly each of them operates in. Jurisdiction based on Article 8 BR would require an anchor defendant that infringes in all countries where such co-defendants are active, and pleadings on such defendant are missing.

38. With respect to locally operating companies without activities in UPC territory, which is according to Pfizer the case for: Pfizer Switzerland, Pfizer Norway, Pfizer Czech Republic, Pfizer Spain, Pfizer Croatia, Pfizer Hungary, Pfizer Poland, and Pfizer Trading Poland, GSK's allegations relate only to their home countries. According to Pfizer, there is not a single specific allegation that the alleged acts are taking place outside the respective Defendant's country, even less evidence.

39. Pfizer points out that for Pfizer Greece, GSK has (only) provided evidence of activities in Malta, a UPC Contracting Member State. For Pfizer Inc., the Claimant has referred to the EC Purchase Agreement, which was entered into on behalf of Pfizer Inc. Pfizer and BioNTech accept, for the purposes of their preliminary objection that jurisdiction over them can be assumed on the basis

of Article 7(2) BR. While there is a sufficiently substantiated pleading that Pfizer Greece infringes the Patent in Malta, the jurisdiction for this Court vis-a-vis Pfizer Greece should be limited to Malta only. They argue that Article 34 UPCA cannot override the territorial limitations of Article 7(2) BR and extend the UPC's jurisdiction beyond what is provided for in the Brussels I Regulation.

40. During the oral hearing, PBNT confirmed that they no longer maintain the preliminary objection regarding the Defendants domiciled in the UPCA territory (apart from long-arm jurisdiction).

41. PBNT requests that the Court decide on jurisdiction as follows:
(1) ...
(2) ... (3) Jurisdiction for Pfizer Croatia exists on the basis of Article 71b(1) Brussels I Reg in conjunction with Article 8(1) Brussels I Reg and is limited to Croatia.
(4) Jurisdiction for Pfizer Inc exists on the basis of Article 71b(1) Brussels I Reg in conjunction with Article 7(2) Brussels I Reg and is limited to the UPC Contracting Member States.
(5) Jurisdiction for Pfizer Greece exists on the basis of Article 71b(1) Brussels I Reg in conjunction with Article 7(2) Brussels I Reg and is limited to Malta.
(6) Jurisdiction is declined for Pfizer Czech Republic, Pfizer Spain, Pfizer Hungary, Pfizer Poland, Pfizer Trading Poland, Pfizer Switzerland, and Pfizer Norway.

II.C – COUNTERCLAIM FOR REVOCATION

42. In their counterclaim action, PBNT argue inter alia that the patent is invalid and should be revoked in its entirety in the territory of all (UPC) Contracting Member States in which the patent is designated because of added matter, insufficiency, lack of novelty and lack of inventive step. Following the IC, PBNT focussed their case on the five most promising invalidity attacks, namely two novelty attacks and three inventive step-attacks, as set out in Section I.E above.

43. GSK disputes all invalidity attacks. It also filed an application to amend the patent, submitting 42 (forty-two) auxiliary requests (**AR**s). It limited the number of ARs to ten after the IC (see Section I.E above). GSK requests the Court to dismiss the counterclaim, in the alternative maintain the patent in amended form as far as deemed valid. It also requests that PBNT be ordered to pay GSK's reasonable and proportionate costs.

44. PBNT submit that none of the ARs can remedy the invalidity of the patent.

III. GROUNDS FOR THE DECISION

III.A –SUMMARY

45. GSK's ownership of the patent and standing to sue are not disputed. The Court rejects PBNT's preliminary objection insofar as it is maintained. In the counterclaim actions, the Court finds the patent valid except for claim 13. In the infringement action, it concludes that PBNT infringe the patent with their mRNA vaccines.
The reasons for the above are set out below in the following sections:

- Section III.B: jurisdiction and competence
- Sections III.C technical background and teaching of the patent
- Section III.D: claim construction
- Section III.E: validity
- Section III.F: infringement
- Section III.G: outcome of the proceedings and costs.

46. The Court notes upfront that in a case of this size, with continuously developing arguments in very lengthy submissions from both sides as well as extensive expert reports and other documents relied on, the parties' core arguments are addressed in this decision. It is not deemed necessary, if even possible, to address every single argument exhaustively. As set out by the CoA[4], the principle of the right to be heard according to Art. 76(2) UPCA, requires the Court to deal with the essential substance of a party's submissions and, insofar as they relate to a central issue in the proceedings in question, to address them in its reasoning. The right to be heard does not require the Court to expressly and exhaustively address each and every argument in detail in its decision.

III.B – JURISDICTION AND COMPETENCE

47. As mentioned above, on 8 September 2025 both Pfizer and BioNTech timely filed a preliminary objection (with identical text), which was referred to the main proceedings. Pursuant to Rule 19.1 (a) RoP, a Defendant may lodge a Preliminary objection concerning the jurisdiction and competence of the Court.

48. The preliminary objection is admissible as it was lodged in due form and within the time limit specified in Rule 19.1-3 RoP.

III.B.1 UPC-based Defendants

49. In the oral hearing PBNT confirmed that they no longer maintain the preliminary objection regarding the Defendants domiciled in UPCA territory. Defendants rightfully reacted to the further harmonization of UPC case law that the UPC is considered to be a court of a member state just like the national EU Member State courts (Art. 71a BR), with a territory of domicile encompassing all (UPC) Contracting Member States. Hence, it has (international) jurisdiction under Art. 4 Brussels I Regulation (in the following: "BR") for every Defendant, who is based (Art. 63(1) BR) or domiciled within any Contracting Member State of the UPCA (CoA, Order of 6 March 2025 – UPC_CoA_789/2025 and UPC_CoA_813/2025, GRUR-RS 2026, 3160 mn. 17 – Injunction order Dyson/Dreame; LD The Hague, Order of 6 February 2026, UPC_CFI_875/2025, mn. 4.2.2. – Abbott/MicroTech; confirming: LD Hamburg, Final Order of 7 April 2026 – UPC_CFI_2255/2026 – Dyson v Dreame II, mn. 44 ff). The (partial) withdrawal of the preliminary objection has the effect that it is to be treated as a submission to the jurisdiction and competence of the Court and the competence of the division chosen by the claimant according to R. 19.7 RoP.

50. In view of the above, Art 4 BR jurisdiction is assumed for the three Dutch Defendants, Pfizer Manufacturing Belgium, Pfizer Service Belgium, Pfizer Belgium, Pfizer Luxembourg, Pfizer

[4] Order of 15 July 2026, UPC_CoA_93/2026, Siemens v Hologic

Austria, Pfizer Denmark, Pfizer Finland, Pfizer France, Pfizer Germany, Pfizer Italy, Pfizer Portugal, Pfizer Romania, Pfizer Sweden, BioNTech SE, BioNTech EU, BioNTech Manufacturing Germany, and BioNTech Marburg.

51. As a clarification it is noted that jurisdiction established by domicile is in principal universal and not limited to acts of a defendant within the UPC territory (CoA, Order of 6 March 2025 – UPC_CoA_789/2025 and UPC_CoA_813/2025, mn. 12 – Referral order Dyson/Dreame). This means that the UPC is competent to hear the case against the twenty Defendants based in the UPCA territory mentioned above with respect to the alleged infringement of the patent in all EPC countries where the patent is valid and that are encompassed by Claimant's request. These countries are: Albania, Austria, Belgium, Bulgaria, Switzerland, Cyprus, Czech Republic, Germany, Denmark, Estonia, Spain, Finland, France, Greece, Croatia, Hungary, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Latvia, Monaco, North Macedonia, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Sweden, Slovenia, Slovakia, San Marino and Turkey. In short this means all member states of the European Patent Convention excluding Ireland and the United Kingdom (SoC, mn. 199 and fn. 93) (long-arm jurisdiction).

52. According to the Kodak/Fujifilm decision of the CoA, in this situation, which is where the Court has jurisdiction to decide on the alleged infringement and remedies requested by the patentee based on a non-UPC designation of a European patent (EP), and where the Defendant has – as a defence – asserted that the EP relied on is invalid, it follows from Art. 24(4) BR and Art. 22(4) Lugano Convention (in the following "Lugano") that the Court shall not decide the validity of such patents, but as decided in CJEU-BSH v Electrolux the Court does not lose jurisdiction to decide the infringement action based on such patents, where designations in the territories of Members States of the European Union (EU) and Signatories to the Lugano Convention are concerned (CoA, decision of 2 June 2026 – UPC_CoA_312/2025 pp., mn. 302 – Kodak v Fujifilm).

III. B.2 Non-UPCA-based Defendants

53. Pfizer maintained the preliminary objection with respect to the non-UPCA-based defendants Pfizer Czech Republic, Pfizer Spain, Pfizer Hungary, Pfizer Poland, Pfizer Trading Poland, Pfizer Switzerland, and Pfizer Norway in general, and with respect to Pfizer Inc., Pfizer Croatia, Pfizer Greece to the asserted long-arm-jurisdiction. All these entities, except Pfizer Inc, are based in the European Union or in signatory states of the Lugano Convention. This remaining preliminary objection is not successful as the UPC has jurisdiction based on Art. 8(1) BR, resp. Art. 6.1 Lugano (vis-à-vis Pfizer Norway and Switzerland). According to Art. 8 (1) BR (Art. 6.1 Lugano), a person domiciled in a Member State may also be sued where he/she is one of a number of Defendants, in the courts for the place where any one of them is domiciled, provided the claims are so closely connected that it is expedient to hear and determine them together to avoid the risk of irreconcilable judgments resulting from separate proceedings. Art. 71b (2) BR extends this provision for the UPC to persons not domiciled in an EU Member State.

54. While the Defendants are correct that jurisdiction according to Art. 7 sub (2) BR requires that the harmful event occurred or may occur in that BR Contracting Member State, this is not the case for Art. 8 BR. Jurisdiction based on Art. 7 sub (2) BR only refers to cases concerning damage occurring in the forum's territory, as this is the only link between the court seized and the

subject matter of the dispute (comp. CoA, Order of 13 March 2026 – UPC_CoA_922-925/2025 – Keeex/Adobe et al, mn. 44). Thus, international jurisdiction over non-UPCA-based Defendants regarding non-UPC national parts of the European patent can only be obtained by means of Art. 8 BR, as for Art. 8 BR it is not a requirement that the alleged collective infringement takes place within UPCA territory (LD The Hague, Order of 19 August 2025 – UPC_CFI_191/2025 and 192/2025 - Arbutus Biopharma v Moderna et al, mn. 22).

55. Art. 8 (1) BR states that a person domiciled in a Member State may also be sued where he/she is one of a number of Defendants, in the courts for the place where any one of them is domiciled, provided – as mentioned above – the claims are so closely connected that it is expedient to hear and determine them together to avoid the risk of irreconcilable judgments resulting from separate proceedings. Art. 8 (1) BR requires a close connection with a Defendant who is domiciled in the UPCA area and who is, thus, subject to the UPC's universal jurisdiction under Art. 4 BR (LD Hamburg, Order of 7 April 2026 – UPC_CFI_2255/2025 – Dyson v Dreame II, mn. 52). It requires that the respective claims are so closely connected that it is expedient to hear and determine them together to avoid the risk of irreconcilable judgments resulting from separate proceedings (CoA, Order of 6 March 2025 – UPC_CoA_789/2025 and UPC_CoA_813/2025, mn. 15 – Referral order Dyson/Dreame).

56. For the question at hand – the UPC's jurisdiction to decide on allegedly (the word "allegedly" might subsequently be omitted for brevity, it is however implied) infringing acts in other EPC-countries – the close connection has to be assessed based on infringing acts in these countries and not only in other EU-/UPCA-countries. According to the "Roche" decision of the CJEU, such a connection cannot simply be established by actions for infringement of the European patent with the same product brought against a company established in another Contracting State on the basis of acts allegedly committed there by that company (CJEU, 13. 7. 2006 – C-539/03, mn. 33 – Roche Nederland BV and others v Primus and Goldenberg). That means that the infringement of various national parts of a European patent by different infringers was considered not in itself sufficient to establish jurisdiction under Article 8 (1) BR even if the infringers belong to the same group and pursue a uniform business policy drawn up by the main Defendant. As a consequence, the establishment of jurisdiction under Art. 8 (1) BR requires a party domiciled in the UPC-territory (universal jurisdiction) that allegedly acted in the other EPC-countries in question as well. This is because it has been clarified that Art. 8(1) BR must be interpreted as meaning that a situation where two or more companies are each separately alleged to have committed an infringement of the same national part of a European patent by carrying out reserved actions with regard to the same product may give rise to "irreconcilable judgments" resulting from separate proceedings as referred to in that provision (CoA, Order of 6 March 2025 – UPC_CoA_789/2025 and UPC_CoA_813/2025, mn. 16 – Referral order Dyson/Dreame; see CJEU, decision of 12 July 2012, C-616/10 - Solvay v Honeywell, reg. Art. 6(1) of Regulation (EC) No 44/2001).

57. In the present case, GSK can successfully claim that at least Pfizer CV NL, BioNTech SE, BioNTech Manufacturing Germany, Pfizer Manufacturing Belgium and BioNTech Marburg may serve as the anchor defendants under Art. 8 (1) BR (resp. Art. 6(1) Lugano) for Pfizer Inc. and the Pfizer affiliates. For the purpose of establishing jurisdiction, it is sufficient that Claimant substantiated that Pfizer CV NL is the central (top-)entity for the Pfizer group's non-US activities, who together

with its subsidiaries, is responsible for the marketing of Comirnaty globally (outside of the US) including in all EPC Member States as it owns a large number of subsidiaries across numerous jurisdictions including Pfizer NL and Pfizer Export NL. As Pfizer Inc. on behalf of the Pfizer group had entered into a strategic partnership with the BioNTech group for the joint development and commercialization of the Infringing Products (Exhibit BBo04) and signed the APA and subsequent agreements with the EC on behalf of the group, it is sufficiently plausible that Pfizer Inc has a central and leading role in the manufacturing and commercial exploitation of the Infringing Products.

58. The same applies to BioNTech SE, which on behalf of the BioNTech group entered into the strategic cooperation with the Pfizer group for the joint development and global distribution of Comirnaty (Exhibit BB04). In its own Annual Financial Statement (Exhibit BB37, p. 35, 61, and 66), BioNTech SE referred to the *BioNTech Pfizer-Comirnaty franchise* on which basis their ["our"] COVID-19 vaccine is marketed, with Comirnaty revenues having stabilized "at a low single-digit billion figure", as convincingly submitted by GSK. The fact that the statements in the combined management report relate to both, the BioNTech Group and BioNTech SE, substantiate Claimant's assertion that BioNTech SE, BioNTech SE Manufacturing and BioNTech Marburg can in principle be held responsible for the manufacturing and marketing of Comirnaty stretching into all EPC countries and thus qualify as anchor defendants. In addition, BioNTech Manufacturing Germany is the MA holder for EMA countries, which it makes available to sub-holders in participating countries. BioNTech Malburg manufactures the mRNA for the Infringing Products, and either directly or indirectly supplies the RNA to other EPC-countries.

59. Contrary to PBNT's position, it is not decisive that Pfizer CV NL is a holding company. For one, Defendants themselves have conceded that Pfizer CV NL's annual report states that the company "engages in the business of manufacturing biopharmaceutical products". Second, whereas they argue that neither the annual report nor any other evidence relied on by GSK specify which products are covered, Claimant substantiated its assertion by pointing out that the annual profit of USD 11.4 billion realized by Pfizer CV NL is mainly due to Comirnaty (see Annual Report, Exhibit BBo5A-C, p. 52 and 53).

60. In addition, Pfizer CV NL declared itself jointly and severally liable for legal transactions of subsidiaries and affiliates within its corporate structure, including for Pfizer NL, Pfizer Export NL (Annual Report Exhibit BBo5A-C, p. 62-63; and Exhibit BB06), and Pharmacia International B.V., which owns 99,9997% of the shares of Pfizer Manufacturing Belgium, which in turn manufactures the Comirnaty vaccine in Belgium. Pfizer Manufacturing Belgium is responsible for the batch releases (Exhibit BBo9, p. 16, as is BioNTech Manufacturing Germany).

61. The above is sufficient to establish a close connection between the action against Pfizer CV NL with the actions against the remaining EU-based defendants and with Pfizer Switzerland and Pfizer Inc., as GSK made it plausible that Defendants jointly infringe the respective national parts of the bundle patent by the manufacture, marketing and distribution of the same attacked product together with Pfizer CV NL as the central orchestrator of the sales activities in Europe and EPC countries.

62. This close connection is not only supported by the fact that all defendants have a commercial relationship as they all belong to either the Pfizer or the BioNTech group, who all take part in

the manufacture or marketing of Comirnaty, with BioNTech Manufacturing Germany holding the European Marketing Authorisation (MA) for Comirnaty. As in the case at hand, market entry of the attacked embodiments on the basis of BioNTech Manufacturing Germany's MA is not in dispute, but has already happened, BioNTech Manufacturing Germany thus inevitably contributes to the offering of the attacked embodiments on the market by making the MA available, further linking all actions against all defendants together. The same applies to BioNTech Marburg as manufacturer of the active ingredient of the Infringing Products, the mRNA. Hearing the cases together helps avoiding irreconcilable judgements concerning the different branches of the Pfizer and BioNTech groups manufacturing, advertising, offering or distributing the same attacked embodiments in different EPC countries.

63. For Pfizer Norway and Pfizer Switzerland the same follows from the application of Art. 6(1) Lugano. Also here, the claims against these Defendants are closely connected with the claims against Pfizer CV NL et al as well as the manufacturing entities In addition to the points laid out above, GSK has substantiated its claims that Pfizer Norway not only offers and places on the market the Infringing Products and imports and stores the Infringing Products for these purposes within and to Norway, but that Pfizer Norway also purchases the Infringing Products from "Other countries" and other Pfizer entities, such as Pfizer Italy or Pfizer Denmark (Exhibit BB36, p. 13 and 20). With regard to Pfizer Switzerland, GSK asserted that it offers and places on the market the Infringing products and imports and stores the Infringing Products in all EPC Member States including in Switzerland (and has done so).

III.B.3 Jurisdiction for other national parts of the EP (long arm jurisdiction)

64. As far as Defendants object to international jurisdiction extending to other EPC countries where the patent is valid, for those defendants for which jurisdiction is not based on Art. 4 BR (that is for the non-UPCA-based Defendants), the (preliminary) objection is not successful, either.

65. PBNT pointed out that GSK has not made specific allegations that any of the Defendants perform infringing acts in these other EPC countries. However, as far as jurisdiction under Art. 4 BR (universal jurisdiction) is concerned, according to the case law of the CoA it is not necessary to examine the plausibility of any acts committed by a Defendant in that country for the purposes of establishing jurisdiction (CoA, Order of 6 March 2025 – UPC_CoA_789/2025 and UPC_CoA_813/2025 – Referral order Dyson/Dreame, mn. 12). Hence, the Court has jurisdiction for the national parts of the patent in these other EPC countries with respect to the UPCA-based Defendants based on Art. 4 BR. Art. 8 BR extends this jurisdiction over the other defendants as Pfizer CV NL, BioNTech SE, BioNTech Manufacturing Germany, Pfizer Manufacturing Belgium and BioNTech Marburg – sued in their universal jurisdiction – also in this regard serve as anchor for all Defendants.

III.B.4 Competence

66. Competence of the Local Division The Hague follows from Art. 33(1) lit. b) UPCA for the same reasons as stated above.

III.C –TECHNICAL BACKGROUND AND TEACHING OF THE PATENT

III. C.1 Technical background

67. The patent relates to *immunisation* with a *nucleic acid RNA* encoding an *immunogen* to trigger immunisation. For the delivery of the immunogen, a vehicle containing *lipids* (or a lipid) is used. For a better understanding, the technical background, in particular also the terminology in italics, is briefly explained in this section in a highly simplified way, based on the parties' submissions and the expert declarations. The scientific background described in this section constitutes common general knowledge that is not in dispute.[5] Insofar as the parties do not agree on what constitutes further common general knowledge at the priority, this is addressed in other sections of this decision (in particular also when addressing validity, inventive step).

