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Allele Biotechnology and Pharmaceuticals, Inc.

UNITED STATES DISTRICT COURT

SOUTHERN DISTRICT OF CALIFORNIA

Allele Biotechnology and Pharmaceuticals, Inc., a California corporation

Plaintiff,

v.

Pfizer, Inc., a Delaware corporation; BioNTech SE, a German company; BioNTech US, Inc., a Delaware corporation; and DOES 1-30

Defendants.

Case No. 20-cv-01958-H-AGS

FIRST AMENDED COMPLAINT FOR PATENT INFRINGEMENT

JURY TRIAL DEMAND

Honorable Judge Marilyn L. Huff

Plaintiff Allele Biotechnology and Pharmaceuticals, Inc. (hereafter "Allele") brings this Complaint for monetary and declaratory relief against Defendants Pfizer, Inc., a Delaware corporation ("Pfizer"), BioNTech SE, a German company, and BioNTech US, Inc., a Delaware company (collectively "BioNTech") (and each

Defendant collectively "Defendants") to address Defendants' infringement of Allele's patent related to Defendants' COVID-19 vaccine, BNT162.

1. This action arises under the patent laws of the United States, 35 U.S.C. § 1 *et seq*., based on Defendants' infringement of United States Patent No. 10,221,221 ("the '221 Patent").

INTRODUCTION

2. Prior to the current COVID-19 crisis, Allele had already developed the revolutionary mNeonGreen. mNeonGreen belongs to Allele, as does the '221 Patent covering the exclusive right to use mNeonGreen. mNeonGreen is an artificial fluorescent that Allele painstakingly developed over many years through the genius of its inventors. It is the world's brightest monomeric fluorescent protein, dubbed by third-party industry veterans as the "King of fluorescent proteins." A prominent university used mNeonGreen to make the "gold standard" COVID-19 assay for effectively testing against vaccine candidates, which Pfizer and BioNTech readily took for their own unauthorized commercial testing and development.

3. Defendants have made, and upon information and belief are continuing to make, pre-clinical, clinical, and post-clinical use of mNeonGreen in a neutralization assay, to (a) rapidly winnow an unmanageable number of vaccine candidates down to four (4) vaccine candidates; (b) select their BNT162 mRNA-based COVID-19 vaccine candidate; (c) conduct Phase I-III clinical trials; (d) secure rapid FDA authorization for distribution of a commercial vaccine; (e) validate the commercial vaccine; and (f) further test the commercial vaccine, for example, against new COVID-19 strains.

4. Pfizer and BioNTech's approach to a COVID-19 vaccine relied on an unproven, gene-based biotechnology using messenger ribonucleic acid (mRNA).

5. BioNTech had been trying for over a decade to create such an mRNA-based therapeutic, but had not launched a single commercial product in that timeframe. Similarly, BioNTech and Pfizer had previously attempted to develop an

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mRNA flu vaccine without success. On information and belief, Defendants did not use mNeonGreen in those prior unsuccessful efforts.

6. Only through use of mNeonGreen were Defendants able to research, develop, and test their SARS-CoV-2 vaccine candidates at lightspeed, and be first to market. Allele's mNeonGreen has been an instrumental driver in selecting the most potent vaccine candidate, which has saved precious time and lives as a result. Defendants took advantage of the benefits brought by mNeonGreen to facilitate a rapid proof of concept during the discovery, research and further development of products, entry into clinical trials, regulatory approval, and sales.

7. Being first to market earned Defendants an immediate $445 million in grants. As distribution began, Pfizer raised its 2021 projections to $60 billion total revenue, $15 billion of which is from the resulting COVID-19 vaccine (leading to as much as $4.35 billion in profit off the vaccine). The benefits of this vaccine throughout the world, particularly when time is of the essence, stem from Defendants' misappropriation of Allele's breakthrough (and patented) mNeonGreen technology as stated by their own collaborators: "The icSARS-CoV-2-mNG reporter virus allows the use of fluorescence as a surrogate readout for viral replication. Compared with a standard plaque assay or median tissue culture infectious dose (TCID50) quantification, the fluorescent readout shortens the assay turnaround time by several days. In addition, the fluorescent readout offers a quantitative measure that is less labor-intensive than the traditional means of viral titer reduction. Furthermore, the mNG-virus-based assay could be automated in a high-throughput format to screen compounds against viral replication."

