Eyes on New Product Development

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IN THIS REPORTING PERIOD, there were a number of drug approvals, including a novel pharmacotherapy for the treatment of dry eye in the United States (only the second, with the first being approved 14 years ago), the first approval for noninfectious uveitis in many years (an additional indication for an approved systemic biologic), a second indication for a combination product, and a new product configuration for a retina pharmacotherapy. A new multifocal intraocular lens (IOL) was approved as was a corneal inlay for treatment of presbyopia. Other novel therapeutic devices (1 for dry eye and 1 for glaucoma) are under review by the Food and Drug Administration (FDA). Drug development continues at many therapeutic levels from anterior to posterior in ophthalmology, including areas such as allergy, glaucoma, dry eye, and retina, but also novel therapeutic areas such as presbyopia, neuroprotection, and relatively rare forms of retinal degeneration. In addition, novel systems for better delivery of existing drugs continue. As judged by the corporate agreements continuing to be made, ophthalmology is clearly an area of perceived high value.

The U.S. FDA and European Medicines Agency (EMA) continue to address issues about biosimilars, the safety and efficacy of marketed products, Internet promotion of pharmaceuticals, and novel methods to evaluate new therapies. The U.S. Congress passed a major update to the Toxic Substances Control Act (TSCA) of 1976, naming it after a late New Jersey senator concerned with environmental safety (now called *Frank R. Lautenberg Chemical Safety for the 21st Century Act*). The initial TSCA was also a major piece of legislation when it was passed. Indeed, long ago when I was a graduate student, one of the questions on the final in a toxicology class was whether the law passed.

Ophthalmic Pharmaceuticals and Biologics

- AbbVie received approval for Humira[®] (adalimumab) for the treatment of noninfectious, intermediate, posterior, and panuveitis in Europe and the United States (May and July 2016).
- AGTC received orphan medicinal product designation for their retinitis pigmentosa gene therapy in Europe (June 2016).
- Aldeyra Therapeutics dosed the last patient in a phase 2 study of NS2 in patients with Sjögren–Larsson Syndrome, an inborn error of aldehyde metabolism (June 2016).
- BioTime, Inc. and its subsidiary Cell Cure Neurosciences Ltd. are developing a cell-based retinal pigment epithelial cells therapy, OpRegen, for dry age-related macular generation (AMD, June 2016).
- Can-Fite BioPharma and its subsidiary, OphthaliX, announced results from its phase 2 clinical trial of CF101 for the treatment of glaucoma (July 2016).
- Eleven Biotherapeutics entered a licensing agreement with Genentech for EBI-031, a humanized monoclonal antibody that potently binds interleukin-6 (June 2016). The firm has also submitted an investigational new drug application to the U.S. FDA (July 2016).
- Encore Vision reported results on a phase 1/2 study for its EV06 ophthalmic solution for the treatment of presbyopia (June 2016).
- Genentech completed a phase 3 study of Actemra[®] (tocilizumab) in the treatment of giant cell arteritis (GIACTA, June 2016).
- GenSight Biologics announced results of its phase 1/2 study, evaluating the safety and tolerability of GS010, an intravitreal AAV2 vector containing the human wild-type ND4 gene, in patients with Leber's hereditary optic neuropathy (June 2016).
- Inotek initiated a phase 2 study of a fixed-dose combination of trabodenoson and latanoprost in the treatment of glaucoma (July 2016).
- Nicox announced that the FDA has accepted for review its new drug application for AC-170 (cetirizine) for itching associated with allergic conjunctivitis (June 2016). The firm also reached an agreement with GHO Capital to transfer its European and International commercial operations (July 2015).
- Ocular Therapeutix, Inc. announced results from its second phase 3 clinical trial to evaluate the safety and efficacy of Dextenza[™] (sustained release dexamethasone) intracanalicular depot for the treatment of ocular itching associated with chronic allergic conjunctivitis (June 2016).
- Omeros completed enrollment in a pediatric study of Omidria[®] (phenylephrine and ketorolac, June 2016).
- Ophthotec completed recruitment in its third phase 3 trial of Fovista[®] (pegpleranib) for patients with wet AMD (June 2016).