68. The role of the immune system is to protect an organism by detecting and fighting harmful substances such as viruses, bacteria, fungi and parasites. It achieves this through an interconnected defense network consisting of organs such as the skin, tissues (for example mucous membranes) and cells (discussed below). Any organism that can cause disease in a host organism is called a **pathogen.**

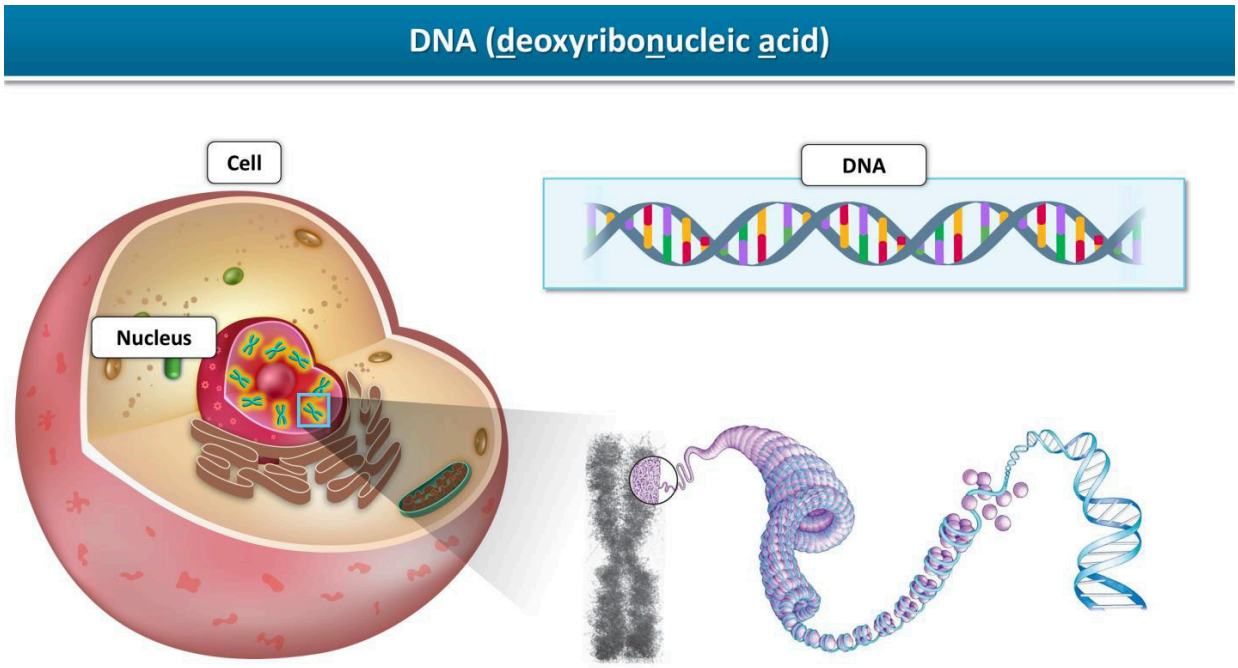
69. In vertebrates, including mammals, the immune system has two key subsystems:
    (i) the innate immune system, which forms the first line of defence against infection. It provides an immediate and non-specific response to pathogens. Inside some infected host cells, certain host cell proteins bind to and "recognize" foreign genetic material. Binding to pathogenic DNA or RNA triggers various rapid immune responses that act to slow the spread of infection. Specialized enzymes (a type of protein) called "nucleases" are found throughout the body, both inside and outside cells. "**DNAses**" are nucleases that break the deoxyribose phosphate backbone of DNA. "**RNases**" are nucleases that break the ribose phosphate backbone of RNA. Nucleases are always active in cells and play a role in the innate immune response.
    (ii) the adaptive immune system, which provides a slower but more targeted, antigen specific response against a particular pathogen. An **antigen** is a substance often found on the surface of pathogens that can be recognized by any component of the immune system. An antigen that triggers an antigen-specific immune response is known as an i**mmunogen**. After the immune response, antigen-specific cells persist in the body forming immunological memory (T and B cell memory). Later exposure to the same pathogen induces an antigen-**specific memory immune response** enabling the adaptive immune system to recognize and respond to the relevant antigens quickly.

70. **Immunization** is the process whereby a person is made immune or resistant to an infectious disease, typically by the administration of a vaccine. **A vaccine** is a biological preparation that improves immunity to the disease-causing pathogen without exposing a subject to the infection. To achieve this, the recipient of the vaccine must be exposed to a pathogen or antigens associated with it. Following (successful) vaccination, the adaptive immune response is triggered against the immunogen, starting the process which leads to the development of immunity. The person's immune system will generate memory cells, which allow the immune system to recognize the immunogen (and therefore the pathogen) again.

[5] Mostly derived from the Joint Technology Tutorial agreed by the parties in the US proceedings (exhibit BB91A).

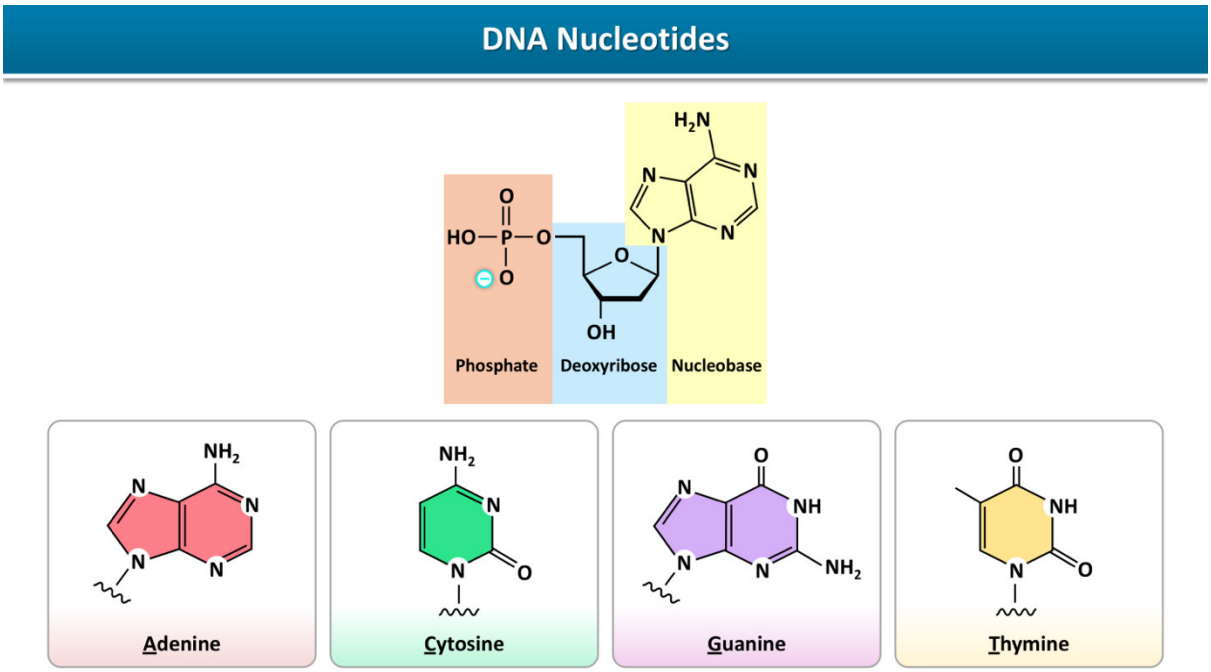
71. There are several types of vaccine. Historically, vaccines relied on delivery of (parts of) the immunogen or pathogen directly to the host, in an inactivated or attenuated form. The invention of the patent that is the subject of these proceedings, deals with a different way of immunization: the delivery of a ribonucleic acid ("**RNA**") encoding an immunogen. To understand how this works, the basics of gene expression are first provided.

72. Deoxyribonucleic acid, or **DNA**, is the hereditary genetic material in most organisms. Pictured below is a simplified portrayal of a cell, like those that make up the human body. DNA resides within the nucleus of cells and encodes the instructions necessary for proteins important for the development, functioning, growth, and reproduction of cells. As such it functions as a generational library in the cell.



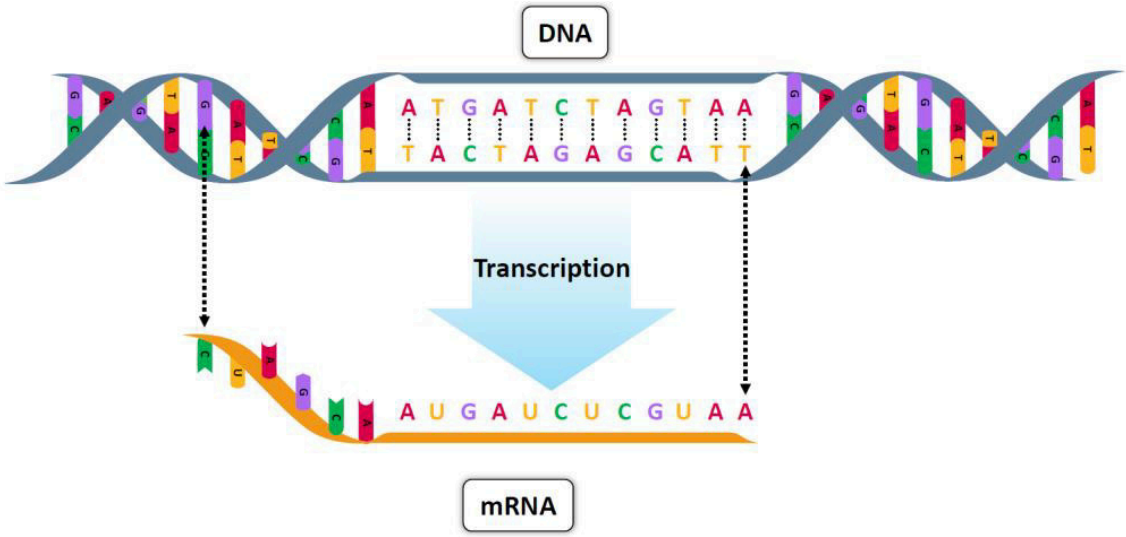
73. DNA is double-stranded; it is made up of two strands of repeating units called "**nucleotides**," each of which pairs with a complementary nucleotide in the other strand through "base pairs" – depicted here as the coloured units, like rungs of a ladder. The two strands wind around one another in a "double helix" structure. In the nucleus, cellular machinery "supercoils" DNA by winding it around proteins called histones, which further condense into "chromosomes".

74. DNA nucleotides consist of a "phosphate," a "deoxyribose" sugar, and a "nucleobase". There are 4 nucleobases in DNA: Adenine, abbreviated by the letter "A"; Cytosine, abbreviated by "C"; Guanine, abbreviated by "G"; or Thymine, abbreviated by "T". This is shown below.



75. The "backbone" of each DNA strand consists of alternating "phosphate" and "deoxyribose" units. The nucleobases project inwards from the backbone. The two strands of DNA "pair" through "**hydrogen bonds**" that form between "complementary" nucleobases: Adenine bonds with Thymine; and Cytosine with Guanine. Each phosphate is "anionic" – meaning it has a negative charge. These charges contribute to the solubility of these molecules in the aqueous environment of cells.

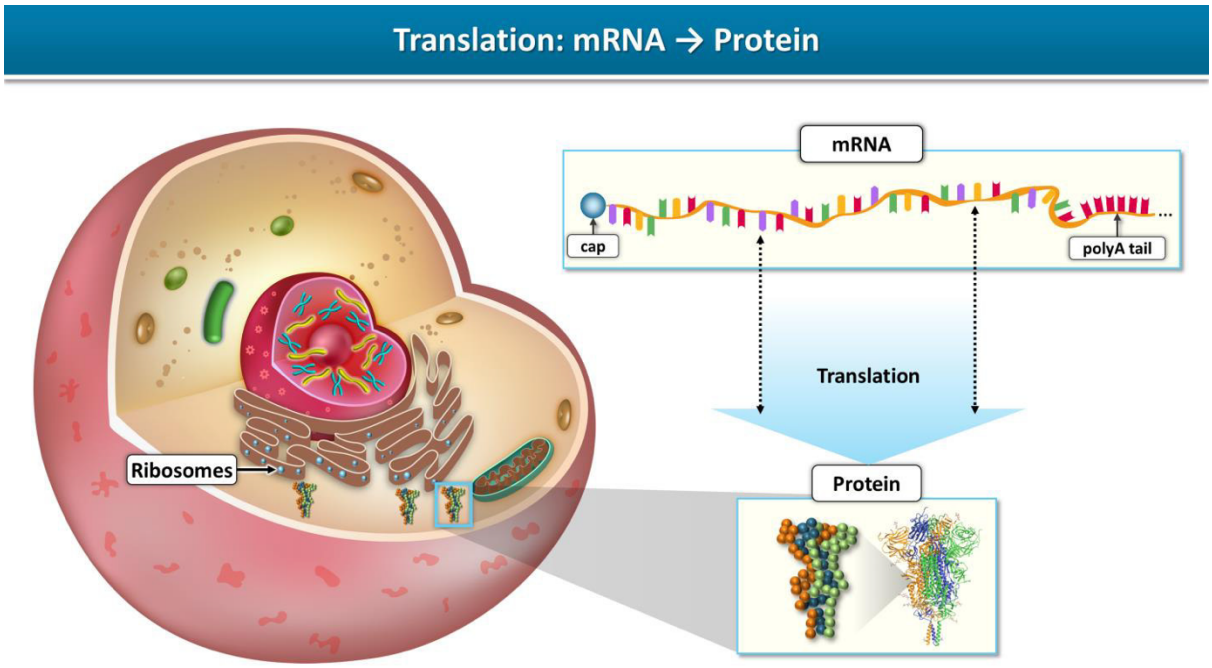
76. Protein production in cells occurs through the sequential processes called "transcription" and "translation." **Transcription** occurs in the nucleus. During transcription, "RNA polymerase" enzymes "read" "template" sequences in DNA to produce complementary sequences of "**messenger ribonucleic acid**" or "**mRNA**" molecules. The molecules in the picture below are not drawn to scale – in reality, mRNA molecules are substantially smaller than DNA chromosomes.



77. Like the DNA template sequences encoding" them, mRNA is composed of a sequence of nucleotides. mRNA nucleotides differ from DNA nucleotides in the presence of "ribose" instead of deoxyribose in the backbone and "uracil" in place of the thymine nucleobase. Like

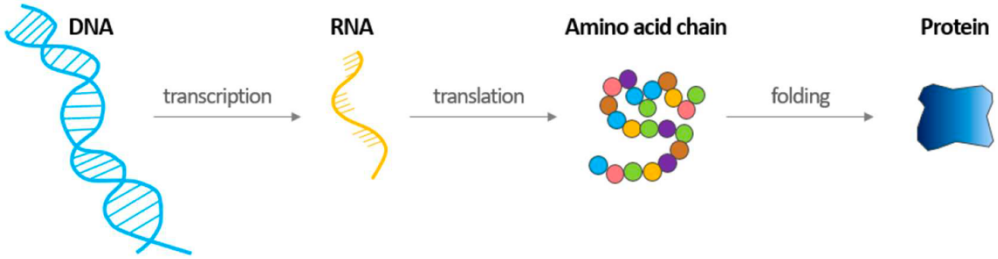
thymine in DNA, uracil in mRNA forms complementary hydrogen bonds with adenine in the DNA template strand during transcription. Unlike DNA, mRNA is generally **single-stranded.**

78. After mRNA is transcribed by "RNA polymerase," other enzymes add a chemical "cap" at one end and a "polyA tail" of repeating adenosine phosphate nucleotides at the other. Both additions protect mRNA molecules from degradation by other enzymes in the cell and facilitate translation of the encoded protein. mRNA then exits the nucleus. In the **cytoplasm** (the environment in the cell but outside the nucleus) enzymes called "ribosomes" "read" the mRNA template to assemble the encoded protein from units called "amino acids." This process is called "translation".



79. **Proteins** serve a variety of functions essential to the proper functioning of every biological system. The human genome encodes for tens of thousands of different proteins. Proteins are composed of amino acid; they form a chain of amino acids. As the amino acid chain exits the ribosome, it folds into a three-dimensional shape or "conformation" specific to that protein that contributes to its function in the body.

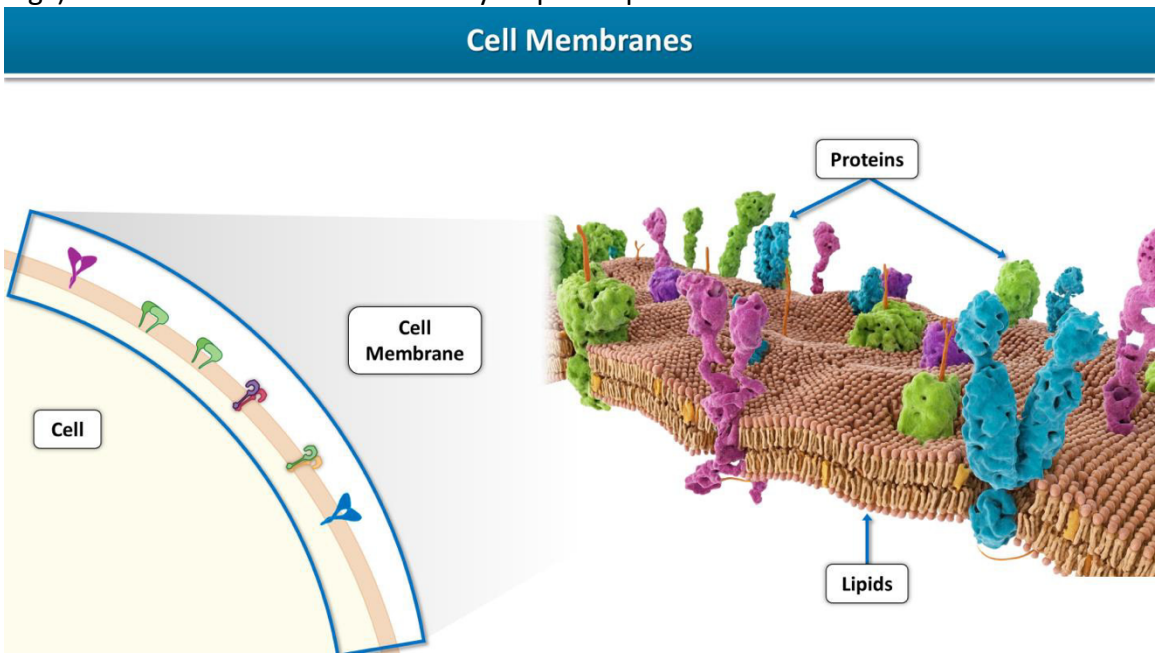
80. The process from DNA to protein is captured in the picture below:



81. When nucleic acids (NAs) as DNA or RNA are used in vaccines, instead of proteins, they make use of the process described above. In the case of **DNA vaccines**, DNA sequences encoding a pathogen protein are used. With these vaccines, the cell reads instructions encoded by the DNA to make the protein that elicits the immune response. In the case of RNA vaccines, RNA sequences encoding a pathogen protein are used. Following administration and entry into host cells, the cell's machinery reads the instructions encoded by the RNA to make the protein that

elicits the immune response. In RNA vaccines, the RNA can be either self-replicating or non-self-replicating RNA. Self-replicating RNA encodes for its own replication machinery.

82. Cell membranes present a barrier to entry by nucleic acids, such as DNA and RNA. Nucleic acids are negatively charged due to the phosphate backbone and are therefore water soluble—or "**hydrophilic**." ("water-loving"). The cell membrane is comprised of a **lipid bilayer,** from which membrane proteins project. The internal section of the bilayer is "**hydrophobic**" ("water-averting") – it excludes water and other hydrophilic species like DNA and RNA.



83. Two of the major lipid components in cell membranes are phospholipids and cholesterol. Phospholipids have a hydrophilic head comprising the negatively charged phosphate and long hydrophobic tails. Compounds that have a hydrophilic region and a hydrophobic region are called "amphiphilic." Amphiphilic lipids, such as phospholipids, are capable of forming bilayers in water under certain conditions. In cell membranes, the hydrophilic head positions at the inner and outer surfaces of the membrane and interfaces with the aqueous environment of the body. The hydrophobic tails form the inner portion of the membrane that excludes water. Cholesterol is nearly entirely hydrophobic and is found inside the lipid bilayer.