8. The authors, in the same publication, go on to state that "the stability of the mNG reporter virus allows it to be used for longer-term studies and *in vivo* without fear of losing its fluorescent marker. Thus, this reporter virus offers a huge advantage for the research community and pharmaceutical companies to develop therapeutics for COVID-19." In other words, mNeonGreen is the best tool for the

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application, including because of savings in labor and time, as well as sensitivity and longevity of the signal to be measured over time. Thus, the Defendants' use of mNeonGreen made possible the rapid identification and development of the leading vaccine against COVID-19, providing a significant advantage in the market and stemming the devastating worldwide effects of the virus.

9. Allele's mNeonGreen is a pioneering breakthrough in fluorescent protein technology, the latest in its history of innovation. mNeonGreen is a broad and flexible discovery-inducing innovation in biotechnology and medicine, allowing scientists and researchers to see biological subjects quickly, clearly, and with a new level of certainty—something of increased importance for therapeutics targeting COVID-19. mNeonGreen's versatility provides a wide array of uses, for example, high throughput studies in the tracking of proteins in a cell to research cell development in growing worms, a use with no relationship to veterinary or medical advancements.

10. Since 1999, Allele has been a leader in developing technology and research tools for such clinical and therapeutic uses. Among other achievements, Allele's advancements have been directed to RNA interference, Fluorescent Proteins, Induced Pluripotent Stem Cells (iPSCs), Genome Editing, and camelid derived Single Domain Antibodies, including those recently developed against SARS-CoV-2 and its UK and South African variants.

11. More recently since January of 2020, Allele has been actively engaged in combating COVID-19, initiating impactful diagnostic and therapeutic platforms premised on speed, accuracy, and sensitivity. mNeonGreen is a broad and flexible discovery-inducing innovation in biotechnology and medicine, allowing scientists and researchers to see what could not clearly and quickly be seen before—something of increased importance for therapeutics targeting COVID-19.

12. Pfizer and BioNTech's infringing uses are varied and widespread, and include, by way of example and without limit: (1) Screening at the research and

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development stage to test the potency, screening for candidates, and narrowing to lead candidates, (2) Preclinical Investigatory Uses to bring the lead candidates toward clinical evaluation, (3) Clinical Trial Uses, and, on information and belief, (3) Post-Approval Marketing Uses. Plaintiff Allele brings this lawsuit because Defendants did not so much as pick up the phone and seek to obtain the rights to use Allele's valuable intellectual property. Instead, Defendants made the deliberate and calculated decision to infringe the '221 patent-in-suit, in order to gain a successful "full speed ahead" advantage, which brought them first to market both domestically and internationally.

JURISDICTION AND VENUE

13. This is an action for patent infringement arising under the patent laws of the United States, 35 U.S.C. § 271.

14. This Court has subject matter jurisdiction over this action under 28 U.S.C. §§ 1331, 1332 and 1338(a).

15. This Court has personal jurisdiction over Defendants because Defendants regularly conduct business within, and specifically direct their business activities to, the State of California and the Southern District of California ("this District"). Defendants have purposefully availed themselves of the opportunity to conduct business in this state through systematic and continuous dealings in this state. Defendants' actions that give rise to personal jurisdiction include, but are not limited to the following: making and using infringing products in this State and in this District, knowing and intending that the infringing products would be used in this District, deriving substantial revenue from the use of infringing products within this District, and expecting their infringing actions to have consequences in this District.

