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Patent Issues Confronting Cell and Gene Therapy Products

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I. Overview of Cell and Gene Therapy Products

a. Introduction

Cell and gene therapies are two relatively new treatment modalities that have emerged as promising approaches in the treatment or prevention of disease and, in particular, the treatment of rare and often life threatening or debilitating diseases. Cell and gene therapies are directed to manipulating and modifying a patient's cells to achieve a therapeutic effect and can provide the ability to tailor and target therapies specific for a particular patient and achieve results previously unavailable to clinicians.

Cell and gene therapies are generally directed to the treatment of small patient populations for whom standard therapies have been ineffective. As such, those developing these products will seek to protect their investments through patent protection. And because cell and gene therapies operate at the cellular level and involve

the transformation of a patient's cells, the patent landscape for such therapies is complex and covers a wide range of aspects.

Although academic research institutions and biotech startups have primarily conducted initial research and development related to cell and gene therapies, growth opportunities have attracted increased research and investment more broadly, including the largest pharmaceutical companies. This article provides insight into some of the opportunities, challenges, and uncertainties surrounding patent protection of cell and gene therapy products, including an overview of the patent landscape and recent U.S. patent law developments.

b. Cell and Gene Therapy Products Defined

While closely related and to a certain extent overlapping, cell and gene therapies can be differentiated by their intended purpose. Cell therapies generally involve the manipulation of a cell to alter its function to provide a therapeutic effect, whereas gene therapies generally involve the replacement, inactivation or introduction of genes into cells, including to restore function when a patient's gene is missing or defective.

The United States Food and Drug Administration ("FDA") provides a global definition of "gene therapy" which encompasses both cell and gene therapies:

> Human gene therapy seeks to modify or manipulate the expression of a gene or alter the biological properties of living cells for therapeutic use. FDA generally considers human gene therapy products to include all products that mediate their effects by transcription or translation of transferred genetic material, or by specifically altering host (human) genetic sequences. Some examples of gene therapy products include nucleic acids (e.g., plasmids, in vitro transcribed ribonucleic acid (RNA)), genetically modified microorganisms (e.g., viruses, bacteria, fungi), engineered site-specific nucleases used for human genome editing, and ex vivo genetically modified human cells. Gene therapy products meet the definition of "biological product" in section 351(i) of the Public Health Service Act (42 U.S.C. 262(i)) when such products are applicable to the prevention, treatment, or cure of a disease or condition of human beings.[1]

[1] U.S. FOOD & DRUG ADMIN., FDA Guidance: Interpreting Sameness of Gene Therapy Products Under the Orphan Drug Regulations (Sept. 2021), https://www.fda.gov/regulatory-information/search-fda-guidance-documents/interpreting-sameness-gene-therapy-products-under-orphan-drug-regulations.

The American Society of Cell and Gene Therapy provides the following descriptions of cell and gene therapies:

> **Cell Therapy** is the transfer of cells into a patient with the goal of improving a disease. Some cell therapies are routine, like blood transfusions. One approach is gene-modified cell therapy, which removes the cells from the patient's body, then a new gene can be introduced or a faulty gene can be corrected. The modified cells are then put back into the body. An example of this approach is CAR-T cell therapy.
>
> **Gene Therapy** is the use of genetic material in the treatment or prevention of disease. Typically, genetic material, such as a working copy of a gene, is delivered to cells using a vector. A vector is often derived from a virus. For safety, all viral genes are removed and the vector is modified to only deliver therapeutic genes into the cells. Once in the cell, a working copy of the gene will help make proteins despite the presence of a faulty gene. Achieving the normal expression and function of proteins makes a big impact on our overall health. [2]

c. The U.S. Regulatory Pathway for Cell and Gene Therapy Products

Cell and gene therapy products are regulated as biologic drug products in the U.S. and are therefore governed under Section 351 of the Public Health Service Act.[3] Biologic drugs are reviewed by the FDA's Center for Biologics Evaluation and Research ("CBER") and Center for Drug Evaluation and Research ("CDER"). The Biologics Price Competition and Innovation Act of 2009 (the "BPCIA") provides for regulatory exclusivities for approved biologic products and for an accelerated pathway for the approval of "biosimilar" versions of innovator biologic products. The BPCIA

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[2] Am. Soc. of Gene Cell Therapy, *Different Approaches*, https://patienteducation.asgct.org/gene-therapy-101/different-approaches (last updated Nov. 5, 2021). *See also*, Wuyuan Zhou & Xiang Wang, *Human gene therapy: a patent analysis*, Gene, Vol. 803 (Nov. 30, 2021) ("Gene therapy is an emerging experimental treatment that delivers functional genes into the human body to counter or replace malfunctioning genes, thus curing diseases without pharmacological intervention, radiotherapy, or surgery.").