84. The patent describes and claims **a liposome,** which is used as a delivery vehicle for RNA carrying an immunogen to the cell. Liposomes also have one or more so called lipid bilayers. In such bilayers, the **amphiphilic** lipids (containing both hydrophilic and hydrophobic parts) assemble according to their chemical nature into hydrophobic and hydrophilic phases. When mixed with water, the hydrophilic section, referred to as the hydrophilic head, of the lipid is directed towards the water, whereas the hydrophobic section, referred to as the hydrophobic tail, is directed towards one another avoiding contact with water. Thus, a bilayer is formed which can be illustrated as follows (picture copied from the SoD, para 3.25):

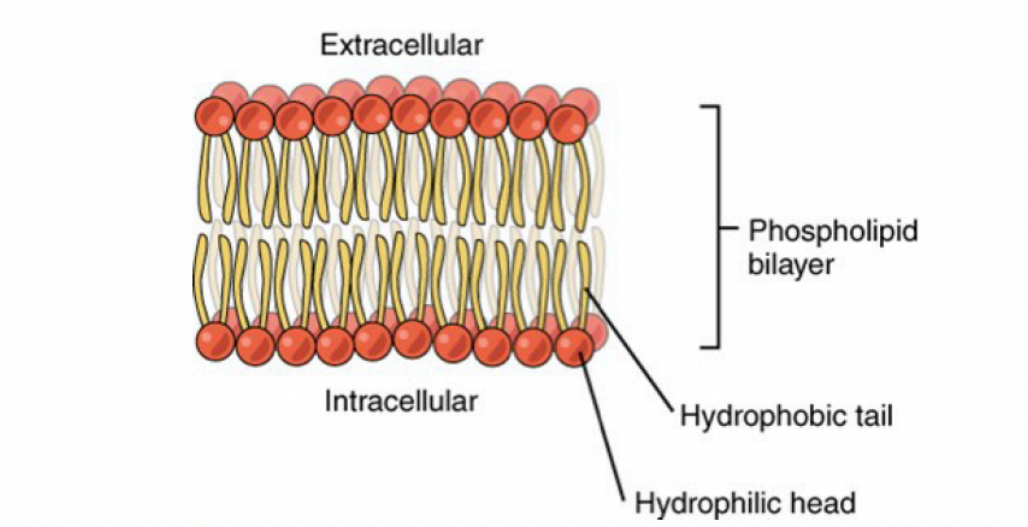


Figure 3: schematic representation of a lipid bilayer[1]

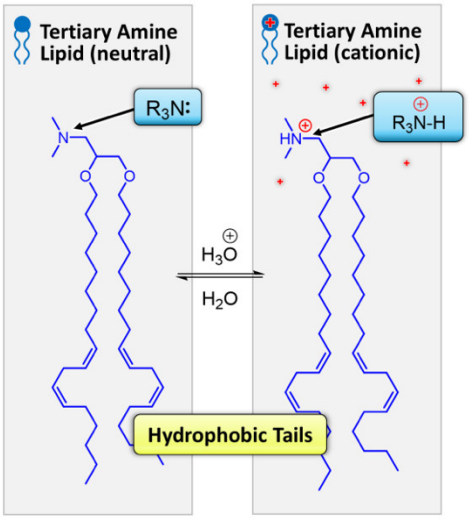
85. One type of lipid that was used to formulate the liposomes is a tertiary amine lipid. In water, the tertiary amine group can be either neutral or positively charged – "cationic".

Liposomes Containing Tertiary Amine Lipids

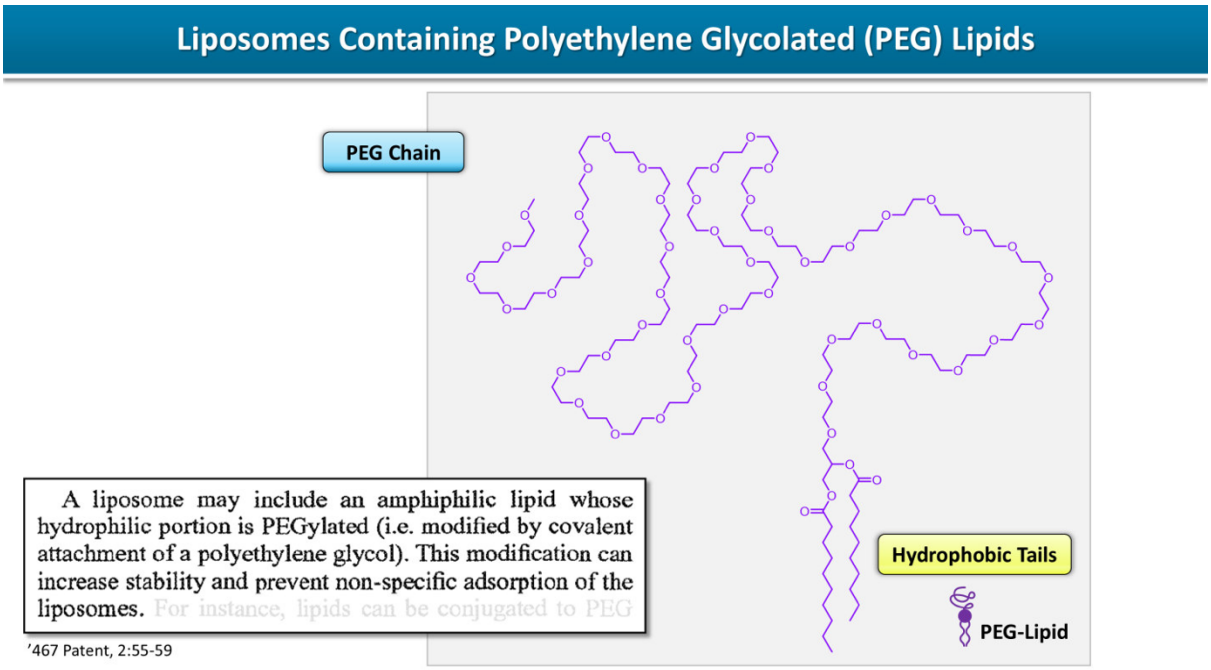
> Liposomes of the invention can be formed from a single lipid or from a mixture of lipids, provided that at least one of the lipids has a pKa in the range of 5.0 to 7.6 (and, preferably, a tertiary amine). Within this pKa range, preferred lipids have a pKa of 5.5 to 6.7 e.g. between 5.6 and 6.8, between 5.6 and 6.3, between 5.6 and 6.0, between 5.5 and 6.2, or between 5.7 and 5.9. The pKa is the pH at which 50% of the lipids are charged, lying halfway between the point where the lipids are completely charged and the point where the lipids are completely uncharged. It can be mea-

'467 Patent, 2:27-36





86. Another type of lipid that was used to formulate the liposomes is a "PEG-lipid".



87. According to the patent, the method for making liposomes described results in encapsulation and protection of the RNA molecules within a liposome suitable for in vivo delivery to a vertebrate cell and immunization against various diseases.

III.C.2 The patent and teaching

88. The patent is in the field of immunisation, as mentioned above. The invention of the patent is concerned with non-viral delivery of RNA for immunisation ([0001]). It teaches that improved delivery to a cell in vivo of an RNA encoding an immunogen can be attained by the use of a liposome with the characteristics of claim 1 which encapsulates an RNA.

89. As largely agreed by the parties, the skilled person in this case is a team with expertise in developing and producing nucleic-acid-based vaccines and in formulating nucleic acids. These skills may be represented by an immunologist experienced in vaccines and a medicinal chemist or biochemist. The patent is described from the perspective of that skilled person.

90. The invention teaches that the delivery vehicle of the inventions allows for in vivo delivery of RNA to a vertebrate cell. Encapsulation in the liposome protects RNA from damaging external chemicals (acids and bases) and enzymatic (e.g. RNases) influences [0009]. The skilled person would be aware of the problem of instability of RNA from the prior art; this problem is solved with the invention by encapsulating the RNA.

91. In addition to protection, the liposomes of the invention are shown to be capable of intracellular delivery of the RNA. Data are provided in the patent demonstrating in vivo expression of the immunogen for which the encapsulated mRNA encodes and an immune response to the immunogen is shown (both humoral and cellular).

92. EP626 teaches, in para. [0011], that the lipid bilayer encapsulation the RNA, can be made of one or several (amphiphilic) lipids, provided that at least one of the lipids has a pKa in the range of 5.0 to 6.8. The pKa is the pH at which 50% of the lipids are charged, lying halfway between the point where the lipids are completely charged and the point where the lipids are

completely uncharged. The pKa can be measured in different ways but preferably using the method disclosed in [0113] of the patent, which method is also incorporated in claim 1.

93. From the fact that only the lipid with the specified pKa value is mentioned as indispensable in [0011], as well as the fact that only such lipid is claimed, the skilled person will understand that the invention lies in the presence of a lipid with these characteristics.

94. The liposomes of all embodiments described in the patent are not made of this 'essential' lipid only, but of four different lipids. This follows from paragraphs [0090] and [0116]:

[0090] RNA was encapsulated in liposomes made by the method of references 11 and 42. The liposomes were made of 10% DSPC (zwitterionic), 40% DLinDMA (cationic), 48% cholesterol and 2% PEG-conjugated DMG (2kDa PEG). These proportions refer to the % moles in the total liposome.

[0116] The liposomes formed above using DlinDMA are referred to hereafter as the "RV01" series. The DlinDMA was replaced with various cationic lipids in series "RV02" to "RV12" as described below. Two different types of each liposome were formed, using 2% PEG2000-DMG with either (01) 40% of the cationic lipid, 10% DSPC, and 48% cholesterol, or (02) 60% of the cationic lipid and 38% cholesterol. Thus a comparison of the (01) and (02) liposomes shows the effect of the neutral zwitterionic lipid.

95. The four lipids forming the liposome's bilayer each represent a different type with distinct functional characteristics. The pKa value refers to the cationic (positively charged) lipid, which interacts electrostatically with the negatively charged RNA. The pKa is selected so that most molecules of this lipid are positively charged during liposome preparation using the method in [0013] of the patent, but neutral under physiological conditions in vivo. The lipid is therefore also called an ionisable lipid or ionisable cationic lipid.

96. EP626 does not mention a specific problem to be solved, except the general statement (in para. [0006]) that '*(t)here remains a need for further and improved nucleic acid vaccines'*. At the heart of the solution provided by the invention, however, are the claimed ionisable cationic lipids with a pKa in the range of 5.0 to 6.8 which are taught to be an indispensable part of the bilayer of the liposomes or the invention which encapsulate the mRNA encoding an immunogen (para. [0011]). The skilled person would have been aware that at the priority date one of the problems preventing medical use of liposomes for in vivo RNA delivery was the toxicity of the cationic lipid in vivo (cytotoxicity).[6]

97. The Court understands the teaching/objective problem to be '*to provide improved RNA vaccination, offering a combination of improved production, storage and stability, achieving a strong cellular and humoral immune response'*. This differs from the objective problem proposed by the parties which are not considered to be correct as explained hereafter at inventive step.

98. Claim 1 of EP 626 may be divided into features as follows:

1.1 A liposome for in vivo delivery of RNA to a vertebrate cell,
1.2 the liposome having a lipid bilayer encapsulating an aqueous core, wherein:
1.3 (i) the lipid bilayer comprises a lipid having a pKa in the range of 5.0 to 6.8 when measured as described in the section "pKa measurement" of the description; and
1.4 (ii) the aqueous core includes a RNA which encodes an immunogen.

[6] See inter alia MacLachlan 2007 (HL37), Semple 2001(HL44).

III.D– CLAIM CONSTRUCTION

99. The Court of Appeal of the UPC ("CoA") set out the following principles regarding interpretation of a patent claim according to Art. 69 EPC.[7] The patent claim is not only the starting point, but the decisive basis for determining the protective scope of a European patent. The interpretation of a patent claim does not depend solely on the strict, literal meaning of the wording used. Rather, the description and the drawings must always be used as explanatory aids for the interpretation of the patent claim and not only to resolve any ambiguities in the patent claim. However, this does not mean that the patent claim merely serves as a guideline and that its subject-matter also extends to what, after examination of the description and drawings, appears to be the subject-matter for which the patent proprietor seeks protection. The CoA also clarified (i) that the principles for interpreting a patent claim apply equally to the assessment of the infringement and to the validity of a European patent and (ii) that a patent must be interpreted from the point of view of the person skilled in the art (the "skilled person").

100. Furthermore, the CoA clarified[8] that the interpretation of a patent claim is a matter of law. Therefore, the Court cannot leave the judicial task of interpreting the patent claim to an expert, but has to construe the claim independently. It is true that the understanding of the person skilled in the art of the terms used in the patent claim in the context of the patent claim as a whole and considering the description and drawings, is the basis for claim construction. The skilled person is a notional person that cannot be equated with any real person in the technical field of the invention. The decisive factor is not the individual knowledge and abilities of a person, but rather the general specialist knowledge that is customary in the relevant field of technology, as well as the average knowledge, experience, and abilities in this specialist field. It is for the Court, not the expert(s), to assess these circumstances. On the other hand, if these circumstances concern facts that can be proven (for instance what qualifies as common general knowledge, as discussed below), the Court shall consider the expert opinions submitted by the parties with respect to such facts.

101. The parties disagree on the interpretation of certain features of claim 1 of the patent. These are, where relevant for the decision, discussed here, applying the principles set out above.

III.D.1 RNA — features 1.1 and 1.4

features *1.1 A liposome for in vivo delivery of **RNA** to a vertebrate cell, and*
*1.4 (…) **a RNA** which encodes an immunogen.*

102. The term 'RNA' is not limited to self-replicating RNA (sr-RNA); other types of RNA are not excluded. The passages of the patent reproduced below identify sr-RNA as the preferred option, not as a requirement, provided that the RNA is +-stranded:

[7] Order of the CoA in NanoString Technologies -v- 10x Genomics, UPC_CoA_335/2023, App_576355/2023 of 26 February 2024, as rectified by the order of 11 March 2024. See also G1/24, Enlarged Board of Appeal EPO.
[8] CoA order of 30 April 2025, Insulet v EOFlow, UPC_CoA_768/2024

[0024] The RNA is +-stranded, and so it can be translated by the non-immune cells without needing any intervening replication steps such as reverse transcription. It can also bind to TLR7 receptors expressed by immune cells, thereby initiating an adjuvant effect.

[0025] Preferred +-stranded RNAs are self-replicating. A self-replicating RNA molecule (replicon) can, when delivered to a vertebrate cell even without any proteins, lead to the production of multiple daughter RNAs by transcription from itself (via an antisense copy which it generates from itself). A self-replicating RNA molecule is thus typically a +-strand molecule which can be directly translated after delivery to a cell, and this translation provides a RNA-dependent RNA polymerase which then produces both antisense and sense transcripts from the delivered RNA. Thus the delivered RNA leads to the production of multiple daughter RNAs. These daughter RNAs, as well as collinear subgenomic transcripts,

(...)

[0026] As shown below, a self-replicating activity is not required for a RNA to provide an adjuvant effect, although it can enhance post-transfection secretion of cytokines. The self-replicating activity is particularly useful for achieving high level expression of the immunogen by non-immune cells. It can also enhance apoptosis of the non-immune cells.

While it may be true that an inherent self-replicating ability of the RNA to be transported into the cell may be helpful to elicit a high level of expression of the immunogen and/or more quickly, and therefore may enhance its therapeutic effectiveness, it is not indicated anywhere in the patent that the invention is only effective when the RNA is self-replicating. In fact, the opposite is true. It is explicitly mentioned in para [0026] that the self-replicating activity is not required for RNA.

103. It is also disclosed in para. [0101] of EP626 that a difference in adjuvant effect against a co-delivered protein is not observed between sr-RNA and non-replicating RNA[9]:

[0101] Results in Figure 18 show that F-specific IgG responses required encapsulation in the liposome rather than mere co-delivery (compare groups C & D). A comparison of groups K, L and M shows that the RNA provided an adjuvant effect against co-delivered protein, and this effect was seen with both replicating and non-replicating RNA.

104. From a technical point of view, the skilled person would see no reason to understand the claimed RNA of the invention to be limited to sr-RNA. The invention relates to a liposome that encapsulates RNA. RNA molecules carry negative charges localised on the phosphate groups. That applies to all types of (single-stranded) RNA as all types share the same physical and chemical properties. Cationic lipids (which are positively charged) are always part of the lipid-mixture forming liposomes to couple with/encapsulate the RNA. These positively charged lipids were known to be toxic in vivo at the priority date because they disrupt the lipid bilayer of cell membranes, thus preventing use in vivo. The claimed invention provides a solution thereto. This solution is applicable to all types of RNA with the chemical and physical properties described.

105. The skilled person thus understands the patent to disclose a general liposome vehicle for formulating and delivering RNA encoding an immunogen into cells. It would understand that the replicons of the examples are RNA molecules that have additional coding RNA that provides them with the capability of directing their own self-replication. This is however optional. There is no reason to expect that liposome-delivered mRNA would not be delivered into and translated in the cell. As mentioned, possibly more (liposomes with) non-self-replicating RNA [or a longer period] might be necessary for the same level of expression to be achieved, but this does not alter the gist of the invention which is aimed at the delivery vehicle of such RNA.

106. RNA in claim 1 when construed correctly is therefore understood to refer to any RNA encoding an immunogen, including mRNA, as long as the RNA is +-stranded. From the latter,

[9] In this context non replicating RNA refers to sr-RNA which has been mutated such as to knock out the self-replication function (see section [0100]).

the skilled person derives that siRNA, a class of double-stranded, non-coding RNA molecules, is not included.

III.D.2 Liposome, encapsulation and aqueous core — features 1.1, 1.2 and 1.4

features *1.1* ***A liposome*** *for in vivo delivery of RNA to a vertebrate cell, and*
1.2 ***the liposome having*** *a lipid bilayer* ***encapsulating an aqueous core*** *and*
1.4 the aqueous core includes a RNA which encodes an immunogen

107. The parties disagree on various issues regarding the interpretation of a 'liposome'. PBNT assert that a liposome differs from lipid nano particles (LNPs), as the latter, according to PBNT, do not contain an aqueous core. It is also in dispute whether the claimed liposome may contain several aqueous cores (GSK's position) or that the language of feature 1.2 should be understood to require the liposome of the invention to contain one single aqueous core (as PBNT contend). Furthermore, it is in dispute whether 'a lipid bilayer encapsulating an aqueous core' requires that the bilayer surrounds the exact and entire perimeter of an aqueous core, or whether it is merely required that the aqueous core (which includes a RNA, feature 1.4) is contained within the liposome having a lipid bilayer.

108. The term 'liposome' as such is not defined in the patent. It is rather described in terms of its functionality, some structural features and a method of synthesis. Some more general information on 'liposomal particles' is provided in [0016] of the patent:

> **[0016]** Liposomal particles are usually divided into three groups: multilamellar vesicles (MLV); small unilamellar vesicles (SUV); and large unilamellar vesicles (LUV). MLVs have multiple bilayers in each vesicle, forming several separate aqueous compartments. SUVs and LUVs have a single bilayer encapsulating an aqueous core; SUVs typically have a diameter ≤50nm, and LUVs have a diameter >50nm. Liposomal particles of the invention are ideally LUVs with a diameter in the range of 50-220nm. For a composition comprising a population of LUVs with different diameters: (i) at least 80% by number should have diameters in the range of 20-220nm, (ii) the average diameter (Zav, by intensity) of the population is ideally in the range of 40-200nm, and/or (iii) the diameters should have a polydispersity index <0.2. The liposome/RNA complexes of reference 1 are expected to have a diameter in the range of 600-800nm and to have a high polydispersity. The liposome can be substantially spherical.