16. Venue is proper as to BioNTech SE in this judicial district pursuant to, *inter alia*, 28 U.S.C. § 1391(c)(3).

17. Venue also is proper as to Defendants under 28 U.S.C. § 1400(b). Each Defendant has committed, induced others to commit, or contributed to others committing, acts of infringement in this District, including by conducting Phase I, II,

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and III clinical trials of the vaccine within the United States and overseas, utilizing mNeonGreen with over 40,000 participants and study sites including in San Diego County, under Clinical Study Identifier NCT04368728. Pfizer has a regular and established place of business in La Jolla, California which, on information and belief, is a 25-acre campus with over half a million square feet of buildings and "one of the largest concentrations of academic and biotechnology institutions in the world." BioNTech has a regular and established place of business at 11535 Sorrento Valley Rd #400, San Diego, CA, namely its 15,000 square foot US laboratory, research and development facility, which it identified as of January 2020 as its U.S. research and development hub.

THE PARTIES

18. Allele is a California corporation with its principal place of business being, 6404 Nancy Ridge Drive, San Diego, California 92121.

19. Allele was founded in 1999 and is recognized as a leading developer of technologies for clinical and therapeutic use. These include research tools for inducing discoveries in a variety of spaces in the life-sciences, including but not limited to investigation, winnowing, and validation of drug and vaccine candidates, as in the ever-changing race to prevent, treat, and cure COVID-19.

20. Defendant Pfizer is a company organized and existing under the laws of the State of Delaware with its principal place of business at 235 East 42nd Street, New York, NY 10017.

21. Defendant BioNTech SE, is a company organized and existing under the laws of Germany, traded in the United States on the NASDAQ, with its principal place of business located in An der Goldgrube 12 Mainz, 55131 Germany. Defendant BioNTech US, Inc. is a company organized and existing under the laws of the State of Delaware with, on information and belief, its principal place of business located in Cambridge, Massachusetts.

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22. The true names and capacities, whether individual, corporate, associate, or otherwise, of defendants DOES 1 through 30, inclusive, are unknown to Allele, who therefore sues said defendants by such fictitious names. Allele will amend this Complaint to state their true names and capacities when the same is ascertained. Allele is informed and believes that at all times herein mentioned, each defendant named herein was the agent of each of the remaining defendants and, in doing the things herein alleged, was acting within the course and scope of said agency. Any reference in this Complaint to the actions or inactions of any defendant, whether such reference is made to such defendant by specific name or otherwise, is also a reference to the actions or inactions of DOES 1 through 30, inclusive.

23. Defendant Pfizer since early 2020 has been, among other things, engaged with BioNTech in the development of their BNT162 MRNA-based vaccine, which was first narrowed from a larger number of candidates using a research tool that is based fundamentally on Allele's mNeonGreen. Through continued unauthorized use of mNeonGreen, Defendants' vaccine candidate was further evaluated, and eventually authorized for use by the FDA on December 11, 2020 after, on information and belief, clinical trials involving at least about 40,000 participants.

24. At all times mentioned herein, Defendants, and each of them, were the agents, servants, co-conspirators, or employees of one another, and the acts and omissions herein alleged were done or suffered by them, acting individually and through or by their alleged capacity, within the scope of their authority. Each of the defendants aided and abetted and rendered substantial assistance in the accomplishment of the acts complained of herein. In taking the actions, as particularized herein, to aid and abet and substantially assist in the commission of the misconduct complained of, each defendant acted with an awareness of his, her or its primary wrongdoing and realized that his, her or its conduct would substantially assist in the accomplishment of that misconduct and was aware of his, her or its overall contribution to, and furtherance of the conspiracy, common enterprise, and

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common course of conduct. Defendants' acts of aiding and abetting included, inter alia, all of the acts each defendant is alleged to have committed in furtherance of the conspiracy, common enterprise, and common course of conduct complained of herein.

FACTS

Background

25. Messrs. Nathan C. Shaner, Gerard G. Lambert, Yuhui Ni, and Jiwu Wang are joint inventors (collectively "Inventors") of the '221 Patent, entitled "Monomeric yellow-green fluorescent protein from cephalochordate" and which issued on March 5, 2019. A true and correct copy of the '221 Patent is attached hereto as Exhibit 1.

26. The '221 Patent will expire on or about December 8, 2033 if all maintenance fees are timely paid (*i.e.* in approximately 13 years).

27. Although the invention(s) set forth in the '221 Patent are best described by its claims, the '221 Patent is generally directed to isolated nucleic acid sequences encoding a monomeric green/yellow fluorescent proteins, and fragments and derivatives thereof.