[3] Codified at 42 U.S.C. § 262.

also provides procedures for innovator companies to assert patents against applicants seeking to market biosimilar versions of the innovator's approved product.[4]

d. FDA Approved Cell and Gene Therapy Products

In 2017, the FDA approved the first cell therapy product in the United States, Kymriah®, and also the first gene therapy product, Luxturna©. Subsequently, five additional oncolytic and gene therapy products have been approved. The twenty-five cell and gene therapy products approved by the FDA to date are summarized below[5]:

[4] Biologic drug products and the BPCIA regime providing for regulatory and patent exclusivities for innovators and the pathway for biosimilar approval is covered in Chapter 14 of the author's treatise Pharmaceutical and Biotech Patent Law, published by the Practicing Law Institute.

[5] *See* U.S. FOOD & DRUG ADMIN., Approved Cellular and Gene Therapy Products, https://www.fda.gov/vaccines-blood-biologics/cellular-gene-therapy-products/approved-cellular-and-gene-therapy-products (last updated Sept. 19, 2022). Note that products approved prior to 2017 do not involve gene manipulation. Asterisks (*) indicate indications approved under accelerated approval.

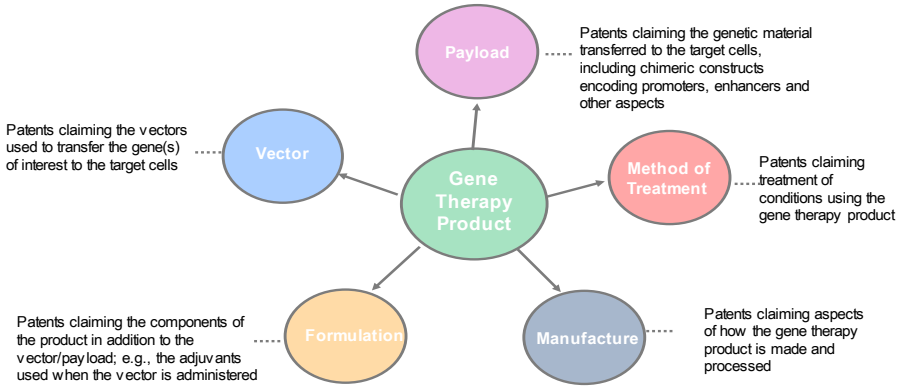
Product Name	Manufacturer	Original Approval Date	Approved Indications
ABECMA	Celgene Corporation	March 26, 2021	Relapsed or refractory multiple myeloma after four or more prior lines of therapy
ALLOCORD (HPC, Cord Blood)	SSM Cardinal Glennon Children's Medical Center	May 30, 2013	Disorders affecting the hematopoietic system that are inherited, acquired, or result from myeloablative treatment
BREYANZI	Juno Therapeutics, Inc.	February 5, 2021	Relapsed or refractory large B-cell lymphoma
CARVYKTI	Janssen Biotech, Inc.	February 28, 2022	Relapsed or refractory multiple myeloma after four or more prior lines of therapy
CLEVECORD (HPC, Cord Blood)	Cleveland Cord Blood Center	September 1, 2016	Disorders affecting the hematopoietic system that are inherited, acquired, or result from myeloablative treatment
DUCORD (HPC, Cord Blood)	Duke University School of Medicine	October 4, 2012	Disorders affecting the hematopoietic system that are inherited, acquired, or result from myeloablative treatment
GINTUIT	Organogenesis Inc.	March 9, 2012	Mucogingival conditions
HEMACORD (HPC, Cord Blood)	New York Blood Center, Inc.	November 10, 2011	Disorders affecting the hematopoietic system that are inherited, acquired, or result from myeloablative treatment
HPC, Cord Blood	Clinimmune Labs, University of Colorado Cord Blood Bank	May 24, 2012	Disorders affecting the hematopoietic system that are inherited, acquired, or result from myeloablative treatment
HPC, Cord Blood	MD Anderson Cord Blood Bank	June 21, 2018	Disorders affecting the hematopoietic system that are inherited, acquired, or result from myeloablative treatment
HPC, Cord Blood	LifeSouth Community Blood Centers, Inc.	June 13, 2013	Disorders affecting the hematopoietic system that are inherited, acquired, or result from myeloablative treatment
HPC, Cord Blood	Bloodworks	January 28, 2016	Disorders affecting the hematopoietic system that are inherited, acquired, or result from myeloablative treatment
IMLYGIC	BioVex, Inc.	October 27, 2015	Unresectable cutaneous, subcutaneous, and nodal lesions in patients with melanoma recurrent after initial surgery