109. Such different vesicles are illustrated in a textbook chapter by McLachlan published in 2007[10]:

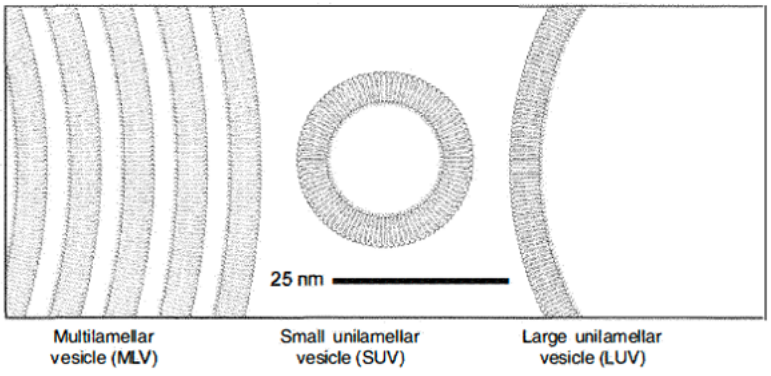


Figure 9.1 Liposomes. Mulilamellar vesicles (MLVs) are large (hundreds of nm in diameter) complex structures containing a series of concentric bilayers separated by narrow aqueous compartments. Large unilamellar vesicles (LUVs) are between 50 and 500 nm in diameter, while the smallest liposomes namely small unilamellar vesicles (SUVs) are <50 nm. LUVs are the preferred systems for delivery of NA drugs. Lipids are drawn roughly to scale.

[10] Exhibit **PBNT C24** - Ian MacLachlan, "Liposomal Formulations for Nucleic Acid Delivery" in Antisense Drug Technology, CRC Press, 2007, 2nd Edition

110. The patent description also includes the following in the chapter 'Disclosure of the Invention:

[0009] The invention utilises liposomes in which immunogen-encoding RNA is encapsulated. Thus the RNA is (as in a natural virus) separated from any external medium by the liposome's lipid bilayer, and encapsulation in this way has been found to protect RNA from RNase digestion. The liposomes can include some external RNA *(e.g.* on their surface), but at least half of the RNA (and ideally all of it) is encapsulated in the liposome's core. Encapsulation within liposomes is distinct from, for instance, the lipid/RNA complexes disclosed in reference 1.

[0010] Various amphiphilic lipids can form bilayers in an aqueous environment to encapsulate a RNA-containing aqueous core as a liposome. These lipids can have an anionic, cationic or zwitterionic hydrophilic head group. Liposomes of the invention comprise a lipid having a pKa in the range of 5.0 to 6.8, and preferred lipids with a pKa in this range have a tertiary amine. For example, they may comprise 1,2-dilinoleyloxy-N,N-dimethyl-3-aminopropane (DLinDMA; pKa 5.8) and/or 1,2-dilinolenyloxy-N,N-dimethyl-3-aminopropane (DLenDMA). Another suitable lipid having a tertiary amine is 1,2-dioleyloxy-N,Ndimethyl-3-aminopropane (DODMA). See Figure 3 & ref. 2. Some of the amino acid lipids of reference 3 may also be used, as can certain of the amino lipids of reference 4. Further useful lipids with tertiary amines in their headgroups are disclosed in reference 5.

[0011] Liposomes of the invention can be formed from a single lipid or from a mixture of lipids, provided that at least one of the lipids has a pKa in the range of 5.0 to 6.8 (and, preferably, a tertiary amine). Within this pKa range, preferred

111. Regarding the preparation of the liposome of the invention, the description of EP626 discloses the following in the same chapter of the description:

[0017] Techniques for preparing suitable liposomes are well known in the art *e.g.* see references 8 to 10. One useful method is described in reference 11 and involves mixing (i) an ethanolic solution of the lipids (ii) an aqueous solution of the nucleic acid and (iii) buffer, followed by mixing, equilibration, dilution and purification. Preferred liposomes of the invention are obtainable by this mixing process.

Mixing process

[0018] Liposomes of the invention can be prepared by a process comprising steps of: (a) mixing RNA with a lipid at a pH which is below the lipid's pKa but is above 4.5; then (b) increasing the pH to be above the lipid's pKa.

[0019] Thus a cationic lipid is positively charged during liposome formation in step (a), but the pH change thereafter means that the majority (or all) of the positively charged groups become neutral. By avoiding a pH below 4.5 during step (a) the stability of the encapsulated RNA is improved.

(...)

[0022] RNA used in step (a) can be in aqueous solution, for mixing with an organic solution of the lipid *(e.g.* an ethanolic solution, as in ref. 11). The mixture can then be diluted to form liposomes, after which the pH can be increased in step (b).

112. In the chapter 'Modes for carrying out the invention' on p.14, under the header 'Liposomal encapsulation', the following is disclosed:

Liposomal encapsulation

[0090] RNA was encapsulated in liposomes made by the method of references 11 and 42. The liposomes were made of 10% DSPC (zwitterionic), 40% DLinDMA (cationic), 48% cholesterol and 2% PEG-conjugated DMG (2kDa PEG). These proportions refer to the % moles in the total liposome.

LNP

113. The skilled person seeking to understand the term 'liposome' of claim 1, thus learns that liposomal particles of the invention are ideally large unilamellar vesicles (LUVs) with a diameter in the range of 50-220 nm and that the liposomes can be substantially spherical. As this is only mentioned as a preferred option according to [0016], SUVs and MLVs are also possible. Such liposome primarily contains lipids that form a particle which size qualifies as 'nano' and can be referred to as a lipid nano particle (LNP). The inventor Geall also referred to particles of the invention as LNPs in Geall 2012 (see Section I.D above): '*Here we show that nonviral delivery of a 9-kb self-amplifying RNA encapsulated within an LNP substantially increased immunogenicity compared with delivery of unformulated RNA.*'

114. However, it was also clear to the skilled person that not all LNPs are a liposome of the invention. To qualify as such, the particle must meet the further claimed requirements,

including the presence of a lipid bilayer encapsulating an aqueous core. The difference between liposomes and lipid nanoparticles (LNPs) is therefore not that these are necessarily structurally different but that the liposomes of the invention are a specific subclass of LNPs. Thus, not all LNPs are liposomes but the liposomes of the invention are LNPs.[11] Also, at the priority date lipid/RNA complexes were known wherein the RNA was not encapsulated in a liposome, e.g. complexes disclosed in reference 1 (see [0009] of EP626, last sentence). These fall outside the scope of protection of claim 1.

SVF method and bilayer

115. Feature 1.2 requires that the liposome have a lipid bilayer encapsulating an aqueous core. The skilled person would firstly understand that the techniques described for preparing liposomes of the invention, especially the preferred technique of [0017] (this technique is often referred to as the '**ethanol-dilution method'** or the Spontaneous Vesicle Formation Method "**SVF-method**") of reference 11 ("**Jeffs 2005**", exhibit BB93), inevitably lead to the formation of lipid bilayers. Within these bilayers hydrophilic heads of each monolayer face the aqueous phases (external and within the liposome) and the hydrophobic tails face each other within the lipid bilayer, as discussed and illustrated at the technical background above (at III.C.1). In response to the TQJ's questions to that effect discussed at the oral hearing (see Section I.E above), parties did not argue otherwise.

Particle morphology

116. The liposome of the invention is not limited in structure and size, as long as it has a bilayer encapsulating an aqueous core. The scalable and extrusion free SVF method to prepare liposomes, first described by Jeffs 2005, enables the rapid and reproducible preparation of what is referred to by Jeffs as 'Stabilized Plasmid Lipid Particles' (SPLP). The skilled person would derive from Jeffs 2005, incorporated by reference in para [0114], that structure and size of the liposomes generated with the SVF-method can vary considerably. This is visualised in the Cryo-TEM images of figure 7 of Jeffs 2005 (p.368) reproduced below with the accompanying text.

[11] See also post-published Tenchov 2021 (Exhibit BB49).

The morphologies of liposomes prepared by SVF were analyzed by Cryo-TEM (Fig. 7). Cryo-TEM has been used extensively to study liposome morphology, including DNA-lipid complexes (24). As reported previously, SPLP prepared by detergent dialysis are predominantly unilamellar (Fig. 7B) (7). SPLP and vesicles prepared by SVF are morphologically distinct from the unilamellar vesicles prepared by detergent dialysis or by extrusion (23). SPLP prepared using SVF appear to have three distinct particle morphologies: unilamellar vesicles similar in appearance to SPLP prepared by detergent dialysis; as well as bilamellar or oligolamellar vesicles that are more abundant and smaller than the unilamellar

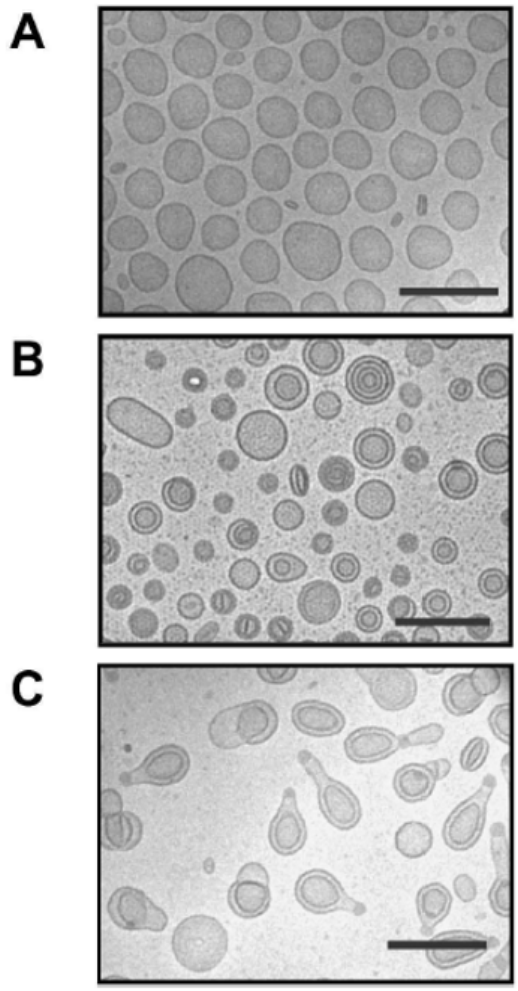


Fig. 7. Cryo transmission electron microscopy of SPLP. (A) SPLP prepared by detergent dialysis. (B) SPLP prepared by stepwise ethanol dilution. (C) Vesicles as in (B) but prepared without DNA. Scale bars = 200 nm.

vesicles; and small dense particles (Fig. 7B). These dense particles have a narrow size range and appear to possess membrane structures. The 15% DODMA vesicles prepared by SVF have a very uniform bilamellar morphology (Fig. 7C). Many of these vesicles also exhibit protrusions of the outer bilayers that were not observed when the vesicles were prepared in the presence of DNA. DNA appears to play an important role in determining the morphology of SPLP. It

117. The SPLPs obtained with the SVF method (shown in Fig 7B of Jeffs 2005) show different particle morphologies: unilamellar, bilamellar and oligolamellar vesicles can be distinguished as well as small dense particles. This in contrast to the liposomes (SPLPs) obtained with the method previously used (detergent dialysis or extrusion), resulting in more homogeneously shaped liposomes that are predominantly unilamellar (shown in Fig 7A). Fig C illustrates that

when vesicles are prepared (with the SVF method) in the absence of nucleic acid (in Jeffs 2005 DNA instead of RNA), the resulting liposomes have a uniform bilamellar morphology. From this it is concluded that DNA appears to play an important role in determining the morphology of the SPLP.

118. The skilled person therefore appreciates that the morphology of the liposomes of the invention, which are prepared with the SVF method, may vary. This is confirmed by [0016] of the patent, see the discussion above, including [0016] of the patent.

encapsulation

119. The skilled person would further understand 'encapsulating' to mean that the bilayer forms the outer boundary of the liposome.[12] As discussed above, one of the main functions of the encapsulation of RNA in a liposome is to protect the RNA from enzymatic RNase digestion. This function is described in para [0009] of EP626, cited above, where it is made clear that the RNA is 'separated from any external medium by the liposome's lipid bilayer'. Such encapsulation 'has been found to protect RNA from RNase digestion'.

120. The skilled person will therefore interpret the 'encapsulation' functionally, as requiring that the aqueous core, which includes RNA, is surrounded by the lipid bilayer as outer protective boundary. To perform its function, the bilayer must thus be substantially continuous and not leave a gap to prevent damaging amounts of most notably RNase from slipping into the core and damage the RNA. However, encapsulation of the (aqueous core including) RNA does not require that the lipid bilayer directly border the aqueous core containing RNA, or that the bilayer be continuous around the aqueous, as long as the bilayer performs the function of protecting the RNA is fulfilled and the bilayer encloses the aqueous core so as to protect it from RNase.

aqueous core

121. The interpretation of 'aqueous core' is also debated. While liposomes are often represented as a spherical particle comprising a single aqueous core, it is not in dispute that liposomes can have a structure which is more complex than this simple model system and can contain several aqueous compartments (as in multilamellar liposomes, see 109 above). The question is whether there is a difference between a compartment and a core. The term 'compartment' is mentioned only once in the patent description, in [0016] (cited above) in the context of MLVs that are explained to have multiple bilayers in each vesicle, '*forming several separate aqueous compartments*'. In the following sentence in [0016] SUVs and LUVs are said to have a single bilayer encapsulating an aqueous core. PBNT argue that a core is different from a compartment, and that the latter thus falls outside the scope of the claim.

122. The Court interprets this feature functionally. The claim requires 'the liposome having a lipid bilayer encapsulating an aqueous core', which core includes RNA. Any aqueous body within the liposome, whether referred to as compartment or core, can fulfil these requirements and can thus qualify as such. This interpretation is supported by the fact that multilamellar vesicles are mentioned in the patent as a type of liposome alongside the SUVs and LUVs without excluding them from protection. In view of the SVF method used, the skilled

[12] It was understood that the bilayer is not a rigid structure but rather dynamic as lipids move around in their respective monolayers.

person will also expect multilamellar vesicles encapsulating with several aqueous compartments are formed.

123. Another point of disagreement between the parties is how much water the aqueous core of a liposome of the invention must contain in order be 'aqueous'. The Court finds that this aqueous core must be more than the natural hydration layer (typically two or three monolayers of water molecules) that apparently always surrounds an RNA molecule (due to its charged and hydrophilic nature), irrespective of its environment (this water layer would not show up in electron microscopic images). That is to say: the aqueous core must actually contain additional water enough to dissolve the RNA, not just hydrate it. The skilled person would conclude this from the way of preparation of the particles as described in the patent, the ethanol-dilution method or SVF method mentioned above, see [0017], [0090]. The use of this method would inevitably result in the RNA being dissolved in the aqueous core since the water with dissolved RNA is "trapped" inside the lipid nano particle. The patent does not teach a way to prepare the liposomes of the invention in a way that does not include RNA dissolved in water.

III.D.3 pKa range and measurement — feature 1.3

Feature 1.3 - the lipid bilayer comprises a lipid ***having a pKa in the range of 5.0 to 6.8*** *when measured as described in the section "pKa measurement" of the description*

124. The wording 'the lipid bilayer comprises a lipid having a pKa' value has two consequences: the bilayer may also contain lipids without the specified pKa value, but the lipid with that value must itself be part of the bilayer.

125. In dispute is the interpretation of 'a pKa in the range of 5.0 to 6.8', whether this range should be interpreted strictly or should be understood to include measurement imprecisions.

126. RNA is anionic, i.e. negatively charged, and therefore interacts electrostatically with the ionisable cationic lipid in the liposome when this is indeed cationic/positively charged. Each ionisable lipid has its own pKa value, which corresponds to a pH. Below that pH, most lipid molecules are ionised and, more precisely, positively charged, allowing them to interact with the negatively charged RNA. At a pH above the pKa, fewer positively charged lipids are available, and the interaction is therefore less efficient.

127. PBNT's position that the upper and lower values of the pKa range are absolute cut-off values that do not allow for any flexibility, is dismissed. As mentioned before the claim should be read together with the description. The measurement method described in section 'pKa measurement' (para [0113]) of the description) therefore qualifies feature 1.3. In [0114] of the patent reference is made to 'reference 5' where 'this method' is also used:

[0114] This method gives a pKa of 5.8 for DLinDMA. The pKa values measured by this method for cationic lipids of reference 5 are included below.

Reference 5 of the patent is international patent application WO2011/076807 (Annex LF34 to Forrest's first declaration, BB90A).

128. GSK's expert Forrest confirms that WO2011/076807 (which shares a common inventor with the patent), details the same method to measure the pKa value as the patent. It is explained, in para. [00357] of WO2011/076807, that '(t)he pKa determined using this method is precise to about 0.2 pKa units.' Forrest explains this as follows:

> 5.22 (...) When viewed in connection with the limited number of buffers employed and the spacing between buffer pHs (from about 0.4 at the narrowest up to about 0.8 pH units), the Skilled Formulator would have understood that this assay was not designed to provide apparent pKa values with high precision but rather was intended to provide a relatively quick and rough measurement to guide selection of ionizable cationic lipids for use in the invention.
> 5.23 Consistent with this understanding, International PCT Patent Application No. WO 2011/076807 (Annex LF34), cited in the Patent (reference 5) (...)

129. The skilled person will thus understand that all pKa values measured with this method should be interpreted as being precise to about 0.2 pKa units. This is inherent to the use of the method.

130. PBNT's assertion that this reference in [0114] cannot be used to interpret feature 1.3 because it is not explicit enough and refers to an unrelated patent, is not to be followed, in view of the above. PBNT's arguments that the precision range would not apply here, because the method described in WO2011/076807 is not exactly the same, is dismissed as insufficiently substantiated. The fact that the pKa values in the patent are also reported to two decimals (e.g. 6.62; 5.85) does not change the conclusion above regarding the precision thereof.

131. The fact that each lipid has a fixed pKa value also does not contradict the above. Such fixed pKa value can only be measured with a certain (im)precision, resulting in the fact that a range around the exact number, will qualify. For the assay described in the patent, the skilled person will thus understand from reference 5, incorporated by reference, that the measurement is precise to only about 0.2 pKa units.

132. In a similar vein, PBNT's assertion that the claim does not contain language such as "about" to qualify the range limits, does not alter this finding. The skilled person will logically assume a certain measurement imprecision and will find in [0113] and [0114] what imprecision to expect.

III.E – VALIDITY OF THE CLAIMS AS GRANTED

133. PBNT submit that the patent does not validly claim priority over either of the two provisional applications relied on. They also raise two grounds of invalidity, as set out at 24.a above. It is argued that claims 1, 2, 3, 6, 10, 12 and 13 lack novelty over WO738 and over WO799. The second ground is lack of inventive step. The claims are asserted to lack an inventive step over WO748, over WO 152 and over Martinon. For each of these three lines of attack, PBNT rely on common general knowledge in addition to the technical teaching of the prior art document taken as the starting point.

III.E.1. Validity of the claimed priority

134. According to PBNT, the patent does not validly claim priority from either US provisional application US 61/361,830 (**P1** or **US830**) filed on 6 July 2010 or US provisional application US 61/378,837 (**P2** or **US837**) filed on 31 August 2010. According to PBNT, the claimed pKa range of 5.0 to 6.8 (feature 1.3) is not completely disclosed.

135. The pKa range claimed in claim 1 of EP626 is 5.0 – 6.8.

136. US830 discloses the pKa range 5.0 to 7.6. It also discloses a more preferred range: "*Within this pKa range, preferred lipids have a pKa of 5.5 to 6.7 e.g. between 5.6 and 6.0.*" A pKa value

of 6.8 is not explicitly disclosed in P1, but a range of 5.5-6.7 can be deduced. In P2 (US837), the pKa upper value range of 6.8 of the patent (as granted), is explicitly disclosed.

137. According to the EPO Guidelines Part H Chapter V-3.5, which are based on longstanding and consistent caselaw of the Boards of Appeal, *"[i]n the case of a disclosure of both a general and a preferred range, a combination of the preferred disclosed narrower range and one of the part-ranges lying within the disclosed overall range on either side of the narrower range can usually be derived from the original disclosure of the application".*

138. Applying these principles to the present case, the Court finds as follows. The patent may rely on P1 (US830) with date 6 July 2010 for the pKa range of 5.0-6.7 (so partially according to G1/15) and for the upper pKa limit of 6.8 on P2, US 837 (dated 31 August 2010).