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- Proteris Biotech received a U.S. National Institute of Health Small Business Technology Transfer grant to develop innovative technology for the treatment of dry eye (April 2016).
- pSivida is in preclinical evaluation of its Durasert™ system for delivering tyrosine kinase inhibitors to the posterior segment (July 2016).
- Quark Pharmaceuticals and, its partner, Biocon randomized the first patient in India in a study of QPI-1007, a siRNA drug candidate for ocular neuroprotection (June 2016).
- Shire received FDA approval for Xiidra® (lifitegrast ophthalmic solution) for treatment of the signs and symptoms of dry eye (July 2016). The firm also announced results from its study of SHP607, the treatment retinopathy of prematurity in premature infants (June 2016).
- ThromboGenics received U.S. FDA approval for an already diluted formulation of Jetrea® (ocriplasmin, June 2016).
- Valeant Pharmaceuticals received a complete response letter from the U.S. FDA regarding its new drug application for latanoprostene bunod ophthalmic solution (July 2016).

Ophthalmic Devices

- Abbott received U.S. FDA approval for its Tecnis Symphony IOL, a multifocal lens (July 2016).
- Allergan submitted a *de novo* application to the FDA for the Oculeve intranasal tear neurostimulator (July 2016).
- Allergan's Xen45® glaucoma treatment system 510(k) notification was accepted for review (June 2016).
- Avedro received approval for a second indication, corneal ectasia, for its combination products Photrexa 0.146% (riboflavin 5'-phosphate ophthalmic solution) and Photrexa Viscous 0.146% (riboflavin 5'-phosphate in 20% dextran ophthalmic solution, July 2016).
- Pixium Vision was granted approval to initiate a clinical trial of the Iris II bionic vision system in patients who have lost sight due to retinitis pigmentosa in the United Kingdom (June 2016).
- Revision Optics received U.S. FDA approval for its Raindrop Near Vision Inlay, a device implanted in the cornea in patients with presbyopia (June 2016).
- Santen Pharmaceutical Co., Ltd. will acquire InnFocus, Inc., developer of the InnFocus MicroShunt® glaucoma implant device (July 2016).

Regulatory, Government, and Pharmaceutical Industry

- Amgen's biosimilar form of AbbVie Humira (adalimumab), ABP-501, was judged to be similarly potent and safe as the original product in a staff review, according to a preliminary review by staff members of the U.S. FDA (July 2016).
- The EMA created a voluntary scheme PRIME, "Paving the way for promising medicines for patients" to enhance

support for the development of medicines that target an unmet medical need (July 2016). http://ec.europa.eu/health/documents/pharmaceutical-committee/stamp/index_en.htm

- Eric Topol, MD, of the Scripps Institute, received a major grant from the U.S. NIH to customize patient care through digital technology (July 2016).
- FedEx Corporation announced that the U.S. Department of Justice dismissed all remaining criminal charges pending against FedEx and its subsidiaries regarding Internet pharmacies (June 2016).
- Juno Therapeutics reported the death of 3 patients in an early stage trial of its JCAR015 agent, a CD19-directed therapy, in cancer patients who had previously used cyclophosphamide (July 2016).
- Novartis' biosimilar form of Amgen's Neulasta® (pegfilgrastim) was not approved by the FDA, which requested additional information in a "complete response" letter (July 2016).
- QLT is merging with Aegerion Pharmaceuticals into a new company to be called Novelson Therapeutics (June 2016).
- The U.S. FDA has taken several actions of interest: (1) It issued a warning regarding the safety of taking higher than recommended doses of the common over-the-counter antidiarrhea medicine, loperamide, including serious heart problems that can lead to death. (2) It formally sought to suspend 4,402 websites that illegally sell potentially dangerous, counterfeit, or unapproved prescription drugs to U.S. consumers. (3) It requested additional information to address data gaps for consumer hand sanitizers. (4) It is responding to demands to supplement the traditional clinical research system with real-world evidence (June 2016).¹
- The U.S. Congress passed and President Obama signed into law a major update to the TSCA of 1976, the Frank R. Lautenberg Chemical Safety for the 21st Century Act, HR 2576, was signed into law (June 2016).

Author Disclosure Statement

The author consults for numerous ophthalmic pharmaceutical and medical device firms.

Reference

1. Wechsler, J. Support grows for wider use of real-world evidence. *Pharm. Exec.* 2016. www.pharmexec.com/support-grows-wider-use-real-world-evidence Accessed June 20, 2016.

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