Product Name	Manufacturer	Original Approval Date	Approved Indications
KYMRIAH	Novartis Pharmaceuticals Corporation	August 30, 2017	Relapsed or refractory B-cell acute lymphoblastic leukemia in pediatric and young adult patients Relapsed or refractory diffuse large B-cell lymphoma in adults after two or more lines of therapy Relapsed or refractory follicular lymphoma in adults after two or more lines of therapy
LAVIV	Fibrocell Technologies, Inc.	June 21, 2011	Moderate to severe nasolabial fold wrinkles in adults
LUXTURNA	Spark Therapeutics, Inc.	December 19, 2017	Confirmed biallelic RPE65 mutation-associated retinal dystrophy
MACI	Vericel Corporation	December 13, 2016	Symptomatic, single or multiple full-thickness cartilage defects of the knee with or without bone involvement
PROVENGE	Dendreon Corporation	April 29, 2010	Asymptomatic or minimally symptomatic metastatic castrate resistant (hormone refractory) prostate cancer
RETHYMIC	Enzyvant Therapeutics GmbH	October 8, 2021	Congenital athymia in pediatric patients
SKYSONA	bluebird bio, Inc.	September 16, 2022	Early, active cerebral adrenoleukodystrophy in patients less than 18 years of age
STRATAGRAFT	Stratatech Corporation	June 15, 2021	Thermal burns containing intact dermal elements for which surgical intervention is clinically indicated in adults
TECARTUS	Kite Pharma, Inc.	July 24, 2020	Relapsed or refractory mantle cell lymphoma in adults* Relapsed or refractory B-cell precursor acute lymphoblastic leukemia in adults

Product Name	**Manufacturer**	**Original Approval Date**	**Approved Indications**
YESCARTA	Kite Pharma, Inc.	October 18, 2017	Large B-cell lymphoma that is refractory to first-line chemoimmunotherapy or that relapses within 12 months of first-line chemoimmunotherapy in adults Relapsed or refractory large B-cell lymphoma after two or more lines of therapy in adults Relapsed or refractory follicular lymphoma after two or more lines of therapy in adults*
ZYNTEGLO	bluebird bio, Inc.	August 17, 2022	β-thalassemia requiring regular red blood cell transfusions in adult and pediatric patients
ZOLGENSMA	Novartis Gene Therapies, Inc.	May 24, 2019	Spinal muscular atrophy in pediatric patients less than 2 years of age with bi-allelic mutations in the survival motor neuron 1 (SMN1) gene

II. Patent Landscape for Cell and Gene Therapy Products

At a high level, cell and gene therapies patenting activity has tended to fall into four main areas: patents directed to (1) basic biology of the gene and diseases (e.g., antisense modulation, RNA & DNA editing); (2) diseases being treated (e.g., cancers, diabetes, asthma), (3) gene delivery methods (e.g., stem cells, vector technologies) for delivering genetic material to the target cells; and (4) potential adverse events (e.g., immune response, immune suppressive treatment).[6] Additional patents surrounding cell and gene therapies include patents directed to formulation of the product (including adjuvants), dosing and administration, and manufacture (including methods of cell growth and culture, processing, and purification). In particular, there has been significant patenting activity directed to viral and non-viral vectors for the delivery of genetic materials to target cells.[7]



Due to the complexity of the cell and gene therapy patent landscape, and because relevant platform technologies and associated patents may be developed and owned by multiple entities, licensing of patents is expected to be relatively common in the cell and gene therapy field.