II.E.2. Novelty

Legal framework

139. The UPC legal standard for novelty has been laid down in several decisions and aligns with the standard applied by the EPO. The assessment of novelty within the meaning of Art. 54(1) EPC requires the determination of the whole content of the prior publication. However, the content of a prior art document must not be treated as a reservoir from which features may be drawn to create a particular embodiment, but rather different passages in a document may only be combined if there is a clear and unmistakable teaching suggesting this. A feature may also be disclosed implicitly, but this requires that the skilled person would objectively consider such feature to be necessarily implied in the explicitly disclosed content, i.e. matter that is a clear and unambiguous consequence of what is explicitly mentioned, shall also be considered as part of its content. Knowledge that a skilled person only acquires as a result of further deliberation beyond this cannot be considered a direct and unambiguous disclosure. It is decisive whether the subject matter of the claim with all its features is directly and unambiguously disclosed in the prior art citation (see UPC_CoA_312/2025, UPC_CoA_333/2025, UPC_CoA_880/2025 UPC_CoA_882/2025, decision of 2 June 2026, Kodak/Fujifilm, UPC_CoA_182/2024, order of 25 September 2024, App 21143/2024, Mammut/Ortovox).

Novelty over WO748

140. The Court considers that the question whether a document is likely to have been known to a person skilled in the art is generally not relevant for the assessment of novelty, contrary to what GSK (its expert [redacted] [redacted] seems to assert (except in the case of an accidental disclosure in the sense of G1/03, which is not at issue here).

141. PBNT submit that all features of claim 1 of EP626 are disclosed in WO748. PBNT assert that claims 1, 4, 5 and 11 of WO748 read together with the description disclose all features of claim 1 of the patent. The claims of WO748 relied on by PBNT are copied below:

> 1. A composition comprising liposomes formed from liposome forming components and, entrapped within the liposomes, a polynucleotide operatively coding for an immunogenic polypeptide useful to induce a desired immune response in a human or animal subject.

4. A composition according to claim 1 in which the polynucleotide is RNA, preferably mRNA.

5. A composition according to any preceding claim in which the immunogenic polypeptide comprises an antigen or fragment of an antigen of an infectious microbe.

11. A composition according to claim 7 or claim 8 in which the cationic component is selected from DOTAP, BisHOP, DC-Chol and stearylamine.

PBNT further rely on the combination of various sentences and paragraphs spread over the description of WO748 to support the allegedly enabling disclosure they present.

142. The Court agrees with PBNT that for the assessment of novelty, the claims of a prior art patent or patent application form an integral part of its technical disclosure and must be read together with the description. This does however not mean that any combination of (features from) claims of a prior art patent necessarily forms a direct and unambiguous disclosure of the subject-matter of this combination, in particular if the combination implies a(n arbitrary) selection. When the combination is not unambiguously derivable for the skilled person, it is not an enabling disclosure that anticipates the patent at issue. What matters is whether the skilled person understands that such an assembly of (features from) claims is disclosed and reflects the technical teaching of the document (see EPO BoA T 1658/12).

143. While in claim 4 RNA is claimed combined with claim 1, the Court considers that the selection of an ionisable cationic lipid, which is encompassed in the list of claim 11, in combination with claims 1, 4 and 5, as suggested by PBNT, in this case amounts to unpermitted mosaicking. In any case, such combination is not clearly and unambiguously disclosed. Claim 11 provides four lipids, one of which (DC-Chol) has a pKa value of 6,76 (which value is not mentioned in WO748 and therefore can only be considered implicitly disclosed to the skilled person). This value lies within the range of feature 1.3. However, according to the description (WO748, p8 L2-25), the three other cationic lipids are labelled as the “preferred cationic lipids”; these are permanent non-ionisable cationic lipids. There is no specific reason to select DC-Chol from this list, which would be required to obtain an “embodiment” out of the reservoir formed by the alleged combination of claims 1, 4, 5 and 11. This is the more so as the pKa value plays no role in the operation of the liposomic vehicle disclosed in WO748. The combination of claims 1, 4, 5 and 11 with the combination of RNA and DL-Chol as cationic lipid) is not described in WO748 and it thus not clearly and unambiguously disclosed.

144. Furthermore, the usefulness of the object resulting from the combination of claims 1, 4, 5 and 11 for in vivo delivery of RNA to a vertebrate cell cannot be derived directly and unambiguously from this combination itself. Patent claims are often a generalization of a technical teaching; in the present case, the technical teaching of WO748 is about DNA, and claim 1 of WO748 pertains more generally to a “polynucleotide”: this is a generalization, not an embodiment.

145. There is no direct and unambiguous disclosure of claim 1 of the patent. In particular, PBNT has not demonstrated the existence of a specific embodiment which would fall within the scope of claim 1 of the patent. For these reasons, the Court considers that WO748 does not

contain a direct and unambiguous disclosure of the object of claim 1. The same was held by the TBA where WO748 was document E1.

Novelty over WO799

146. WO799 was published on 13 January 2011 and filed on 6 July 2010. It is undisputed that WO799 cannot validly claim priority of the earlier application US 61/223,347 filed on 06 July 2009 regarding the disclosure of the ionisable cationic lipid DLinDMA (on which PBNT rely). This is not disclosed in that priority document.

147. The patent may (partially) rely on P1 (US830) for the range of pKa 5.0-6.7 as decided above. While WO799 discloses DLinDMA (which has a pKa of 5.8, according to the table in [0131] of the patent), it is not intervening prior art in the sense of Art. 54.3 EPC for the range relevant here (pKa 5.0-6.7). Both the patent and WO799 can invoke as earliest relevant date 6 July 2010, which means that WO799 does not have a date prior to the (partial) priority date of the patent. As a consequence, WO799 cannot destroy novelty of claim 1 of EP '626.

III.E.3. Inventive step

148. For inventive step, as mentioned, PBNT rely on three prior art documents: WO 98/10748 ("WO748"), WO 2005/120152 A1 ("WO 152"), and a publication by Martinon (1993). Each of these prior art documents is combined with common general knowledge. These lines of attack extend to all auxiliary requests.

Legal framework

149. Pursuant to Art. 56 EPC, an invention shall be considered as involving an inventive step if, having regard to the state of the art, it is not obvious to a person skilled in the art. According to the case law of the CoA, the approach taken by the UPC when establishing inventive step is as follows.13

150. It first has to be established what the object of the invention is, i.e. the objective problem. This must be assessed from the perspective of the person skilled in the art, with their common general knowledge, as at the application or priority date (also referred to as the effective date) of the patent. This must be done by establishing what the invention adds to the state of the art, not by looking at the individual features of the claim, but by comparing the claim as a whole in the context of the specification and the drawings, thus also considering the inventive concept underlying the invention (the technical teaching), which must be based on the technical effect(s) that the person skilled in the art, on the basis of the application, understands is (are) achieved with the claimed invention.

151. Pursuant to Art. 56 EPC, an invention shall be considered as involving an inventive step if, having regard to the state of the art, it is not obvious to a person skilled in the art.

152. In order to avoid hindsight, the objective problem should not contain pointers to the claimed solution. The claimed solution is obvious when at the effective date the person skilled in the art, starting from a realistic starting point in the state of the art in the relevant field of

[13] CoA decisions of 25 November 2026 in UPC_CoA_464/2024, Meril v Edwards (headnotes 4 - 13, mn. 128–136) and UPC_CoA_528/2024, Amgen v Sanofi (headnotes 10 - 22, mn. 122 – 138).

technology and wishing to solve the objective problem, would (and not only "could") have arrived at the claimed solution.

153. The relevant field of technology is the specific field relevant to the objective problem to be solved as well as any field in which the same or similar problem arises and of which the person skilled in the art of the specific field must be expected to be aware.

154. A starting point is realistic if the teaching thereof would have been of interest to a person skilled in the art who, at the effective date, wishes to solve the objective problem. This may for instance be the case if the relevant piece of prior art already discloses several features similar to those relevant to the invention as claimed and/or addresses the same or a similar underlying problem as that of the claimed invention. There can be more than one realistic starting point, and the claimed invention must be inventive starting from each of them.

155. The person skilled in the art has no inventive skills and no imagination and requires a pointer or motivation that, starting from a realistic starting point, directs them to implement a next step in the direction of the claimed invention. As a general rule, a claimed solution must be considered not inventive/obvious when the person skilled in the art would take the next step, prompted by the pointer or as a matter of routine, and arrive at the claimed invention.

156. For an inventive step to be present, it is not necessary to show improvement of the technical teaching as defined by the patent claims over the prior art. Inventive step may also be found if the patent claims disclose a non-obvious alternative to solutions known in the prior art.

Common general knowledge

157. The parties disagree on the content of the skilled person's common general knowledge ("CGK"), on which their inventive-step arguments rely heavily. CGK may make a specific pointer towards a solution unnecessary where the skilled person would take the relevant step as a matter of routine on the basis of that general knowledge. The Court will thus assess the parties' position in this respect first.

158. The CGK is factual information. The burden of proof of whether certain facts are part of the CGK, is on the party who alleges the CGK.

PBNT's position on common general knowledge

159. PBNT consider that the following information, divided into three topics, was part of common general knowledge (SoD, § 8.257 and Rejoinder, § 5.136 to 5.158):

I. Choice of mRNA for vaccines

- The fact that mRNA therapy is an efficient and safe option, avoiding several deleterious side effects known for other vectors, as evidenced by a paper of Kariko from 2008 (PBNT C48), and having a high peak production of protein, as evidenced by a review paper from Pascolo (2008).
- The fact that a significant drawback of mRNA therapy, namely the unwanted immune response against in vitro synthetised mRNA, can be reduced by codon engineering, as evidenced by Kariko and Weisman (first paper in 2005).
- The use of self-replicating RNA to enhance expression capability, as evidenced by Dr Dubensky' expert declaration (PBNT C37, § 23).

- By 2010, DNA was no longer seen as the most promising candidate for vaccine technology, as evidenced by Pascolo (2004).

II. Need to encapsulate RNA

- The delivery of "naked" nucleic acids to target immune cells is challenging because of their negative charge inhibiting the passage across the cell membrane, and because of swift enzymatic degradation.
- Encapsulation in liposomes is one of five established methods of mRNA vaccination, as evidenced by Pascolo (2004 and 2008).

III. Choice of cationic lipids

- The fact that ionisable cationic lipids (such as DODMA, DLenDMA and in particular DLinDMA) were highly effective for use in formulations to deliver RNA or DNA to a vertebrate cell. This fact is reported in publications by Semple (« Rational design of cationic lipids for siRNA delivery », published online on 17 January 2010), and that this lipid "*has proven to be highly effective in SNALP, has been extensively tested in rodents and non-human primates, and is now being evaluated in human clinical trials*" (see Semple, p. 173, first column, second para.).
- The fact that DLinDMA is the best performing cationic lipid for encapsulating siRNA, as evidenced by a paper from Heyes published in 2005 (*« Cationic lipid saturation influences intracellular delivery of encapsulated nucleic acids »*).
- The fact that SNALP formulation with DLinDMA allows encapsulation of siRNA with high efficiency, as evidenced by a paper of Zimmermann published in 2008.
- The fact that DLinDMA enhances the delivery of bioactive agents contained in liposomes by increasing membrane fluidity, as evidenced by WO 2005/120152.
- The fact that lipid particles can deliver mRNA sequences that code for therapeutically useful polypeptides, as evidenced by WO 2010/042877 published on 15.04.2010.

GSK's position on common general knowledge

160. GSK (Reply, §729) summarizes their arguments regarding Common General Knowledge as follows:
    - mRNA was known to be unstable due to hydrolysis, including rapid degradation by enzymes (RNases) present both inside and outside the body. These challenges presented major practical issues for manufacture, storage and handling;
    - In part for this reason, mRNA was not considered a promising candidate for use as a vaccine. Research on mRNA was confined to a limited number of research groups; and
    - In contrast, DNA had been shown to be safe and was still seen as a promising candidate for vaccine technology with numerous clinical trials ongoing.

The concept of CGK – the Court's approach

161. According to established case law of the EPO's Boards of Appeal, CGK is knowledge that an experienced person in the field in question is expected to have, or at least to be aware of, to the extent that he/she knows it could be looked up in a book if needed. Such books are typically

basic handbooks, monographs, encyclopaedias, textbooks and reference books. A similar position was adopted by the UPC:[14]

> The 'CGK', in general, is information which has been commonly known to the skilled person from written sources or from practical experience in the relevant technical field. The 'CGK' includes knowledge which is directly available from familiar sources of information relating to the specific technical field at the prior date but is not to be confused with publicly available knowledge, which may not be general and common. A familiar source of information typically is a source to which a skilled person regularly turns for guidance on standard design solutions that are generally applicable, such as standard textbooks, encyclopaedias, manuals, handbooks, dictionaries and databases which the skilled person knows and can use as a suitable and reliable source for the respective information in the respective technical field. A familiar source of information should not be confused however with all publicly available prior art documents.

162. The Court considers that CGK is not primarily related to a specific document, but rather to specific knowledge. This specific knowledge is typically found in textbooks that introduce the field of technology in question. In this sense, it can happen that the whole content of a certain document (such as a first-year introductory textbook to biology or chemistry) can be considered CGK, but this is not necessarily the case for more specialised sources of information, where the relevant information that qualifies as CGK should be separated from the document in which it is contained. For information to qualify as CGK, it should be contained in more than one document. In very specialized areas, such as the topic at issue, the document may be a review article or a handbook, as put forward by PBNT. However, the issue is not whether the information asserted to be CGK is contained in a well-known and widely accepted document (textbook, review paper, handbook article). Science is primarily about facts, not about opinions. To determine the scope of CGK, the real issue is whether the relevant factual information is so elementary, convincing and consensual, that a person skilled in the relevant field, will necessarily know it, and that the relevant community of the skilled persons has accepted it as an established empirical fact.

163. The Court thus considers that for certain information contained in the prior art to qualify as CGK, it is not sufficient that the skilled person will turn to a 'familiar source of information' when it needs a piece of information which it does not know. In other words, the person who does not know this information (and who does not accept it as a well-assessed empirical fact) cannot be considered as a person skilled in the relevant art. This reasoning also applies if the conceptual, fictitious skilled person is a team, as is the case here. If this condition is not met, such review article or handbook chapter dealing with a piece of missing information could be taken into account as a prior art document for assessing inventive step, but not as a source of CGK. And anyway, if it is accepted that the skilled person would turn in any case to a given handbook chapter, this would then suppose that the information considered as part of CGK is presented in this handbook chapter as a convincing and consensual scientific fact. In this sense, a review article on a dynamic field of science, as was the case for the present filed at the priority date, will usually contain information having different degrees of maturity. If it is accepted that an authoritative review article can contain information that may be qualified as CGK, this is unlikely to be true for the whole content of the review article. In other words, a piece of information does not qualify as CGK for the sole reason that it is contained in a document which the person skilled in the art is likely to know.

[14] Orders of the CD Paris of 29 November 2024 (in Njoy v VMR Products), mn 38 and of 26 December 2024 (in Advanced Bionics v Med-EL), mn 52

164. As an example, PBNT rely on Semple and WO 2010/042877 for CGK, both published only a few months before the patent's priority date. Although the skilled person could undoubtedly have consulted them, that does not by itself establish that their content formed part of common general knowledge. At least some explanation is needed of how that content acquired CGK status within those few months.

165. The issue then is how to determine which information precisely qualifies as CGK in the present case.

Expert evidence

166. As mentioned, the burden of proof of what constitutes CGK is on the party who alleges the CGK. Both parties largely rely on various expert opinions to support their position on the CGK. Expert statements can help the Court to understand what qualified as CGK for a skilled at the priority date of the patent. However, the experts' qualification of certain information as CGK is not necessarily done from the point of view of the legal concept of the 'skilled person', not in the least because the experts tend to be over-specialised compared to the conceptual skilled person. In the present case, several of the experts (such as PBNTs' experts De Smet – PBNT C02 and PBNT C061 – and Dubensky – PBNT C037 – and GSK's expert [redacted] – BB92A and BB157) were working on specific sub-fields (liposome technology in the case of De Smet, vaccines against viral infections in the case of Dubensky and [redacted] Even taking into account that the skilled person in the present case was a team, this high specialisation may influence their view on what was the CGK. Furthermore, within a team the general technical knowledge is not necessarily the simple addition of the CGK of each of its members, especially when it comes to decision making on the orientation and structure of a research project. Moreover, the experts can be assumed to have initially been instructed by the attorneys. In any case, the expert statements submitted by the parties are highly contradictory regarding the definition of what qualifies as CGK and require scrutiny.

Historical evidence on mRNA vaccine research

167. The declaration of [redacted] has the merit not to limit itself to an opinion about what the CGK might have been at the priority date of the patent, but to attempt to support this opinion with facts asserted by an independent historic witness in a context that goes beyond one single document. He cites (in BB92A § 4.12) the following observation from professor Liljeström (made in Dolgin 2021 in Nature, BB104, see also 23 above) recalling the development of RNA-based vaccines:

> In the 1990s and for most of the 2000s, nearly every vaccine company that considered working on mRNA opted to invest its resources elsewhere. The conventional wisdom held that mRNA was too prone to degradation, and its production too expensive.

168. This is further supported by other parts of Dolgin 2021, which paper tells the story of mRNA vaccines, particularly the early attempts to create start-up companies in this field. It relates that the instability of mRNA (for which the patent provides a solution with the encapsulation of RNA by liposomes including an ionisable cationic lipid) was not the only technical problem which needed to be solved. Other problems included the inflammatory reactions to injected mRNA (which was eventually solved by codon-optimisation resulting in 'modified RNA' with certain modifications in the nucleotide uridine) and the toxicity of the cationic lipid in vivo (cytotoxicity, see 96 above). One of the first companies that started the work on mRNA-based pharmaceutical products was the – then start-up – BioNTech, in 2008. However, funding for research on mRNA-based pharmaceutical products, including vaccines, only took off in 2012

when the US Defense Advanced Research Projects Agency decided to start funding industry researchers to study RNA vaccines and drugs, as follows from Dolgin 2021.

169. The same tendency can be derived from data reported and discussed in the second declaration of [redacted] (BB157), as presented by GSK during the oral hearing. These data on research grants by another major US funding mechanism for scientific research, namely the US National Institute of Health (NIH), show that project funding for DNA vaccines between 2005 and 2012 was at least 4 M$ per year (more than 10 M$ per year for 2007, 2008 and 2009 with at least 17 projects per year), while funding for RNA vaccines started in 2009 with one single project for 0.17 M$. Furthermore, these data show that NIH funding of new projects on DNA vaccines peaked in 2007 (18 M$) and dropped below 3 M$ only in 2013, while funding of new projects on RNA vaccines with more than 1 M$ started only in 2015, dropping again below 0.1 M$ in 2018. NIH funding for RNA vaccines received a considerable boost when the first vaccines appeared on the market in 2020.

170. These data do not support PBNT's view on common general knowledge. They do not allow to draw the conclusion that prior to the priority date (July 2010), it was CGK that mRNA-vaccines were considered promising. The standard thereto requires the information to be elementary, convincing and consensual. While these criteria do not need to be met for obtaining public funding, which usually comes at an earlier stage, the fact that public funding to industrial projects from the agencies mentioned above did not start before 2012, that is well after the priority date, does certainly not support PBNT's representation of CGK in this respect.

171. PBNT's reference to the Kariko and Weissman papers (concerning modified RNA) is misleading in relation to common general knowledge. What is common general knowledge today (at least since the Nobel Price Lecture given by these two researchers) is that they had to lead and manage their research project against significant institutional resistance and reluctance of institutional funding institutions. One of the reasons for this is stated in their 2008 paper (see PNBT C048) which starts with the following sentences: *"In vitro–transcribed mRNAs encoding physiologically important proteins have considerable potential for therapeutic applications. However, in its present form, mRNA is unfeasible for clinical use because of its labile and immunogenic nature."* While this paper focuses on gene therapy, this does not support RNA technology having been CGK in 2010 for any pharmaceutical use, including vaccines, as asserted by PBNT.