28. On April 28, 2014, the Inventors assigned the yet-to-be-issued '221 Patent to Allele. A true and correct copy of the assignment is attached hereto as Exhibit 2.

29. The claims of the '221 Patent encompass Allele's mNeonGreen product, which is a fluorescent protein used as a biological tag in genetic engineering work. mNeonGreen is a monomeric protein that was derived from a tetrameric wild-type yellow-green fluorescent protein isolated from the cephalochordate *Branchiostoma lanceolatum* (a "lanYFP"). In nature, two lanYFP monomers form a dimer and two dimers form an "obligate" (mandatory) tetramer. When exposed to certain wavelengths of light, the lanYFP tetramer will brightly fluoresce. However, the tetramer is large and often unsuitable as a fluorescent tag. The engineered

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mNeonGreen monomer is among the brightest and most stable monomeric fluorescent reporter proteins currently known. As described in the patent, the mNeonGreen proteins "have exceptional utility as a biomarker and/or protein fusion tag, and have shown great usefulness as a FRET acceptor for the newest generation of cyan fluorescent proteins."

30. The resulting mNeonGreen, synthetic lanYFP fluorescent protein described and claimed in the '221 Patent is widely recognized as a breakthrough, is used throughout the industry, and has been called the "King of fluorescent proteins" by Professor Amy Palmer, at the University of Colorado Boulder. Applications involving infectious viruses, such as COVID-19 vaccine work, are high concentration environments perfectly suited for mNeonGreen, as broadly recognized. *See,* Xie, et al*, Cell Host & Microbe 27, 841-848* (May 13, 2020) and Muruato, et al., bioRxiv preprint: https://doi.org/10.1101/2020.05.21.109546 (May 22, 2020), true and correct copies of each attached hereto as Exhibit 3 (hereafter "Cell Host Article") and Exhibit 4, respectively.

31. The commercial protein of mNeonGreen corresponds to SEQ ID NO:1 of the patent (claims 1, 3, 4 and 5). Allele used the nucleic acid of SEQ ID NO:2 (claim 3) to express this protein.

32. The '221 Patent (and the mNeonGreen technology covered by it) is not a patented invention subject to review by the FDA or any Federal law which regulates the manufacture, use, or sale of drugs or veterinary biological products. As a result, the '221 Patent is also ineligible for patent term extension under 35 U.S.C. § 156.

33. In practice, mNeonGreen facilitates quick, targeted, and incredibly precise research in many different fields, including during investigation and winnowing of vaccine candidates to treat COVID-19, as well as post-authorization marketing and research for independent commercial purposes. The fluorescent-tagged therapeutic proteins associated with mNeonGreen are constructed to determine receptor expression and dynamics with therapeutic outcome for high-

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throughput systems, as in the present global race for a vaccine to COVID-19. A key hurdle in developing a vaccine for infectious diseases, such as the novel coronavirus of COVID-19, is narrowing many candidates to a manageable amount by determining therapeutic outcome of potential drug candidates against COVID-19 strains, something which mNeonGreen readily solves.

34. Where there is a race against time, weaker fluorescent alternatives are simply no option. mNeonGreen was the critical link in Defendants' COVID-19 vaccine development for narrowing many candidates to a manageable amount, its Phase I, II, and III trial success, authorization by the FDA, commercial use authorizations overseas thereafter, and on information and belief, obtaining marketing data as to effectiveness against other strains of the COVID-19 virus. This research tool is even more critical in a global pandemic where the need for a vaccine to save lives has never been more crucial. While Defendants were required to obtain a commercial license from Allele, Defendants never sought a license with Allele or even contacted them.

Accused Products

35. In early 2020, Defendants Pfizer and BioNTech jointly agreed to develop and bring to market a COVID-19 vaccine, both within and outside the US.

36. Defendants needed a way to safely, reliably, and rapidly evaluate a larger number of vaccine candidates and therefore used mNeonGreen in a reporter assay to narrow those candidates down to only four (4), and then to one.