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[6] *See* Zhou & Wang, *supra*, at 2.

[7] *See id.* at Fig. 1(d) (showing patenting activity for vectors).

III. Current Patent Issues and Disputes Relating to Cell and Gene Therapy Products

a. Section 101 and 112 Issues Impacting Cell and Gene Therapy Products

i. Patent Eligibility

Under Section 101 of the Patent Act, "any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof" is patent eligible.[8] However, the Supreme Court has long held that this provision contains an implicit exception for laws of nature, natural phenomena, and abstract ideas, which are not patentable.[9] At the same time, the Court has also stressed that an invention is not rendered ineligible for patent protection merely because it involves a law of nature, natural phenomenon, or abstract idea because "[a]t some level, 'all inventions . . . embody, use, reflect, rest upon, or apply laws of nature, natural phenomena, or abstract ideas.'"[10]

In 2012, the Supreme Court set forth a two-step framework, commonly known now as the "*Alice/Mayo* test," for distinguishing patents that claim such patent-ineligible exceptions from patents that claim patent-eligible applications of those concepts. In step one of the *Alice/Mayo* test, the court determines whether the claims of the patent are directed to a law of nature, natural phenomenon, or abstract idea, focusing on the claim as a whole. If the claims are directed to such a concept, the inquiry proceeds to step two, where the court examines whether the additional elements, considered individually and as an ordered combination, transform the nature of the claim into a patent-eligible application.

Over the past decade, the Supreme Court has weighed in on the patent eligibility of a range of additional subject matter, including diagnostic claims and gene claims in *Mayo Collaborative Services v. Prometheus Laboratories, Inc.* and *Ass'n for Molecular Pathology v. Myriad Genetics, Inc.*, respectively.[11]

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[8] 35 U.S.C. § 101 (2018).

[9] Mayo Collaborative Servs. v. Prometheus Lab'ys, Inc., 566 U.S. 66, 70 (2012).

[10] Alice Corp. v. CLS Bank Int'l, 573 U.S. 208, 216–17 (2014).

[11] Mayo, 566 U.S. at 66; Ass'n for Molecular Pathology v. Myriad Genetics, Inc., 569 U.S. 576 (2013).

At issue in *Mayo* were claims reciting "[a] method of optimizing therapeutic efficacy for treatment of an immune-mediated gastrointestinal disorder" comprising a step of administering a thiopurine drug to a patient, a step of determining the resulting metabolite level, and a "wherein" clause providing the metabolite concentrations correlating with the toxicity and efficacy of thiopurine drug dosages.[12] Applying the two-step framework, the Supreme Court found that the claims (1) recited "laws of nature—namely, relationships between concentrations of certain metabolites in the blood and the likelihood that a dosage of a thiopurine drug will prove ineffective or cause harm"; and (2) failed to add steps "sufficient to transform the nature of the claim."[13] In particular, the Court found that the "administering" step, "determining" step, and "wherein" clause to "consist of well-understood, routine, conventional activity" previously engaged in by those in the field. Because the combination of the steps "amounts to nothing significantly more than an instruction to doctors to apply the applicable laws when treating their patients," the Court held that the three steps were insufficient to transform the patent-ineligible natural correlations into patent-eligible applications.[14]

At issue in *Myriad* were composition claims for isolated DNA sequences coding for BRCA1 and BRCA2 and related claims to cDNA for the same. The Court distinguished the claims to isolated genomic DNA from the claims to cDNA, holding that "[a] naturally occurring DNA segment is a product of nature and not patent eligible merely because it has been isolated, but cDNA is patent eligible because it is not naturally occurring."[15] In distinguishing the claims, the Court emphasized that the claims, which were "not expressed in terms of chemical composition" or "[relying] in any way on the chemical changes that result from the isolation of a particular section of DNA," could not be "saved by the fact that isolating DNA from the human genome severs chemical bonds and thereby creates a nonnaturally occurring molecule."[16] The Court further emphasized that its decision did not implicate the patentability of DNA in which the order of the naturally occurring nucleotides has been altered or the

[12] *Mayo*, 566 U.S. at 74–75.

[13] *Id.* at 76, 78.