172. The Court considers that PBNT also overstretch the concept of CGK at the priority date of the patent with respect to the assertions listed at 159.II (need to encapsulate) and III (choice of cationic lipid) above. For instance, PBNT rely on the review papers of Dr Pascolo (University of Tübingen). This author published review articles on the same field in 2004, 2006 and 2008. **Pascolo 2007**[15] is a review paper titled *« Plasmid DMA and Messenger RNA for Therapy »* published in a *« Handbook of Pharmaceutical Biotechnology »*. As such, this publication could have been consulted by a person skilled in the art to solve the problem. However, the Court is not convinced that Pascolo 2007 contains any information about the fact that packaging mRNA in liposomes would be a promising approach to deliver these molecules to the cytosol which would be so elementary, so convincing and so consensual that it could qualify as CGK, as PBNT assert. This review paper of 40 pages must be read as a whole. Liposomes cover a very limited

[15] Exhibit PBNT-C63 Pascolo "Plasmid DNA and Messenger RNA for therapy", Handbook of Pharmaceutical Biotechnology, pp. 971–1011, published online in August 2006 and in paper in 2007, also referred to as Pascolo 2006 in view if the online publication date.

space in this paper and are always discussed as one approach among others, none of which had yet been proven to be fully convincing. The short paragraph about liposomes on p. 981/982 is not particularly persuasive in the context of the whole paper and relies on only four bibliographic references. Another passage on page 972 refers only to Martinon's seminal paper from 1993 (**Martinon**[16]) and another paper, and states clearly that "*This technology has not yet been transferred to human clinical trial. Encapsulated pDNA, however, were shown earlier to be potent vaccine formulations."* Concerning preclinical studies for the use of mRNA for eliciting immune response in animal models, this is dealt with in a paragraph of ten lines (p. 993) alongside pDNA (plasmid DNA). Concerning mRNA, the author mentions only one bibliographic reference, which is his own review paper from 2004 (**Pascolo 2004**, HL20). As a rule, self-citations tend to be of little value to establish consensus over a scientific result.

173. If PBNT's argument that Pascolo (2007) reflects CGK on the effectiveness of liposome-encapsulated mRNA in eliciting an immune response in vertebrates were correct, this information would not only appear in other papers (which it has not before the priority date) but also necessarily reappear (and probably more clearly) in the same author's 2008 review paper, bearing a title even more specific than the 2007 paper: "*Vaccination with Messenger RNA (mRNA)*" (Pascolo 2008, PBNT C2.k and C37.d). While this paper states that "*The utilization of mRNA has several superlative advantages compared to pDNA",* it focuses on codon optimization of the mRNA. Codon optimization is a completely different issue; it represents another difficulty related to the industrial production of mRNA (a difficulty which may also have contributed to the delayed emergence of interest in the pharmaceutical use of RNA). Encapsulation into cationic liposomes is mentioned on p. 228/229 of Pascolo 2008 along with three other methods, namely direct injection of naked mRNA into the dermis, needleless delivery of gold particles coated with mRNA using a gene gun, and transfection of in vitro generated autologous antigen presenting cells that are readministered to patients. Pascolo 2008 states that only the injection of naked mRNA and re-administration of transfected monocyte-derived dendritic cells has been evaluated so far in humans through phase I/II trials.

174. The Court thus fails to see how the Pascolo review papers could be considered a basis for the alleged CGK that encapsulation of mRNA in liposomes would be a particularly promising approach for making vaccines. This conclusion is independent from the question whether the person skilled in the art would have read these papers.

175. PBNT further rely on MacLachlan's review article published in 2007 (**MacLachlan 2007**, PBNT C024) ("*Liposomal Formulations for Nucleic Acid Delivery",* which forms Chapter 9 of the handbook *"Antisense Drug Technology. Principles, Strategies, and Applications"*). Although it is assumed that also this paper as such w/could have been consulted by a person skilled the art, it does not evidence the CGK alleged by PBNT.

176. MacLachlan 2007 presents several methods for encapsulating nucleic acids (NA) using lipids. It also describes the measurement of particle size and the zeta potential,[17] as well as pharmacokinetics and toxicity of liposomal nucleic acid formulations using cationic lipids. The overwhelming majority of examples listed in table 9.1 of MacLachlan's paper is about

[16] Exhibit PBNT-C6 Martinon et al., "Induction of virus-specific cytotoxic T lymphocytes in vivo by liposome-entrapped mRNA", Eur. J. Immunol. 1993, 23, 1719-1722.

[17] The zeta potential is a physico-chemical parameter of [an LNP/liposome-RNA complex), which is relevant for any nanoscopic particle suspended in a liquid medium.

oligodeoxynucleotides (ODN) as a payload; ODNs are short DNA molecules synthesized for specific purposes like research or therapeutic applications. Section 9.5.5, titled *"The Efficacy of Liposomally Formulated NA[18] Drugs",* states that "*[c]urrently, the clinical experience with liposomal formulation of NA drugs is limited, requiring us to rely on preclinical results to gauge their promise"*. The paper then discusses in depth the methodological shortcomings of certain published studies and comes to a fairly optimistic conclusion: *"Together with efforts to develop chemically modified NA using optimal pharmacological properties, liposomal NA shows considerable promise in a number of applications. It is highly likely that as NA drugs continue to move from bench to bedside, liposomes will increasingly become a component of their success"*. This conclusion is, however, a rather conditional statement which contrasts with the rather modest results on efficacy of liposomally formulated NA drugs reported in earlier sections of the paper.

177. The Court is thus not convinced that information from MacLachlan 2007 that PBNT asserts to be CGK, is so elementary, so convincing and so consensual as to qualify as such. Furthermore, the Court is not convinced that SNALPs and the stepwise ethanol dilution technique formed part of the CGK of the skilled person defined above. The skilled person, in July 2010, was not a specialist in the field of liposomes. Rather, the Court would follow GSK's assertion of prior art, as summarized above at 160 which seems to be more in line with historic reality. As the choice of the cationic lipid is not needed for the assessment of inventive step below, PBNT's assertions of CGK regarding that topic need not be addressed here.

The objective problem

178. As discussed above, the patent is virtually silent on any problem to be solved, except the general statement (section [0006] of the patent) that *"[t]here remains a need for further and improved nucleic acid vaccines",* the technical field being defined as the *"non-viral delivery of RNA for immunisation"* (see section [0001] of the patent).

179. In the context of the UPC approach to inventive step, PBNT's position is that GSK's asserted technical effects are not credible across the full scope and should thus be disregarded. According to PBNT the objective problem is thus '*the provision of an alternative or at best improved liposomal delivery vehicle for immunogen-encoding RNA*'.

180. PBNT's proposal for the objective problem is not followed. The Court finds that the technical effect of the claimed invention of protection of RNA within the liposome, in vitro delivery of the liposome-encapsulated mRNA into the (cytosol of the) cell, subsequent translation of the RNA in the cell into the immunogen and resulting immunisation, is made sufficiently plausible in the patent. This for instance follows from figures 1 (RNase cannot reach the encapsulated RNA), figure 15 (expression of immunogen SEAP) and Figure 16 (detected anti-F titers). These effects can thus be taken into account. The inclusion of a liposome delivery vehicle into the objective problem, is a clear pointer to the solution, introducing unwanted hindsight.

181. GSK formulates the objective problem as providing an *"improved nucleic acid vaccination, offering (a combination of) improved handling, production, storage and stability, achieving a safe and strong cellular and humoral immune response"* (Reply, § 751).

182. The Court does not adopt GSK's proposed objective problem verbatim. The patent attributes improved vaccine stability to encapsulation in a liposome ([0096]), the subject-

[18] NA means Nucleic Acid.

matter of claim 1. The features of that claim are thus directly related to the solution. By contrast, the patent provides no teaching on vaccine handling or the safety of the immune response. Those aspects remain vague, add nothing to the state of the art and therefore cannot form part of the objective problem. The term 'nucleic acid' is also too broad, as the patent only concerns RNA.

183. The objective problem as identified by the Court in Section III.C.2 above, is *to provide improved RNA vaccination, offering a combination of improved production, storage and stability, achieving a strong cellular and humoral immune response*.

Assessment of inventive step – WO748

184. PBNT's first inventive-step attack starts from WO748, which is also relied on for novelty. They consider it a realistic starting point because it concerns cationic liposomes containing an entrapped polynucleotide encoding an antigen to elicit an immune response and addresses the same technical problem as the patent. PBNT propose two lines of attack: starting either from a liposome encapsulating RNA encoding an immunogen, or from a liposome comprising a lipid with a pKa in the range specified in feature 1.3 (SoD, § 8.229; Rejoinder, § 5.198).

185. According to GSK, WO748 is not a realistic starting point because this document deals mainly with permanently cationic lipids, for which the pKa value is irrelevant, and not with ionisable lipids. Furthermore, it does not contain any enabling example with RNA. And in any case, even if it was taken as a starting point, it does not provide any pointer towards the solution.

186. The Court sides with GSK and does not consider WO748 a realistic starting point for providing improved RNA vaccination. Even if taken into account, WO748 also does not contain any pointer that would lead the skilled person to use RNA rather than DNA. WO748 contains no example of RNA encoding an immunogen encapsulated in a liposome. The teaching of WO748 even seems limited to DNA. The skilled person understands this for instance from p6 L24: "*The polynucleotide may be RNA but is preferably DNA*") and from the described preparation method (dehydration – rehydration method) to incorporate plasmid DNA into liposomes (see p.15), which is preferred for DNA. PBNT seek to bridge the gap by treating the use of liposomes to entrap immunogen-encoding RNA for vaccination as common general knowledge. As explained above, the Court rejects that conception of CGK as too broad.

187. The Court also does not see any pointer in the CGK which would lead the skilled person to generate a lipid bilayer using an ionisable cationic lipid according to claim feature 1.3 starting from this prior art document. WO748 does not discuss the influence of the pKa value on the structure of the liposome and contains no hint that this might be an important parameter. The problem of cytotoxicity of permanent cationic lipids in vivo is not mentioned. As discussed above at novelty, permanent cationic lipids are described to be preferred over DC-Chol (which is an ionisable cationic lipid; WO748, p8 L2-25).

188. For these reasons the invalidity attack based on WO748 combined with common general knowledge cannot succeed.

Assessment of inventive step – WO152

189. The second inventive-step attack relies on WO152, entitled "Cationic lipids and methods of use". Its main focus is therapeutic uses: delivery of nucleic acid agents for gene therapy, silencing a target sequence expressed by the cell ([0082]), delivery of various therapeutic products ([0083] and [0178]), and delivery of diagnostic agents ([0183]).

190. WO152 discloses several nonviral gene delivery vehicles such as plasmid DNA-cationic liposome complexes, PEG-coated stabilized plasmid-lipid particles (SPLP) and stabilized nucleic acid-lipid particles (SNALP) with plasmid DNA (pDNA), in which context cationic lipids are also mentioned.

191. Vaccination/immunisation is mentioned only once in WO152 in a single sentence in relation with liposomes (in [0175]), but the precise nature of the payload is not defined: *"Liposomes containing the cationic lipids of the present invention are also particularly useful as carriers for vaccines that will be targeted to the appropriate lymphoid organs to stimulate an immune response***."** There is no mention of the payload, and no operating example is given because WO152 is directed at gene therapy and not at generating an immune response with the use of liposomes with specific characteristics. The Court therefore does not consider WO152 a realistic starting point for the skilled person wishing to improve RNA based vaccines.

192. Even if considered as a suitable starting point, this would not lead to the invention. Though taken as a whole, WO 152 seems to disclose all features of the claim individually, all these features are not disclosed combined in one single embodiment. In the context of novelty, the TBA also found this in its decision of 16 December 2020 (BB44B, wherein E9 corresponds to WO152) during the (withdrawn) opposition against EP626 (see Section I.B above). In particular, there is no information in WO152 that would support the contention that the SNALP particles are structurally identical to liposomes of the invention.

193. In the context of the whole content of WO152, the isolated sentences and remarks on immunization are not sufficient as a pointer towards immunization by liposome encapsulated RNA, and the person skilled in the art would not pick out those isolated sentences on immunisation cited above. Cationic lipids are mentioned in WO 152 only as "adjuvants for immunization" in relation with protein antigens (section [0174]); this is a different approach to vaccination. Reliance on the CGK as defined above by the Court cannot bridge the gap between the teaching of WO152 and the claimed invention. Moreover, the document does not contain any teaching which would lead the skilled person to feature 1.3: the technical teaching in WO152 on the influence of the pKA value is at best unclear and seems to identify favourable effect at pKA values of the order of 7.6 (see section [0239]).

194. The Court finds no pointer towards the solution of the objective problem in WO152 combined with common general knowledge as identified above. That combination provides neither a pointer to RNA encoding an immunogen (feature 1.4) nor a pointer to a pKa value within the claimed range (feature 1.3).

195. This invalidity attack is thus unsuccessful, too.

Assessment of inventive step – Martinon

196. According to a third attack, the starting point is Martinon, *"Induction of virus- specific cytotoxic T lymphocytes in vivo by liposome-entrapped mRNA"*). The Court agrees with PBNT that Martinon would have been a reasonable starting point for the skilled person, as it deals with mRNA encoding an immunogen entrapped in liposomes comprising the lipids cholesterol / dipalmitoylphosphatidylcholine / phosphatidylserine. It also mentions clearly the vaccination purpose of these liposomes and shows the ability of this mRNA to elicit an immune response in a vertebrate.

197. It is undisputed however that Martinon does not disclose feature 1.3. In their SoD (§ 8.254 to 8.265), PBNT argue that *"[t]he skilled person would arrive without any inventive activity at the claimed solution, based on various documents from the prior art and/or the common general knowledge"* (see §8.257). The "various documents from the prior art" invoked are publications by Semple, Heyes, MacLachlan, Zimmermann, Jeffs, as well as WO152 and WO877. This shotgun approach was not pursued at the oral hearing which focused on common general knowledge in relation with Martinon as the starting point.

198. As discussed above, PBNT in this context propose the objective problem as *"the provision of an alternative liposome composition for the delivery of RNA encoding an immunogen"*. This reformulation seems to be based on the problem-solution approach (PSA). However, even in the framework of the PSA, the Court is unable to deduce this problem from Martinon as a starting point. The missing claim feature 1.3 has a technical effect related to the pKa value, i.e. the lipid is ionisable, with a positive charge at lower pH for binding the RNA when the delivery vehicle is formed and neutral at physiological conditions, to avoid the cytotoxic effect of the cationic lipid. There is no hint in Martinon to a problem which could possibly be resolved by this technical effect. The difficulties identified by Martinon in relation with the use of mRNA as a vaccine are related to the engineering of the RNA, to the route of administration, but not to the liposome itself, and even less to the electrochemical properties of the lipids forming the liposomes. The Court can see no reason why the person skilled in the art should turn to an ionisable cationic lipid having a pKa value according to feature 1.3.

199. At the oral hearing, PBNT argued that the teaching of Martinon would lead to the subject-matter of claim 1 by using CGK. This argument is based on the extensive conception of CGK proposed by PBNT. As mentioned above, the Court adopts a much more restrictive definition of the CGK, which does not support the argument put forward by PBNT. In particular, the Court cannot follow PBNT's reasoning that the advantages of ionisable cationic lipids for building liposomes for use with mRNA vaccines were part of CGK.

200. As a consequence, this inventive step attack cannot succeed either.

III.E.4 Insufficiency of disclosure

201. In their counterclaim for revocation, PBNT argued that EP626 must be (partially) revoked pursuant to Art. 138(1)(b) EPC because claim 13 is not disclosed in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art. They assert that the use of the claimed liposomes for raising a protective immune response in a vertebrate is not sufficiently disclosed and cannot be executed by a person skilled in the art. PBNT did not maintain this attack during the focussing of their validity attacks. During the oral hearing PBNT

explicitly mentioned that it wants to maintain this attack and would like the Court to address it. In the specific circumstances of this case, the Court will take this into account.

202. In its decision of 25 November 2025 (Amgen/Sanofi), the CoA provided guidance on the assessment of sufficiency within the UPC. The test to be applied is whether the skilled person is able to reproduce the claimed subject matter based on the patent without any inventive effort and without undue burden. An invention is sufficiently disclosed if the patent specification shows the skilled person at least one way – and in case of functional features: one technical concept – of performing the claimed invention. Where a claim contains one or more functional features, it is not required that the disclosure includes specific instructions as to how each and every conceivable embodiment within the functional definition(s) should be obtained. A fair protection requires that variants of specifically disclosed embodiments that are equally suitable to achieve the same effect, which could not have been envisaged without the invention, should also be protected by the claim. Consequently, any non-availability of some embodiments of a functionally defined claim is immaterial to sufficiency, as long as the skilled person through the disclosure is able to obtain suitable embodiments within the scope of the claim. A reasonable amount of trial and error does not prevent the invention from being enabled. The burden of presentation and proof lies with the party invoking invalidity of the patent.

203. Claim 13 reads as follows:

> 13. The liposomes of claims 1-11, or the pharmaceutical composition of claim 12, for use in a method for raising a protective immune response in a vertebrate, comprising the step of administering to the vertebrate an effective amount of said liposome, or said pharmaceutical composition.

204. The parties disagree whether claim 13 requires a demonstration in the patent of a protective immune response raised in a vertebrate to which an effective amount of the liposome or pharmaceutical composition comprising the liposome has been administered. PBNT argue that this demonstration is necessary over the full scope, and that using the claimed liposome for raising a protective immune response is insufficiently disclosed. GSK submits that such demonstration is not necessary and relies on the Amgen/Sanofi ruling of the CoA cited above.

205. As follows from the wording cited above, claim 13 is a medical use claim. The function of raising a protective immune response is thus part of the claim and proof of it must therefore be provided in the application as filed as well as in the patent as granted, in particular if, in the absence of experimental data, it would not be credible to the skilled person that the therapeutic effect is achieved. A lack in this respect cannot be remedied by post-published evidence (G2/21, para 77).

206. As decided above at claim construction, when correctly construed, the term ‘RNA’ is not limited to srRNA, but encompasses RNA in general, including mRNA. All examples and data in the patent specification, including those concerning the expression of the encoding RNA encapsulated in the liposome shown in figures 15 and the immune response (IgG titers) plotted in figure 16, were obtained with srRNA. It is evident from the patent specification that even the data presented for srRNA do not conclusively show that the technical effect of raising a protective immune response in vertebrates, is achieved, let alone over the whole pKA range claimed. At higher pKa values the measured expression of the srRNA content of the liposome tested decreases significantly. According to the teaching of the patent in relation with Figure

16 (see para [0133]), *"[t]he best results are seen where the pKa is where the cationic lipid has a pKa between 5.7 – 5.9, but pKa alone is not enough to guarantee a high titer e.g. the lipid must still support liposome formation".* Figure 16 shows several examples within the claimed pKa range of feature 1.3 generating no (measurable) immune response at all, or at best a very small immune response. The same is true for figure 15 where expression of the encoded RNA is measured. It should be noted that the vertical axis of figure 15 which expresses a parameter representing the quantity of RNA expression extends over almost three orders of magnitude.

207. The skilled person was aware that srRNA, due to the self-replicating property, can elicit an immune response with a much lower amount of initially present RNA molecules than non-srRNA. The skilled person was thus aware that, while in the case of srRNA there might be sufficient (initial) activity due to self-replication of the srRNA, this activity may be insufficient with mRNA. Hence, it is not credible to the skilled person that the therapeutic effect is achieved for all non-self-replicating mRNA.

208. The Court thus finds that claim 13 is not sufficiently disclosed over the whole breadth of the claim, in particular not for mRNA and is thus invalid.

II.E.5 Conclusion on validity

209. The patent as granted is therefore considered valid as far as claims 1-12 are concerned. Claim 13 is not valid. The Auxiliary Requests do not need to be addressed; no AR can mend the invalidity of claim 13.

III.F – INFRINGEMENT

210. The allegedly Infringing Products all use the same delivery system for an mRNA, comprising four lipids, including ionisable (cationic) lipid ALC-0315 as set out in 11 and 12 above. In the chapter on claim construction, the Court already concluded that claim 1 is not limited to srRNA or any other particular type of RNA. It is not in dispute that the RNA contained in Comirnaty products is an RNA under feature 1.1 and 1.4 which encodes an immunogen.