37. On or about April 29, 2020, Defendants initiated Phase I of their COVID-19 vaccine trial, in part to further evaluate and narrow COVID-19 vaccine candidates. Phase II of their COVID-19 trial initiated on June 19, 2020 to further evaluate vaccine candidates with an expanded cohort. Throughout each of Phases I and II of their COVID-19 vaccine trial, Defendants Pfizer and BioNTech analyzed patient samples using an mNeonGreen neutralization assay to evaluate COVID-19

neutralizing antibody levels. The FDA did not require that Defendants use a neutralization assay with mNeonGreen, but Defendants did so anyway.

38. For example, BioNTech admitted it used mNeonGreen technology in Phases I and II of its COVID-19 vaccine trial to assess "various BNT162 mRNA vaccine candidates." *See,* SEC Form 6K dated July 1, 2020, a true and correct copy of which is attached hereto as Exhibit 5.

39. At page 21 of Form 6K shown in Exhibit 5 at Page 73, BioNTech states, "[t]he SARS-CoV-2 neutralization assay used a previously described strain of SARS-CoV-2 (USA_WA1/2020) that had been rescued by reverse genetics and engineered by the **insertion of an mNeonGreen (mNG) gene** into open reading frame 7 of the viral genome." (Emphasis added.) Stated differently, the COVID-19 vaccine of Defendants' COVID-19 vaccine trial was discovered and researched by Defendants using an mNeonGreen neutralization assay, a research tool built on a DNA construct with a monomeric mNeonGreen protein, patented by Allele, inserted into the recombinant and infectious SARS-CoV-2 virus.

40. mNeonGreen was not, and is not, regulated by the FDA or any government agency or federal law, particularly those involving drugs, biologics, or medical devices or implicated by 35 U.S.C. § 271(e)(1). Allele's '221 Patent covering mNeonGreen was not, and is not, eligible for patent term extension under 35 U.S.C. § 156. The FDA also did not require that Defendants use the mNeonGreen Neutralization Assay in their vaccine work—Defendants chose to.

41. Further, Defendant BioNTech's Form 6K includes a copy of Mulligan et al., Phase I/II Study to Describe the Safety and Immunogenicity of a COVID-19 RNA Vaccine Candidate (BNT162b1) in Adults 18 to 55 Years of Age: Interim Report ("Mulligan"), a medRxiv preprint made available on July 1, 2020 at https://doi.org/10.1101/2020.06.30.20142570.

42. Mulligan contains additional information about BioNTech's work. *See* Exhibit 5 Page 62 (Exhibit 99.2, Mulligan p. 1). For example, Mulligan reported

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dose-dependent titers of neutralizing antibodies in human subjects with safe (mild to moderate) adverse reactions:

> The SARS-CoV-2 neutralization assay used a previously described strain of SARS-CoV-2 (USA_WA1/2020) that had been rescued by reverse genetics and engineered by the **insertion of an mNeonGreen (mNG) gene** into open reading frame 7 of the viral genome.[20] This reporter virus generates similar plaque morphologies and indistinguishable growth curves from wild-type virus. Viral master stocks used for the neutralization assay were grown in Vero E6 cells as previously described.[20]

Exhibit 5 Page 73 (at Exhibit 99.2, page 12).

43. In other words, while not required by the FDA to use mNeonGreen, BioNTech admits in Exhibit 5 that it used in Phases I and II of their COVID-19 vaccine trial the DNA construct described in the Cell Host Article, which contains and is fundamentally based on the mNeonGreen research tool, to research its SARS-CoV-2 vaccine candidates.

44. Defendants continued using the infringing DNA construct described in the Cell Host Article, including for example in Phase III trials and for commercial purposes such as validation, quality control, promotion, and marketing advantage.

45. Defendants have not used mNeonGreen in order to enter the market with a product that competes with mNeonGreen. mNeonGreen is not a patented drug with a soon-to-expire patent term and Defendants did not need to establish bioequivalence of a generic substitute of mNeonGreen to enter the market with their vaccine). Defendants have not conducted appropriately limited safe harbor testing so that their vaccine could be pre-approved and ready to launch as soon as the '221 Patent expires.