[14] *Id.* at 79–80.

[15] *Myriad*, 569 U.S. at 576.

[16] *Id.* at 593.

patentability of applications of knowledge about genes.[17] The Supreme Court has not opined on such issues to date.

ii. Written Description and Enablement

Section 112 of the Patent Act provides that a patent "specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same."[18] In the decade since the Federal Circuit's *en banc* decision in *Ariad Pharmaceuticals, Inc. v. Eli Lilly & Co.* reaffirming that the provision contains a written description requirement separate from an enablement requirement,[19] Section 112 challenges have garnered additional attention; in particular, in "unpredictable" arts like those surrounding cell and gene therapies. Recent Federal Circuit opinions in *Juno Therapeutics, Inc. v. Kite Pharma, Inc.* and *Amgen Inc. v. Sanofi, Aventisub LLC* provide greater insight on the scope of disclosure sufficient to meet the written description and enablement requirements of particular import to cell and gene therapies.

Juno v. Kite

In Juno, the Federal Circuit reversed a $1.2 billion judgment in favor of Juno for infringement of U.S. Patent No. 7,446,190 (the "'190 Patent") on grounds that the patent lacked adequate written description to support its broad functionally defined genus claims to chimeric antigen receptors (CARs).[20]

At issue were claims directed to a nucleic acid polymer encoding a three-part CAR for a T cell, comprising (1) "the intracellular domain of the human CD3 ζ chain"; (2) "a costimulatory region comprising a specific amino acid sequence" that corresponds to "part of a naturally occurring T cell protein called CD28"; and (3) "a binding element that specifically interacts with a selected target."[21] The broader of the asserted claims, claims 3 and 9, limited the "binding element" to "a single chain antibody," (i.e., a single-chain variable fragment ("scFv")), and thus covered "any scFv for binding any

[17] *Id.* at 595.

[18] 35 U.S.C. § 112(a) (2018).

[19] *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336 (Fed. Cir. 2010) (en banc).

[20] Juno Therapeutics, Inc. v. Kite Pharma, Inc., 10 F.4th 1330, 1332–33 (Fed. Cir. 2021).

[21] *Id.* at 1333–34; '190 Patent at claims 3, 5, 9, 11.

target."[22] The other asserted claims, which depended from claims 3 and 9, further specified that the claimed scFvs bind to CD19, a protein found on blood cancer cells.[23] The specification disclosed two scFv examples, one binding to CD19 and one binding to PSMA, a protein found on prostate cancer cells, but did not disclose the amino acid sequences of these scFvs.

On appeal, Kite argued that the asserted claims failed to disclose representative species or common structural features to identify which scFvs would function as claimed; that the claims covered "millions of billions" of scFv candidates; and that the binding ability of scFvs lacked predictability.[24] Juno raised several counterarguments, including that scFvs in general were well-known in the art and that the specification disclosed two scFv examples representative of all scFvs.[25]

The Federal Circuit rejected Juno's argument that the two scFvs examples were representative, explaining that the "mere fact that scFvs in general bind does not demonstrate that the inventors were in possession of the claimed invention."[26] Although it was not necessary for the patent to disclose the amino acid sequences of the two scFvs examples, the Court noted that the patent lacked disclosure of any other means of identifying scFvs capable of binding specific targets to demonstrate that the inventors possessed the entire class of possible scFvs that bind to a selected target.[27] The Court also found that the '190 Patent did not disclose structural features common to the members of the genus of claims 3 and 9, citing expert testimony that (1) "an scFv with the same common structure but with a different amino acid sequence would recognize a different antigen"; and (2) "all scFvs have a common structure, regardless of whether they bind."[28] Thus, the fact that scFvs in general were well-known or share the same general structure did not cure the deficiencies with the '190 Patent disclosing only two scFv examples and providing no details relating to common characteristics,

[22] *Id.* at 1334, 1336 (emphasis in original).

[23] *Id.* at 1334.

[24] *Id.* at 1336.

[25] *Id.*

[26] *Id.* at 1337.

[27] *Id.*

[28] *Id.* at 1339.

sequences, or structures for a skilled artisan to identify which scFvs would function as claimed[29].