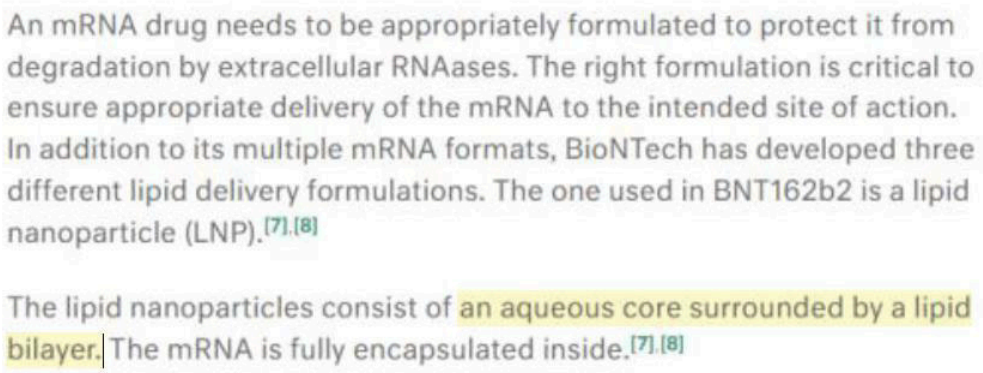
211. GSK's allegation of infringement relies on several elements of evidence. The Cayman Report (see Section I.C, 13, above) is relied on for the pKa of the cationic lipid ALC-0315 in the Infringing Products. Measured in isolation according to the method specified in the patent, ALC-0315 gave the following results:

- Scientist 1: pKa between 6.617 and 6.825; mean 6.752.
- Scientist 2: pKa between 6.801 and 6.809; mean 6.805.

GSK contends that these results establish feature 1.3.

212. To establish particle structure, GSK submitted the First and Second ATEM Reports containing Cryo-TEM images of Comirnaty (see Section I.C, 14-18 above). GSK argues that the images show liposomes with a bilayer and an aqueous core. For their interpretation, GSK rely on Brader 2021, which contains Cryo-TEM images of mRNA vaccine samples supplied by Moderna. Moderna also commercialises Covid-19 mRNA vaccines described as lipid nanoparticles.

213. GSK also pointed out that BioNTech acknowledged on its public website in 2021 that BioNTech's *"lipid nanoparticles consist of an aqueous core surrounded by a lipid bilayer. The mRNA is fully encapsulated inside".*



An mRNA drug needs to be appropriately formulated to protect it from degradation by extracellular RNAases. The right formulation is critical to ensure appropriate delivery of the mRNA to the intended site of action. In addition to its multiple mRNA formats, BioNTech has developed three different lipid delivery formulations. The one used in BNT162b2 is a lipid nanoparticle (LNP).[7].[8]

The lipid nanoparticles consist of an aqueous core surrounded by a lipid bilayer. The mRNA is fully encapsulated inside.[7].[8]

214. PBNT dispute that their products fall within the patent's scope of protection. They contend that the allegedly Infringing Products (Comirnaty):

- do not contain lipids within the pKa range of feature 1.3;
- do not contain mRNA in a discernible aqueous core enclosed by such a bilayer; instead, the mRNA is condensed within a predominantly non-aqueous core;
- do not have liposomes enclosed by a continuous lipid bilayer; and
- do not have a bilayer that comprises the ionisable cationic lipid ALC-0315.

215. For evidence, PBNT rely on Szebeni 2023 (see 22 above) and Unruh et al. ("*Mesoscopic Structure of Lipid Nanoparticle Formulations for mRNA Drug Delivery: Comirnaty and Drug-Free Dispersions*", 2024, **Unruh 2024,** exhibit PBNT C20). PBNT assert that both papers analyse Comirnaty products and mention that they comprise lipid nanoparticles which are very different from liposomes as they are not enclosed by a continuous bilayer, and the RNA is enclosed in the solid core of the lipid particles. The Szebeny paper also suggests that the ionizable cationic lipid ALC-0315 does not form a lipid bilayer but binds to the mRNA molecule to form a solid particle.

The Court's assessment is as follows:

pKa range — feature 1.3

216. Concerning feature 1.3, in the chapter on claim construction, the Court concluded that the range of claim 1 of 5.0-6.8 is to be interpreted +-0.2 pKa units. This means that the ionisable cationic lipid ALC-0315 with a pKa value as measured in the Cayman Report falls well within this range. The fact that the same research laboratory has performed a pKa determination of the same lipid in 2024 leading to a value of 6.953 does not alter this finding (see exhibit PBNT 084); no standard deviation is given for this value. Not only does this not show a pKa outside the margin of error +-0.2 pKa units as inherent to the method used in the patent to determine the range, there is apparently also a non-negligible chance that the pKa of ALC-0315 is below 6.85. Feature 1.3 is thus reproduced.

RNA in an aqueous core

217. The First and Second ATEM Reports and both parties' submissions establish that PBNT's products contain three types of particles:

- biphasic dense (also called “blebbed”) particles;
- biphasic split particles; and
- almost spherical solid core particles.

These are precisely the three types typically formed using the ethanol-dilution method (see Jeffs 2005, discussed above).

218. PBNT provided evidence that the solid core particles are not liposomes, as they do not contain significant amounts of water. However, the samples of the Infringing Product assessed by ATEM also contain significant amounts of particles which are not solid core particles.

219. With GSK, the Court will focus on the “blebs” of the so-called biphasic dense particles. Since these particles according to the independent ATEM Reports that both parties refer to, are present in amounts varying from 7-24% (see 16 above) of all particles, assessing their structure is enough for the assessment of infringement. PBNT have pointed to the Szebeni and Unruh articles, to allege that the particles do not have an aqueous core with mRNA, but rather a solid non-aqueous core in which the mRNA is condensed, and that the nanoparticles are surrounded only in part by a bilayer. However, Fig 6A of Szebeni that they refer to appears a representation of the solid core particle, rather than the blebbed particle. It appears that for the morphology of the blebbed particle, little to nothing may be derived from these papers.

220. From the newly submitted Cryo TEM images (the Second ATEM Report), in which the RNA is stained with thionine, it becomes clear that the blebs of these particles contain RNA. In Brader 2021, who examined a product provided by Moderna, it is mentioned that these blebs are solvent filled. While these Cryo-TEM images do not allow to deduce the nature of the solvent, it is clear however that the only solvent possible is water. PBNT also did not point to any other possible solvent. In addition, no other specific solvent, apart from aqueous solvents, is mentioned in the EPARs cited above, where the finished product is described to be in a buffer at pH 6.9 to 7.9.

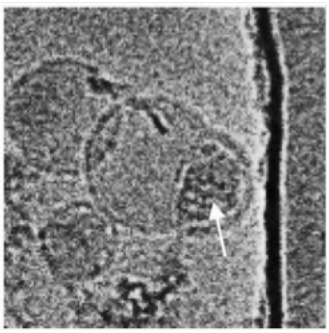
221. Tellingly, Szebeni also interprets the blebs described in Brader and visible in Fig 3 of Szebeni as “water-containing” (marking added):

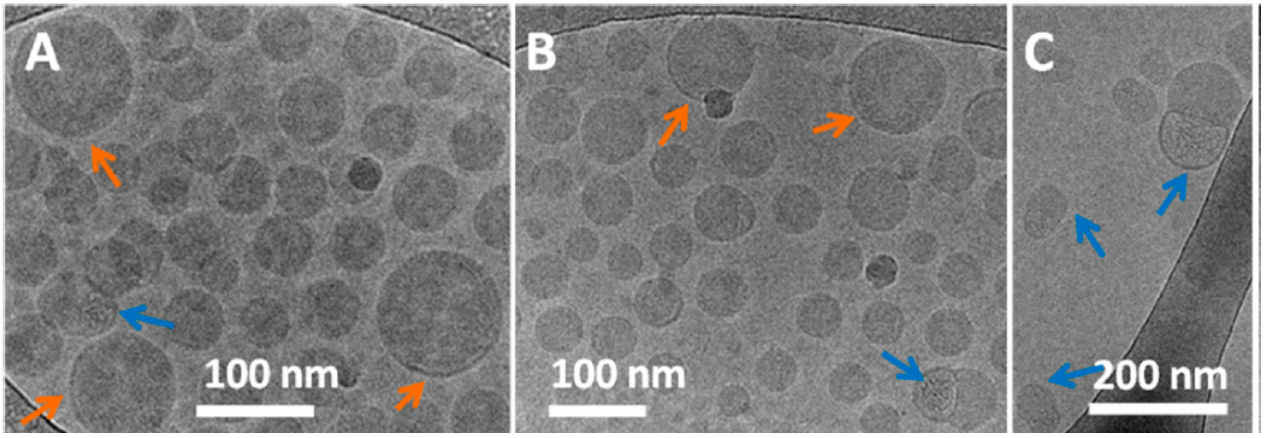
> lipid bilayer envelope by AFM force spectroscopy. Additionally, cryo-TEM images of all samples also included particles having a bicompartmental structure with a bilayer-coated bulge showing “grain-like” nanostructures related to mRNA (blue arrows in Figure 3A–C).[28] It was suggested previously that these water-containing “blebs” may form upon segregation of DSPC from other lipids to form HSPC-enriched membranes/envelopes.[29]

222. In the chapter on claim construction, it was already concluded that an aqueous core in the sense of the (claims of the) patent may be an aqueous compartment. Hence a “bleb” qualifies as such an aqueous core.

223. PBNT further dispute that the RNA is to be found in the aqueous core. The new Cryo-TEM images however make clear that RNA may be found in the bleb, when stained with thionine

just like Brader did. As in Brader and as confirmed by Szebeni, the dark mottled areas shown in the new Cryo-TEM images confirm the presence and location of mRNA within the Comirnaty liposomes, including within the bleb compartments (see the white arrows):

thionine stained	Not stained
	
5	6



224. The bleb with the thionine-stained RNA is clearly visible and indicated by a white (in the ATEM reports at the top) or a blue (in Szebeni, fig 3 at the bottom) arrow in the above images. Note that the blue arrow in Szebeni points to just one example particle among others shown with likewise stained RNA. The similarity of the morphologies is immediately apparent. In addition, PBNT has not substantiated that it uses a method to manufacture the particles that differs from the ethanol-dilution method referred to in the patent. As mentioned before, it is inherent to this method that liposomes with a lipid bilayer are formed and that RNA will reside in the aqueous compartment, or – if not in each bleb of the PBNT particles – at least in a number of the water-filled blebs sufficient to consider this feature met. In the Szebeni images, the orange arrow points at lipid bilayers.

225. In addition, the Court notes that the morphology and morphology distribution are temperature and pH dependent (reference is made to the conclusion of Szebeni, cited in 21 above). Such observation was also made by Brader (see 20 above) in the context of Moderna's mRNA vaccines. Brader concludes: "*Recognizing that mRNA can dissociate from the charged lipid to reside within a solvent-filled bleb compartment has direct implications for the chemical microenvironment of the mRNA and confers a new significance to this liposomal-like LNP structural domain*." And Szebeni mentions in the conclusion: "*Our experimental data and theoretical considerations suggest that the highly convoluted mRNA strains are condensed in the core of NPs primarily by temperature-dependent weak inter- and intramolecular interactions, involving hydrogen bonds and, depending on the actual pH, ionic bonds with IPC lipids. However, ionic interactions between the nucleic acid and IPC lipids may be insignificant or absent at neutral pH in the vaccine's saline diluted formulation for human use*." This suggests that the distribution of blebbed particles may increase over time, when temperature and pH increase, and that at -80 degrees Celsius the presence of solid core particles may be dominant, as PBNT assert, but not in the vaccine when used. The Cryo-TEM images of fig. 3 of Szebeni were taken immediately after diluting the frozen vaccine.

Continuity of the lipid bilayer

226. The next point of dispute is whether the blebs are surrounded by a continuous bilayer. In the chapter on claim construction, the Court already concluded that this feature should be interpreted functionally. Even if PBNT's assertion would be followed that the part of the bleb abutting the solid core may not be a bilayer, this does not distract from the fact that the rest of the border is a bilayer which protects the RNA inside from most notably RNase. GSK has sufficiently substantiated that a bilayer of lipids is formed as mentioned above. Bilayers are also shown in the Szebeni Cryo-TEM images depicted above (orange arrows). The fact that part of the direct boundary of the bleb containing RNA may not be such bilayer, does not necessarily imply that the remaining bilayer is incapable of protecting the RNA, on the contrary rather. Nor does this exclude that the bilayer forms a further outlying boundary. That something else also may contribute to keeping RNase out and to encapsulation of the aqueous core, does not detract from this finding.

Bilayer containing ALC-0315

227. According to PBNT, GSK has failed to prove that ALC-0315 resides in the bilayer. This argument cannot be followed. GSK with its expert Forrest have sufficiently made plausible that it is unlikely that ALC-0315 is not part of the bilayer. After all, as PBNT have not substantiated a way of production of the particles different from the ethanol-dilution method as referred to in the patent, it must be assumed that a bilayer is formed under these conditions. The ionisable ALC-0315 would logically reside in such bilayer, with its hydrophilic head interacting with the (aqueous core containing) RNA and the hydrophobic tails interacting with the other lipid tails inside the (inner monolayer of the) bilayer during the encapsulation reaction conditions.

228. Against the background of strong indications that the bilayer of the blebbed particles comprises ALC-0315 or at least a number of the bilayers in the blebs, sufficient to consider this feature met, PBNT's rebuttal falls short. No evidence or conclusive scientific reasoning were

advanced by PBNT to counter GSK's evidence. Any positive proof or sound scientific reasoning that, contrary to what is to be expected, the bilayer would NOT comprise ALC-0315, is absent from PBNT's submissions. The same applies to PBNT's suggestion that ALC-0315 will rather be in the solid part of the blebbed particle. Not only does this seem unlikely as GSK's expert Forrest explains, with reference to the manufacture of the particles where the ionizable cationic ALC-0315 binds to the RNA (which we know from the Cryo-TEM images resides in the aqueous bleb), it is inherently unlikely that in a dynamic system, all ALC-0315 will be in the solid particle and not in substantial amounts in the bilayer. Without supporting data, this argument is not deemed credible, and is considered insufficiently substantiated (R.171.2 RoP, cf. UPC_CoA_920_2025, 16 September 2026, Heraeus v Vibrantz, para. 316).

Conclusion on infringement

229. It is thus assumed that the lipid bilayer comprises a lipid having a pKa in the claimed range, as required by feature 1.3. Therewith all features of claim 1 are considered present in the Infringing Products.

230. Infringement of claims 2, 3, 6, 10 and 12 is also asserted and can be established. It is not in dispute that ALC-0315 has a tertiary amine (claim 2). As the pKa of ALC-0315 is considered to fall within the claimed pKa range of claim 1, it also falls within the range of claim 3, which has the same upper value. From the diameter results from the First ATEM Report (shown at 16 above), it is clear that the particles of the Infringing Products also meet the diameter requirements of claim 6. It is further obvious that claim 10 is infringed, as the immunogen encoded by the Infringing Products elicits an immune response in vivo against a virus. The Infringing Products in addition qualify as a pharmaceutical composition (claim 12).

III.G –LEGAL CONSEQUENCES AND COSTS

231. The established infringing acts justify most of GSK's requests, which are directed against all Defendants jointly and individually. The established international jurisdiction makes the requested relief admissible against all Defendants. This section addresses whether, and to what extent, that relief may be granted.

III.G.1 Injunctive relief

232. GSK requests injunctive relief for all EPC member states where the patent is valid and in force with the exception of Ireland and the UK, which can be divided into three territorial groups:

i. all eighteen UPCA Contracting Member States (the **UPCA Member States**);
ii. the seven non-UPC EU Member States where the patent is valid, namely Cyprus, Czech Republic, Spain, Greece, Croatia, Hungary and Poland (the **Other EU Countries**),
iii. The '**Lugano Countries**' Iceland, Norway and Switzerland and
iv. Other EPC Countries where the patent is valid: Albania, Liechtenstein, Monaco, North Macedonia, Serbia, San Marino and Turkey (the **Non-EU EPC Countries**).

The Infringing Products are asserted to be on the market in those countries, or there is a threat that they will enter those markets. This is not in dispute.

joint infringement

233. The Pfizer group comprises an extensive network of subsidiaries across numerous European jurisdictions, with individual Pfizer entities across Europe as local representatives of the MA holder for Comirnaty responsible for sales in at least their home countries, whereto they are provided with the Infringing Products via related companies. The Pfizer Group, headed by Pfizer Inc, operates in a highly integrated way, with one consolidated financial statement applying to the group; this is confirmed in its annual reports. This was substantiated by GSK and not, or not substantially, disputed.

234. The BioNTech group, headed by parent company BioNTech SE, also operates as a unified business entity through the interconnected activities of interdependent subsidiaries. From the Annual Report 2024, the integrated and interdependent nature of its business is apparent. BioNTech group's management oversees the entire business as a single operating unit and decisions regarding the business operations are made based on the BioNTech group "as a whole". BioNTech SE centrally manages the finances of the group. It funds all financing transactions and provides liquidity to other group companies, further emphasising the integrated nature of the BioNTech group and their financial and operational interdependence. This is not in dispute. Some excerpts from the group's Annual Report 2024, exhibit BB102, p. 47, 50 and 88, are shown below:

The objective of BioNTech SE's financial management is essentially identical to that of the Group and involves providing liquidity for the growth of the Group companies.

The business development of BioNTech SE is essentially subject to the same risks and opportunities as the BioNTech Group, as BioNTech SE participates in the risks of the Group companies through its shareholdings. As a result of the BioNTech Group's centralized financial management, all financing transactions are primarily processed via BioNTech SE. As the parent company of the BioNTech Group, BioNTech SE is integrated into our Group-wide risk management system.

Decisions with respect to business operations and resource allocations are made by our Management Board, as the chief operating decision maker based on BioNTech as a whole. Accordingly, we operate and make decisions as a single operating segment, which is also our reporting segment.

235. GSK further argues that, due to the partnership between Pfizer and BioNTech to jointly develop and subsequently market Comirnaty, the production and sales of the Infringing Products is greatly integrated within PBNT, acting as a single business entity for the production and sales of Comirnaty in the EPC Territory through the interwoven activities of (interdependent subsidiaries of) both Pfizer and BioNTech. PBNT's commercialization of the Infringing Products is of an integrated nature, with the use of shared resources, supported by common infrastructure and with centralized decision-making.

236. Each Defendant at least (co-)infringes, in any case facilitates infringement, in its own territory. Several Defendants are undisputedly involved in infringing activities outside their country of residence, namely:

- Pfizer Inc, Pfizer CV NL and BioNTech SE as parent companies with centralised financial and operational powers;
- BioNTech Marburg as producer of the active substance (mRNA encoding an immunogen);
- Pfizer Manufacturing Belgium and BioNTech Manufacturing Germany as manufacturers of the vaccines and

- the latter company also is the MA holder for Comirnaty for EMA territory with several other defendants functioning as national representatives for the MA holder.

and that the operations are very much integrated with centralised decision making.

237. The above facts are publicly available and are not substantially disputed by PBNT. They do dispute the joined operations leading to joint liability or joint infringement. They also assert that for each individual Defendant all types of infringing acts (including making, offering) etc, must be established. This assertion is however incorrect. One type of infringement suffices as a basis for a general injunction against an infringer.[19]

238. PBNT also misinterpret the consequence of contributory infringement. According to the autonomous interpretation of art. 63, 25 and 26 UPCA, those assisting infringement are considered infringers. In CoA decision of 3 October 2025, Philips/Belkin, it was explained (in English translation, emphasis added):

> 180. An "infringer" within the meaning of Article 63 UPCA in conjunction with Article 25 UPCA is also someone who does not themselves carry out the acts referred to in Article 25 UPCA, but to whom the acts of the principal infringer are attributable because they are an instigator, accomplice or accessory. This is the result of an autonomous interpretation of the provisions, taking into account their purpose (cf. the rules of interpretation applicable to the UPCA as an international treaty: Article 31 VRC; UPC Court of Appeal, Order of 2 June 2025,UPC_CoA_156/2025, APL_8790/2025, para. 23, XSYS/ESKO).