46. On the contrary, Defendants have an FDA authorization for their own product, have launched, did infringe, and on information and belief continue to infringe, openly and intentionally, many years before the '221 Patent will expire, in total disregard for Plaintiff's rights and Plaintiff's crucial contribution to the success of Defendants' vaccine.

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47. Using the data premised on Defendants' use of mNeonGreen, Defendants have successfully received commercial authorizations for their COVID-19 vaccine outside the United States, and foreign sales are projected to comprise the majority of Defendants' COVID-19 vaccine sales. For example and without limitation, Defendants received commercial authorization to enter into contracts and distribute their COVID-19 vaccine in the European Union, the United Kingdom, South Africa, Japan, Canada, Mexico, Colombia, Saudi Arabia, Turkey, South Korea, Australia, and Argentina. With each passing day, more foreign regulators approve of Defendants' vaccine based on the data incorporating the unauthorized use of mNeonGreen—*i.e.* uses of mNeonGreen not solely and reasonably related to the development and submission of information to the FDA in the United States—but to procure lucrative vaccine contracts. Defendants have misused Plaintiff's '221 Patent and mNeonGreen without authorization to develop a patented product of their own.

48. Defendants forecasted producing globally up to 50 million vaccine doses in 2020, up to 1.3 billion doses in 2021, and corresponding sales numbers approximating $26.44 billion (far higher than even their revised FTC projections), having the great benefit of the very quick and confident progress afforded through their unauthorized use of mNeonGreen and resulting in Defendants' success as the first to market an effective COVID-19 vaccine.

49. On information and belief, while not required by the FDA and instead for marketing purposes, Defendants have continued to use the mNeonGreen neutralization assay as a research tool to evaluate their commercially authorized COVID-19 vaccine against at least 20 new COVID-19 strains.

50. Simultaneously, in order to prevent other market participants from manufacturing or distributing BNT162 or another vaccine built off Defendants' results, Defendants have (1) applied for patent coverage related to their COVID-19 vaccine efforts stemming from their mNeonGreen uses, and (2) forcefully opposed

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the World Health Organization's initiative to expand vaccine access to poor countries by granting compulsory patent rights or otherwise relaxing patent laws.

Defendants Used and Continue Using the MNeonGreen Neutralization Assay At All Times

51. Scientists from UTMB, who provided the mNeonGreen-SARS-CoV-2 DNA construct to Defendants, reported an "urgently needed ... fluorescent-based SARS-CoV-2 neutralization assay" with "gold standard" results. *See* Exhibit 4 Page 40). The assay of Exhibit 4 "was built on a stable mNeonGreen SARS-CoV-2" reporter virus (*Id*., at 41) (citing the Cell Host Article) and is "superior ... because it measures functional SARS-CoV-2 neutralizing activity…. [T]he mNeonGreen reporter assay [aka mNeonGreen neutralization assay] offers a rapid, high throughput platform to test COVID-19 patient sera not previously available." *Id.*, at 43-44. The Cell Host Article also evidences that UTMB made a "reverse genetics system" for SARS-CoV-2 by assembling seven cDNA fragments into a full-genome cDNA of the virus. The recombinant virus has been distinguished from wild-type SARS-CoV-2. *See* Cell Host Article at Exhibit 3 at 29, 31 (842, Fig. 2E). RNA transcribed from this cDNA produced a highly infectious virus that, according to UTMB, "recapitulates the replication kinetics of the original clinical isolate." *Id.*, at 29.

52. mNeonGreen was incorporated into this cDNA to make a reporter virus:

> **We generated a stable mNeonGreen SARS-CoV-2 (icSARS-CoV-2-mNG)** by introducing this reporter gene into ORF7 of the viral genome. icSARS-CoV-2-mNG was successfully used to evaluate the antiviral activities of interferon (IFN). Collectively, the reverse genetic system and reporter virus provide key reagents to study SARS-CoV-2 and develop countermeasures.

Cell Host Article at Exhibit 3 at 28 (841 (Summary)), Exhibit 3 at 30, 32 (843, Fig. 3A).