With respect to the narrower asserted claims, the Federal Circuit similarly held that the '190 Patent lacked written description support for the claimed genus of functional CD19-specific scFvs. The Court noted that Juno did not dispute that out of the "millions of billions" of possible scFvs, only four or five CD19 specific scFvs were known in the art as of the priority date of the '190 Patent.[30] Relevant considerations included the unpredictability of a scFv's binding ability, the relatively small number of known of CD19 specific scFvs compared to the universe of possible scFvs, and the lack of details about the characteristics of any CD19 specific scFv.

Lastly, the Federal Circuit rejected Juno's argument that the Court's decision in Ariad was irrelevant because the real invention of the '190 Patent was the claimed two-part "backbone"—comprising the CD3 ζ and costimulatory regions—not the scFv binding element.[31] Citing Boston Scientific Corp. v. Johnson & Johnson, the Court stated "[t]he test for written description is the same whether the claim is to a novel compound or a novel combination of known elements. The test is the same whether the claim element is essential or auxiliary to the invention."[32]

Amgen v. Sanofi

In *Amgen*, the Federal Circuit affirmed the district court's judgment as a matter of law of lack of enablement of Amgen's claims to genera of monoclonal antibodies.[33] The decision marked the second time the Federal Circuit considered the patents-at-issue, which remanded the case following an earlier jury determination that the patents were not invalid for lack of enablement and written description.[34] On remand, the court granted Sanofi's motion for judgment as a matter of law for lack of enablement, in part because the claims, which were functionally defined by their ability to bind to one or more of fifteen residues of the PCSK9 protein, encompassed millions of antibody candidates and related to an unpredictable field.

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[29] *Id.* at 1339–40.

[30] *Id.* at 1340–41.

[31] *Id.* at 1341–42.

[32] *Id.* at 1341.

[33] Amgen Inc. v. Sanofi, Aventisub LLC, 987 F.3d 1080 (Fed. Cir. 2021).

[34] *Id.* at 1083–84.

In first discussing precedent on functional claim limitations, the Federal Circuit cautioned that such limitations "pose high hurdles in fulfilling the enablement requirement for claims with broad functional language."[35] The Court emphasized that "it is important to consider the quantity of experimentation that would be required to make and use, not only the limited number of embodiments that the patent discloses, but also the full scope of the claim."[36]

Then, applying the specific *Wands* factors, the Court agreed with the district court's findings that (1) the scope of the claims was broad; (2) the invention was in an unpredictable field of science; and (3) a person of ordinary skill in the art could only obtain undisclosed claimed embodiments by a trial and error process that required substantial amount of time and effort.[37] The Court noted that of the disclosed embodiments none bound more than nine residues—despite the claims including antibodies binding up to sixteen—and none bound to three of the claimed residues.[38] With respect to unpredictability of the art, the record also lacked "nonconclusory evidence that the full scope of the broad claims can predictably be generated by the described methods."[39] Taken together, the Court determined that undue experimentation would be required to practice the full scope of Amgen's claims.

b. Potential Implications of Section 101 and 112 Case Law for Cell and Gene Therapy Patents

- Under current Supreme Court precedent, claims protecting cell and gene therapy products must be carefully drafted to avoid claiming a natural gene on its own and natural processes that may lead to challenges based on patent ineligibility under 35 U.S.C. § 101.
- Patents functionally claiming broad aspects of a gene therapy beyond the disclosure may be subject to written description and enablement challenges under 35 U.S.C. § 112.

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[35] *Id.* at 1087.

[36] *Id.* at 1086.

[37] *Id.* at 1087–88.

[38] *Id.* at 1087 n.1.

[39] *Id.* at 1087–88.

- Recent Federal Circuit case law highlights the challenge of developing a sufficiently diverse range of examples to support claims of genus scope.
- Innovators should make sure that claim coverage to specific commercial embodiments is solid and well supported.
- The need to develop patent strategy to protect against both innovator and biosimilar competitors.
- Biosimilar challengers will likely have to use same sequences as the innovator and therefore fall within the scope of narrower claims.
- Peer innovators are more likely to use different sequences that may only fall within the scope of broader genus claims that are subject to written description and enablement challenges.
- Per *Juno v. Kite*, the broad features of the claimed construct may not be what the inventors considered the innovative aspect of their invention.