239. In this case several Defendants at least provide services to other PBNT Defendants that all within the above qualification, as will be discussed below. The Court establishes, as sufficiently substantiated, partly in repetition of what is listed at the start of this decision:
- Pfizer and BioNTech partnered to develop, manufacture, secure regulatory approval and subsequently market/distribute a vaccine for Covid-19;
- PBNT operate an interdependent and integrated supply and distribution network in Europe, whereby various group-members share their resources;
- the centralized decision-making within each group (Pfizer-group by Pfizer Inc and Pfizer CV NL and within BioNTech by BioNTech SE), also concerns the making, offering, placing on the market, use, import, storing, or otherwise commercializing the Infringing Products;
- The Infringing Products have been sold, used and/or offered for sale in the UPCA Member States and in Other EPC Countries as a joint effort of Pfizer and BioNTech;

240. The interdependent, integrated and centrally controlled operational structure of PBNT means that individual subsidiaries, including Defendants, perform or contribute as joint infringers, to infringing acts which concern various jurisdictions, without the precise scope of the infringing or contributory act of each individual Defendant being distinguishable. Infringing acts in the relevant territory are however, in view of the preceding established facts, jointly attributable to the Defendants. It is not in dispute that each PBNT-Defendant made, offered, placed on the market, used, imported or stored the Infringing Products or threatens to perform one of the aforementioned actions in its own territory, and that in any case the entities mentioned in 236 also support performing actions according to Art. 25 and 26 UPC in other territories as joint infringers.

[19] CoA 14 February 2025, Abbott/Sibio.

241. The Court therefore finds that all Defendants can be considered to individually and collectively/jointly infringe, threaten to infringe or contribute to infringement of the patent. This in principle merits the grant of injunctive relief against all Defendants. The territorial scope of the injunction is addressed next.

territorial scope

242. The territorial scope of the measures in any case includes all Contracting Member States. Art. 34 UPCA clarifies that as a rule – unless a more limited scope is requested (cf Art. 43, 76 UPCA) – decisions of the UPC shall cover the territory of all Contracting Member States where a European patent has effect.[20]

243. As the essential RNA component of all European products is supplied by BioNTech Marburg, and the vaccines are supplied by the two manufacturing entitles mentioned above, these companies directly or indirectly infringe the patent by manufacturing the (essential part of the) attacked embodiment. This applies to all EPC countries, as the 'service' of providing mRNA is relevant for all those countries. Similarly, Pfizer Manufacturing Belgium and BioNTech Manufacturing Germany provide, or in any case threaten to provide, services to other Defendants, which services are used to infringe, by making available the vaccines they manufacture. This also applies to all EPC Countries.

244. Pfizer Inc can also be considered an infringer as it facilitated the sale of Comirnaty by concluding the APA (and subsequent renewals) with the European Commission. This applies to all EU countries. The same applies to the MA-holder BioNTech Manufacturing Germany, who makes the MA available to all EMA countries (the EU and Iceland, Liechtenstein and Norway).

245. As infringing acts by several Defendants, including the anchor defendants, are established in all EPC countries, this merits inclusion of these countries in the territorial scope of the injunction as requested (with the exception of Ireland and the UK). It is not in dispute that the infringement test is applied similarly in all these countries, which can be assumed based on the common test of Art. 69 EPC. As far as the territorial scope of the Enforcement Directive is concerned, there is also a presumption that the national provisions transposing the Enforcement Directive contain provisions corresponding to those of the UPCA and, in any event, do not deviate from them to the detriment of the patent proprietor. PBNT has not rebutted this presumption. The same applies to the other non-EU EPC countries as PBNT did not substantiate that the test for infringement is materially different in those countries. Any party wishing to rely on national differences must plead and provide proof of the relevant national law and how it is applied in accordance with Art. 54 UPCA.[21]

246. Consequently, the injunction will be granted for all EPC countries, as requested, namely, for all UPCA Member States, for the Other EU Countries, for the Lugano Countries and for the Other EPC Countries (see 232 above), collectively: the **Relevant Territory.**

247. For long-arm jurisdiction of the UPC, the CoA[22] in light of the BSH v Electrolux decision by the CJEU, established the following test for a situation where for UPC territory the patent is considered valid and infringed:

[20] Recently confirmed in CoA, decision of 2 June 2026 – UPC_CoA_312/2025 - Fujifilm v Kodak.
[21] CoA decision of 17 August 2026, UPC-CoA_365/2025 and 367/2025.
[22] CoA, decision of 2 June 2026 – UPC_CoA_312/2025 - Fujifilm v Kodak.

"18. Where it concerns either EU/LC EPs [*i.e. non-UPC-EU or Lugano countries, the Court*] (in view of Art. 24(4) Br I bis and 22(4) LC) or non-EU/LC EPs [*that is non-EU/Lugano EPC countries, the Court*] (in view of comity):

a. the Court may – where appropriate and in order to avoid undue delay – consider there is a reasonable, non-negligible possibility that the patent will be held valid by the competent national court and issue a decision including its orders under the condition subsequent that the patent is not held to be wholly or partially invalid to the extent the infringement is based thereon, in first instance or appeal proceedings before the national court competent to hear the revocation case in relation to such an EP (R. 118.2 RoP and Solvay v Honeywell (C-616/10) mutatis mutandis).
b. if such a competent national court holds the patent to be valid, then the decision becomes permanent.
c. if such a competent national court at first instance or on appeal holds the patent to be wholly or partially invalid to the extent the infringement is based thereon then the condition under which the decision, including its orders, was issued is not fulfilled and it falls away.
d. In the case under c. the patentee may request the Court for orders consequential on such a decision within two months of the decision of such a competent national court (R. 118.4 RoP), including a request for a stay of the proceedings until a final decision is rendered by the competent national court.

248. The Court considers the (bundle) patent to be valid (apart from claim 13), also for all national parts in non-UPCA countries, assuming the same applicable validity test. The Court therefore considers there is no reasonable, non-negligible possibility that the corresponding national parts of the patent will be held invalid by the competent national courts. In view of comity and the exclusive jurisdiction rule of Art 24 BR (Art. 22 Lugano), the Court will therefore issue a decision for the territory of EU-non-UPCA/Lugano parts of the patent as set out by the CoA at a. as cited above, under the condition subsequent that the patent is not held to be wholly or partially invalid in first instance or appeal proceedings before the national court competent to hear the revocation case in relation to such national part (R. 118.2 RoP). This means that an injunction shall apply, until a national court finds the patent invalid pursuant to PBNT filing national revocation actions, which has not been done so far. The above applies to the Other EU Countries (Cyprus, Czech Republic, Spain, Greece, Croatia, Hungary and Poland) and to the Lugano-countries (Iceland, Norway and Switzerland). For other countries, namely Albania, Liechtenstein, Monaco, North Macedonia, Serbia, San Marino and Turkey, the injunction is issued without this further condition as the Court considers the patent (apart from claim 13) valid inter partes.

249. The injunction will be granted for the Infringing Products, including any further versions of variants thereof. PBNT's assertion that this would be too vague and unenforceable, is not followed.

proportionality and enforcement

250. GSK requests that any injunctive relief for the Infringing Products only become enforceable (i) after a final decision on appeal by the UPC, (ii) if and insofar as PBNT have not entered into a licence agreement with GSK within three months following such final decision, and (iii) GSK providing a notice under Rule 118.8 RoP.

251. PBNT assert that, in view of considerations of proportionality, the Court should use its discretionary power not to grant an injunction in the circumstances of this case.

252. The Court shall apply and interpret the rules, including Art. 63(1) UPCA, in accordance with Articles 41(3), 42 and 52(1) UPCA on the basis of the principles of proportionality, flexibility, fairness and equity (points 2-5 of the preamble to the RoP, Art. 3 IPRED). Fairness and equity shall be ensured by having regard to the legitimate interests of all parties, which can also include third parties. The Court ensures this by assessing the interests of the parties and, in particular, taking into account the potential harm for either of the parties resulting from the granting or the refusal of an injunction pursuant to Art.63(1) UPCA. The granting of an injunction is the general rule; only when special reasons exist, an injunction may be refused (See CoA Edwards v Meril).

253. The Comirnaty vaccines are widely used. It is clear that an injunction to remove these RNA vaccines from the market, will have a major impact on PBNT, especially for BioNTech as the Infringing Products are their only products in the Relevant Territory. Also, third parties who rely on PBNT's vaccines at issue would potentially be impacted. The removing of the Infringing Products from the Relevant Territory will be a major operation, the impact of which is difficult to reverse. GSK, on the other hand, does not have its own Covid-vaccine. GSK is therefore considered a non-implementer: it does not practice the patent. It is not expected to suffer substantial harm that cannot be compensated financially. It is mainly after monetary compensation (damages and a license).

254. However, the fact that its patent is infringed merits an injunction. Denying GSK an injunction might not be in compliance with (Art. 3 of) the Enforcement Directive (2004/48/EC of 29 April 2004) as this will deny GSK an effective, dissuasive way to enforce its patent.

255. The Court finds that the enforcement conditions requested by GSK for the Infringing Products, address some proportionality issues adequately. It will prevent that PBNT is forced to remove its products from the market before this decision becomes final (which in case of an appeal may take a year or so). And even after that period, it has three months to prevent the injunction by acquiring a license. Therewith the interests of the parties are adequately balanced.

256. An injunction upon the finding of infringement is therefore granted, as is the rule, but the enforceability of the injunction is postponed, as requested. PBNT's request to extend the period for conclusion of a license to six months after the injunction becomes final, is dismissed. As the appeal will also give PBNT ample time to discuss a license, three months is considered sufficient.

257. To avoid any confusion, the Court will leave out the words 'on appeal' after 'final decision', to clarify that in case no appeal is filed, the decision may also become final.

258. The Court dismisses the requested declaratory relief because it is too vaguely and broadly worded. It also finds no identifiable interest for GSK in a separate declaration, given the established infringement, the resulting injunction and the established liability for damages.

III.G.2 Request for information

259. In view of the established infringement, the request for information will in principle be granted.

260. PBNT request inter alia that any access to confidential information as requested by GSK should be:

(a) Restricted to GSK's outside counsels and, alternatively, to two GSK Recipients who are named to PBNT in advance, who should not take part in an eventual licence agreement negotiation between the parties, should be bound by confidentiality, subject to a penalty in case of breach; and

(b) Only be used by GSK to:

(i) Calculate any potential damages claims in connection with the asserted patent infringement; or

(ii) Identify other third parties involved in the production or distribution of the accused products for the purposes of asserting claims for alleged patent infringement against them.

261. PBNT also argue that Art. 67 UPCA provides a basis only for the requests under IV.1 of the Statement of Claim, not for the accounting information requested under IV.2. In their view, stating that the IV.2 material is needed to verify the information to be provided under IV.1 is insufficient and unjustified. If the Court grants the requests, PBNT contend that access shall be limited to an auditor and GSK's external counsel or, alternatively, two GSK Recipients. GSK wishes to receive information on, for instance, the quantities and distribution channels of the products and on PBNT's profits, but that does not require GSK to have access to all of PBNT's invoices and all evidence of advertising activities. These documents contain privacy-sensitive information and, as the parties are competitors, the privacy of PBNT should outweigh GSK's interest in seeing these documents. If GSK (or its accountant) were to get access to the requested documents, then PBNT argue that the details requiring confidentiality must be redacted.

262. The request for information will be granted as mitigated below to reflect the purpose of the information. The information will allow GSK to take appropriate action to prevent further infringements and to prepare damages proceedings. The order will be given to PBNT jointly and not to each Defendant separately, in view of the integrated operations. It will also be limited in territorial scope and time. In response to PBNT's request regarding confidentiality, it shall be permitted to redact details requiring confidentiality, as long as the purpose of the information is not affected.

263. In any case no damages can be due prior to the date of the grant of the patent (28 October 2015) and parties agree that the order to provide information should not go back further than that date. However, it is not in dispute that the first MA for the Infringing Products is dated 21 December 2020, and Comirnaty only became available in the Relevant Territory after that date. The Court fails to see how PBNT may be liable for damages for infringement with the Infringing Products in the Relevant Territory before this date. This has also not been properly argued. The start date for information will thus be set (broadly) on 1 January 2020. In view of the large volume of information expected to be collected (over a period of more than five years, and for all defendants), the compliance period for the information is extended from one to three months as requested by PBNT. For the avoidance of doubt: the information can be provided in electronic form.

III.G.3 Penalties, damages, interim award

264. GSK requests a penalty for violation of all orders. This request is granted for the injunction and information orders (and not for the declaratory order and for the monetary payments).

The amounts are mitigated and maximised as deemed proportionate to the orders to be enforced, as set out in the operative part.

265. PBNT is declared to be liable for damages suffered by GSK for the established infringement. The amount requested by way of interim award of damages, EUR 2,000,000, seems reasonable in view of the case value of EUR 50,000,000.

III.G.4 Counterclaim for revocation

266. In view of the validity assessment, the Court partially revokes EP626 in the counterclaim for revocation pursuant to R.118.3 RoP and Art. 65 UPCA. Under Art. 24(4) BR, that decision is limited to UPCA territory. Claim 13 is thus revoked in all UPCA Member States where the patent is valid. Claims 1-12 are maintained as granted, and the remainder of PBNT's requests in the revocation action are dismissed.

III.G.5 Costs

267. As the predominantly unsuccessful party, PBNT shall bear the reasonable and proportionate legal costs and other expenses incurred by GSK in the infringement action and in the counterclaim actions. In view of the partial revocation of the patent, only 75 % of GSK's costs in the counterclaim action will be reimbursed.

268. Parties reached the following agreement on the costs:

The Parties agree that the total recoverable amount across UPC_CFI_620/2025, UPC_CFI_0001509/2025 and UPC_CFI_0001511/2025 combined is EUR 2,000,000.00 (only excluding court fees). In light of this agreement, the Parties respectfully submit that no further substantiation of costs is required in respect of the recoverable amount, and respectfully request that the Court reflect the agreed recoverable amount in its decision.

The Parties have not reached agreement regarding the allocation of costs and therefore respectfully request that the Court determine the allocation of the agreed amount in its decision, having regard to the Parties' submissions at the oral hearing of 3 September 2026. |

269. Therefore, the court can make a final decision on the costs of these proceedings without the need for separate cost proceedings. The agreed amount is divided 50/50 between the infringement action and the counterclaim actions. PBNT will be ordered to pay EUR 1,000,000 to GKS as a final amount in the infringement action, to which amount (only) the court fees paid by GSK must be added, and EUR 750,000 in the revocation action as total, final amount. As mentioned above, identical counterclaim files UPC_CFI_1509/2025 and UPC_CFI_1511/2025 are considered as one file. The reimbursement set for the revocation action thus applies collectively to both files.

270. The cost orders is declared immediately enforceable as requested.

IV. DECISION

For all these reasons and after having heard the parties, the Court

Partial revocation

I. Revokes claim 13 of EP 2 590 526 in the territory of the Contracting Member States of the UPCA;

Injunction

II. Prohibits the Defendants, each separately, from infringing claims 1, 2, 3, 6, 10 and 12 of EP 2 590 626 by making, offering, placing on the market, using, importing or storing for the aforementioned purposes in the Relevant Territory, i.e. all EPC countries with the exception of Ireland and the UK, with the Infringing Products, including Comirnaty and further infringing variants thereof;

Information

III. Orders the Defendants collectively to provide the representatives of GSK, within three months after service of the decision with

a. information on infringement with the Infringing Products in the Relevant Territory starting from 1 January 2020, in the form of a structured list for each calendar year and by Infringing Product, including:
   i. the origin and distribution channels of the Infringing Products;
   ii. the quantities produced, manufactured, stored, delivered, received or ordered and the prices paid for the Infringing Products;
   iii. the identity of all third parties involved in the production or distribution of the Infringing Products;

b. documentation to substantiate this information in electronic form that can be assessed using a computer, including:
   i. number of and dates on which the Infringing Products were delivered and distributed;
   ii. invoices - or, if not available, delivery bills, or similar documentation - of individual deliveries, indicating the date, quantity, price, and type of the product, for all Infringing Products sold or otherwise disposed of;
   iii. the profits generated with the Infringing Products;
   from which documents confidential information may be redacted;
   from which documents confidential information may be redacted;

c. the accuracy of which may be audited and certified by a European certified public accountant appointed by GSK at the Defendants' expense (reasonable costs only), which certified public accountant shall be bound by the confidentiality obligations towards GSK, or in the alternative, the correctness of which is confirmed by the submission of an affidavit by the CEOs of the Defendants;

Damages

IV. a. Declares that the Defendants are jointly and severally liable for damages to be paid to GSK resulting from the infringement with the Infringing Products in the Relevant Territory, to be further assessed in separate proceedings under Rule 125 RoP;

b. Orders the Defendants jointly and severally, with the provision that any amount paid by one Defendant shall discharge the other Defendants for that same amount, to pay GSK within two weeks from this decision (subject to R. 188.8) an interim award of damages in the amount of **EUR 2.000.000,**

Penalty sums

V. Orders the Defendants to pay a recurring immediately payable penalty to the Court of up to EUR 100.000 per day, part of a day counting as a full day, in case of non-compliance with the order at II. and EUR 50,000 for the order at III. (subject to the enforceability set out below) with a total maximum of EUR 50,000,000;
These penalties will be determined by the Local Division The Hague upon request by GSK (Art. 62(1) UPCA; R. 354.3 and 4 RoP).

Cost award

VI. Orders the Defendants jointly and severally to pay to GSK within two weeks from this decision, with the provision that any amount paid by one Defendant shall discharge the other Defendants for that same amount, the following amounts as compensation for costs and expenses:

i. in the infringement action **EUR 1,000,000** plus court fees and

ii. in the counterclaim action **EUR 750,000;**

Enforceability

VII. Provides that

1. the injunction at II. shall only become enforceable:
   i. after a final irrevocable decision by the Unified Patent Court;
   ii. if and in so far as PBNT have not entered into a licence agreement with GSK within three months following such final decision, and
   iii. GSK providing a notice under Rule 118.8 RoP.
2. the orders at III., IV.b, V. and VI are immediately enforceability subject to GSK providing an enforcement-notification to this effect pursuant to Rule 118(8) RoP;
3. With respect to all non-UPCA countries the orders are subject to the additional condition that the competent national courts do not hold the patent invalid;

Further requests

VIII. Rejects any further requests made by the parties.

Brinkman Presiding judge	Brinkman Edger Frank Digitally signed by Brinkman Edger Frank Date: 2026.11.10 08:24:48 -03'00'
Schilling Legally qualified judge	STEFAN SCHILLING Digital signiert von STEFAN SCHILLING DN: cn=STEFAN SCHILLING, c=DE, email=stefan.schilling@unifiedpatentcourt.org Datum: 2026.11.10 11:55:01 +01'00'
Schmidt Technically qualified judge	Martin SCHMIDT Signature numérique de Martin SCHMIDT Date : 2026.11.10 09:29:58 +01'00'
Kokke Legally qualified judge and judge rapporteur	Digitally signed Kokke Margot Elsa 2026-11-10 06:51:45 +0100 Unified Patent Court Einheitliches Patentgericht Juridiction unifiée du brevet
On behalf of the deputy registrar	Digitally signed Hageman Larissa Donata 2026-11-10 08:13:00 +0100 Unified Patent Court Einheitliches Patentgericht Juridiction unifiée du brevet

Information about appeal

An appeal against the present decision may be lodged at the Court of Appeal, by any party which has been unsuccessful, in whole or in part, in its submissions, within two months of the date of its notification (Art. 73(1) UPCA, R. 220.1(a), 224.1(a) RoP).

Information about enforcement

An authentic copy of the enforcement of the decision will be issued by the Deputy-Registrar upon request of the enforcing party, R. 69 RegR (Rules governing the Registry of the UPC). (Art. 82 UPCA, Art. Art. 37(2) UPCS, R. 118.8, 158.2, 354, 355.4 RoP).