53. While the Cell Host Article describes an mNeonGreen neutralization assay, for SARS-CoV-2, it emphasizes the robustness of using mNeonGreen as a gold standard tool for rapid characterization and development of "countermeasures"

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for a variety of emerging infections. As a representative example of such emerging viruses, the authors of the Cell Host Article developed a SARS-CoV-2 reporter tool, the aforementioned mNeonGreen neutralization assay, with the "**mNeonGreen virus [] be[ing] reliably used** to study viral replication and pathogenesis as well as to develop vaccines and antiviral drugs." *Id.* at 29, 30. The authors further describe the mNeonGreen reporter virus as "a reliable surrogate for high-throughput drug discovery" that "represents a major tool for the research community and significantly advances opportunities for countermeasure development for COVID-19." *Id*. at 34.

54. The Key Resources Table of the Cell Host Article lists "**synthesized mNeonGreen gene (sequence optimized)**" and refers to a publication from 2013 by the Inventors which corresponds to the '221 Patent. See, Cell Host Article at e1, e2.

55. mNeonGreen in UTMB's construct is identical to SEQ ID NO:1 of the '221 patent.

56. Mulligan of Exhibit 5 also states, "BioNTech is the Sponsor of the study" and that "Pfizer was responsible for the design, data collection, data analysis, data interpretation, and writing of the report," confirming Defendants' intimate involvement in every aspect of the study. *See* Exhibits 6, 7, and 8 with true and correct copies of each attached hereto which confirm mNeonGreen's continued use by Defendants in their development of a COVID-19 vaccine. Defendants directly used the invention patented in the '221 Patent, and for which Defendants have since obtained hefty government grants and sales. Exhibit 5 Page 66 (at Exhibit 99.2 p. 5).

57. While not required by the FDA, Defendants, on information and belief, continue using the mNeonGreen neutralization assay or variant thereof, which includes mNeonGreen, to research SARS-CoV-2-neutralizing antibody levels against at least 20 new COVID-19 strains. The purpose of this infringing use is to compete in the marketplace against other COVID-19 vaccines, by highlighting to potential purchasers and users of the vaccine added benefits of using Defendant's

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BNT162 vaccine instead of other vaccines. These uses are referred to herein as "Post-Approval Marketing Use."

58. A protein made using the DNA construct used by Defendants has "at least one" of the mutations in claim 1, at least three of the mutations in claim 4, at least 95% sequence identity according to claims 1, 2, and 4; has at least 97% sequence identity according to claim 5, and has a monomer according to claim 2.

59. Therefore, the mNeonGreen protein used by Defendants, including in mNeonGreen neutralization assays, literally infringes at least claims 1, 2, 4 and 5 of the '221 Patent.

60. At no time has Allele granted Defendants authorization, license, or permission to practice the inventions claimed in the '221 Patent.

61. Because of this continued infringement, Defendants were able to identify their COVID-19 vaccine candidate, BNT162, as the most promising candidate to commercialize and be the first COVID-19 vaccine authorized for commercial use in the United States and worldwide.

Defendants' Willful Infringement

62. The '221 Patent was issued by the United States Patent and Trademark Office. As an issued patent, the '221 Patent has a presumption of validity per 35 U.S.C. § 282.

63. At least claims 1, 2, 4 and 5 of the '221 Patent have all of their limitations met by the Accused Product, which thus infringes the '221 Patent.

64. Since at least as early as May 2020, Defendants have been aware of the '221 Patent, and have had actual knowledge of the '221 Patent and the obvious risk of infringement by continued use of mNeonGreen throughout their development of their COVID-19 vaccine candidate in the United States.

65. Despite their knowledge of the obvious risk of infringement of the '221 Patent, Defendants since at least as early as May of 2020 continued using Allele's mNeonGreen throughout their COVID-19 vaccine trials and, on information and

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belief, after their post-FDA authorization of commercial use of their COVID-19 vaccine.

66. Defendants' continued infringement was and is subjectively reckless and intentional. Defendants have infringed the '221 Patent in a willful and egregious manner, in wanton disregard of the '221 Patent.