Cell and gene therapy products are likely to implicate patents directed to both broader platform technologies, such as vectors used to carry a genetic payload to a target cell, and technologies specific to a particular product, such as methods of treatment of particular conditions. As such, the patent landscape for cell and gene therapies will continue to be broad and diverse, creating challenges for patent owners seeking to maintain exclusivity and strategic opportunities for patent owners seeking to license or cross-license their innovations.

c. Pending Cell and Gene Therapy Patent Disputes in District Courts

An indication of the importance of patents to cell and gene therapy products is reflected in currently pending patent litigation at the district court level. These litigations are likely only the beginning as owners of patents in the cell and gene therapy field seek to assert their rights, either to obtain exclusivity in a particular area or to monetize the value of their patent portfolios.

San Rocco Therapeutics, LLC v. bluebird bio, Inc.

On October 21, 2021, San Rocco Therapeutics (formerly Errant Gene Therapeutics, LLC) filed a patent infringement suit in the District of Delaware alleging that bluebird's Zynteglo drug product, "which is manufactured using (and containing) the BB305 lentiviral vector" infringes U.S. Patent Nos. 7,541,179 and

8,058,061.[40] On July 26, 2022, the court granted in part bluebird's motion to stay the proceedings and compel arbitration, staying the case pending an arbitrator's determination regarding interpretation of the license and release provisions.[41] As of publication, the case remains stayed pending the results of arbitration.

Regenxbio Inc. v. Sarepta Therapeutics, Inc.

On September 15, 2020, REGENXBIO and the Trustees of the University of Pennsylvania filed a patent infringement suit in the District of Delaware alleging that Sarepta's manufacture and use of host cell technology to make recombinant AAV gene therapy products, including SRP-9001, infringe U.S. Patent No. 10,526,617.[42] Defendant moved to dismiss on the basis that its activities in developing its product fell within the "safe harbor" of 35 U.S.C. § 271(e)(*1*), which allows, under certain circumstances, companies to develop products that require FDA premarket approval without risk of patent infringement. The court denied this motion, finding that Sarepta was not developing a product that is "subject to any FDA regulatory approval process."[43] Defendant's answer was filed on January 18, 2022, and the case is proceeding through discovery. The patent-in-suit is expected to expire in November 2022.

Regenxbio Inc. v. Aldevron LLC

On September 16, 2020, REGENXBIO and the Trustees of the University of Pennsylvania filed a patent infringement suit in the District of North Dakota alleging that Aldevron's manufacture and use of host cells containing a recombinant nucleic acid sequence encoding capsid proteins and a heterologous non-AAV sequence infringes U.S. Patent No. 10,590,435.[44] The parties are awaiting decisions on motions

[40] San Rocco Therapeutics, LLC v. bluebird bio, Inc., C.A. No. 21-1478-RGA (D. Del. Oct. 21, 2021).

[41] San Rocco Therapeutics, LLC v. bluebird bio, Inc., C. A. No. 21-1478-RGA (D. Del. Jul. 26, 2022).

[42] Regenxbio Inc. v. Sarepta Therapeutics, Inc., C.A. No. 20-1226-RGA (D. Del. Sept. 15, 2020).

[43] Regenxbio Inc. v. Sarepta Therapeutics, Inc., C.A. No. 20-1226-RGA (D. Del. Jan. 4, 2022) (Jan. 4, 2022 Memorandum Order) at 8-9.

[44] Regenxbio Inc. v. Aldevron LLC, No. 3:20-cv-171 (D.N.D. Sept. 16, 2020).

for summary judgment regarding, *inter alia*, non-infringement and invalidity; no trial date is set. The patent-in-suit is expected to expire in November 2022.

IV. Conclusion

In this article, we have discussed patent issues impacting the emerging fields of cell and gene therapies. As more cell and gene therapy products are developed and obtain regulatory approval, it can be expected that patents will play a very important role as the developers of those products seek to protect their substantial investments and may also have to respond to assertions of patent rights by others. Because patents implicating cell and gene therapies may relate to many aspects of the product, its manufacture, and administration, a wide variety of patents can be expected to be raised in the context of adversarial patent proceedings and also in licensing and collaboration transactions. Accordingly, those involved in the cell and gene therapy field will want to pay careful attention to these patent developments.

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