FIRST CLAIM FOR RELIEF

(Infringement of the '221 Patent Against All Defendants)

67. Allele realleges and incorporates by reference all paragraphs in this Complaint above as if fully set forth herein.

68. This is a claim for patent infringement and arises under the Patent Laws of the United States and, in particular, under 35 U.S.C. §§ 271, *et seq*.

69. Defendants have in the past infringed and continue to infringe the '221 Patent in violation of 35 U.S.C. § 271(a) by making, using, offering to sell, and/or selling, in the United States, or importing into the United States, mNeonGreen with its SARS-CoV-2 neutralization assay and DNA construct that infringes at least claims 1, 2, 4, and 5, of the '221 Patent.

70. Allele is informed and believes that Defendants have infringed, and continue to infringe, the '221 patent by making, using, selling, offering for sale and/or licensing products covered by at least claims 1, 2, 4, and 5 of the '221 Patent without Allele's authorization or consent.

71. Defendants have in the past infringed and continue to infringe the '221 Patent in violation of 35 U.S.C. § 271(f) because Defendants supply or cause to be supplied from the United States all or a substantial portion of the patented invention for combination outside the United States, including use of mNeonGreen with its SARS-CoV-2 neutralization assay and DNA construct throughout their COVID-19 vaccine trial in the United States and outside the United States, in a manner that would infringe at least claims 1, 2, 4, and 5 of the '221 Patent, if such combination occurred within the United States.

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72. Section 287 of Chapter 35 of the U.S.C. has been satisfied.

73. Defendants' infringing conduct will continue unless enjoined by this Court.

74. Defendants' acts of direct infringement have been, and continue to be, willful and deliberate and Defendants' acts of indirect infringement were, and continue to be, knowing and intentional.

75. Allele is entitled to an award of damages adequate to compensate Allele for patent infringement, as well as prejudgment interest from the date the infringement began, but in no event less than a reasonable royalty as permitted by 35 U.S.C. § 284.

76. Allele is entitled to an award of treble damages for the period of any willful infringement pursuant to 35 U.S.C. § 284.

77. Allele is entitled to a finding that this case is exceptional and an award of interest, costs and attorneys' fees incurred by Allele in prosecuting this action as provided by 35 U.S.C. § 285.

78. Allele is entitled to an award of pre-judgment and post-judgment interest as provided by law.

79. Allele is entitled to such other and further relief as this Court or a jury may deem just and proper.

PRAYER FOR RELIEF

WHEREFORE, in consideration of the foregoing, Allele respectfully prays for a judgment against Defendants:

A. Finding that the '221 Patent has been infringed by Defendants in violation of 35 U.S.C. §271;

B. Finding that Defendants' infringement of the '221 Patent is willful;

C. An award of damages adequate to compensate Allele for patent infringement, as well as prejudgment interest from the date the infringement began, but in no event less than a reasonable royalty as permitted by 35 U.S.C. § 284;

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D. An award of treble damages for the period of any willful infringement pursuant to 35 U.S.C. § 284;

E. A finding that this case is exceptional and an award of interest, costs and attorneys' fees incurred by Allele in prosecuting this action as provided by 35 U.S.C. § 285;

F. For an award of pre-judgment and post-judgment interest as provided by law; and

G. For such other and further relief as this Court or a jury may deem just and proper.

Dated: February 25, 2021

Respectfully Submitted,

TROUTMAN PEPPER HAMILTON SANDERS LLP

/s/ Ben Lewis Wagner
Ben Lewis Wagner

Attorneys for Plaintiff
Allele Biotechnology and Pharmaceuticals, Inc.

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DEMAND FOR JURY TRIAL

Plaintiff Allele Biotechnology and Pharmaceuticals, Inc. hereby demands a trial by the jury on its claims herein and all issues and claims so triable in this action.

Dated: February 25, 2021

Respectfully Submitted,

TROUTMAN PEPPER HAMILTON SANDERS LLP

/s/ Ben Lewis Wagner
Ben Lewis Wagner

Attorneys for Plaintiff
Allele Biotechnology and
Pharmaceuticals, Inc.

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