Partnering in pediatrics

By Amy Donner, Senior Editor

Alexion Pharmaceuticals Inc. is hoping that its research collaboration with **Cincinnati Children's Hospital Medical Center** will help the biotech build out a rare disease pipeline that currently is dominated by a single molecule—Soliris eculizumab. The deal is Alexion's first collaboration with a clinical center and complements its pipeline-building efforts with biotechs and academia.

For CCHMC, the deal brings the first infusion of corporate dollars into its two-year-old innovation fund.

Under the deal, Alexion will fund rare disease research programs at the hospital and will have an exclusive option to license completed programs. If Alexion exercises an option, it would be responsible for clinical development and commercialization, and the CCHMC would be eligible for milestones and royalties.

Further financial details were not disclosed, but Alexion established the Alexion Rare Disease Innovation Fund within the hospital's existing Innovation Fund.

Niki Robinson, assistant VP of CCHMC's Center for Technology Commercialization (CTC), said that the Innovation Fund was established in 2012 to help make hospital discoveries more commercially viable. The fund is managed by the CTC.

"Awardees don't just get funding," she said. "They also get mentors and a commercially driven milestone plan before the work gets started."

The goal is to get the projects to a commercial point within two years.

Proposals are vetted by an advisory board consisting of 20 experts in drug discovery or devices, angel investors and VCs. Half of the members of the advisory board are affiliated with CCHMC, and the others are external.

Grants are evaluated based on five criteria: significance or clinical impact, commercial potential, novelty (including IP considerations), feasibility and impact on the mission of the hospital.

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**—Kim Diamond,
Alexion Pharmaceuticals Inc.**

Table 1. Innovation Fund award recipients. The Innovation Fund is managed by **Cincinnati Children's Center for Technology Commercialization**.
Source: Cincinnati Children's Center for Technology Commercialization

Principal investigator	Indication	Summary (status)
2012		
John Pestian	Neurology	Markers as a predictor of repeated suicide attempts (Optioned to Assurex Health Inc.)
Margaret Hostetter	Infectious disease	Peptide vaccines and antibodies to prevent central line infections
Michael Seid; Peter Margolis	Not applicable	Collaborative chronic care (C3N) portal for personalized collaborative care (in due-diligence stage to form start up)
John Perentesis	Not applicable	Next-generation clinical trials management software
Hector Wong	Hepatic disease	Pediatric sepsis biomarker risk model (launched Persepsys Biomedical LLC in 2014 to create products that prevent death from sepsis or septic shock)
Marie-Dominique Filippi; Yi Zheng	Inflammation	Anti-inflammatory drug targeting NADPH oxidase 2 (NOX2) in acute lung injury
2013		
Lee (Ted) Denson	Gastrointestinal disease	Markers to diagnose inflammatory bowel disease (IBD), Crohn's disease and ulcerative colitis (UC)
Charles Dumoulin	Imaging	Neonatal MRI scanner (in due-diligence stage to form start up)
William Hardie	Pulmonary disease	Therapy to reverse pulmonary fibrosis
Punam Malik	Hematology	<i>Hemoglobin-γ</i> gene therapy to treat sickle cell disease
Senthil Sadhasivam	Neurology	Point-of-care gene chip to dose opioids for pain management in perioperative patients
Hector Wong	Hepatic disease	IL-27 as a biomarker for early identification of patients with sepsis
2014		
Prasad Devarajan; Hermine Brunner	Autoimmune disease; renal disease	Blood test to detect the onset of kidney failure in patients with lupus
H. Leighton Grimes	Cancer	Small molecule targeting signal transducer and activator of transcription 5 (STAT5)
Michael Jordan	Autoimmune disease	Targeted, activated immune cells to suppress undesirable immune response
Ming Tan	Infectious disease	Vaccine for norovirus, rotavirus, hepatitis E virus and astrovirus

The program has funded 16 projects in 3 years (see Table 1, “Innovation Fund award recipients”), resulting in 24 patents and 24 partner agreements that include industry-sponsored research, matching funds, options or licenses, and confidentiality agreements.

In 2014, the hospital spun out its first company related to an Innovation Fund award. **Persepsys Biomedical LLC** was formed based on a project led by Hector Wong. The startup is focused on sepsis. Wong is a professor of pediatrics and director of critical care medicine at CCHMC.

The Innovation Fund has provided about \$1 million to the projects per year. Until now, that money has come solely from CCHMC internal sources.

Enter Alexion

Rather than forming a new initiative, the Alexion Rare Disease Innovation Fund will piggyback on the existing Innovation Fund. The advisory board will be expanded to include representatives from Alexion.

“They will pick and fund their own projects,” said Robinson. In this regard, she noted, Alexion’s advisory board members will be more akin to partners than advisors.

“We are considering projects that show significant promise in providing life-transforming benefits to patients with devastating disorders,” said Alexion spokesperson Kim Diamond. “When it comes to therapeutic areas, we are agnostic.”

As with the other Innovation Fund projects, funding levels will be project specific. Robinson said that funding levels are determined at the end of a process during which the scope and scale of a project often evolves based on the commercialization plan.

The first projects chosen by Alexion in the collaboration with CCHMC will begin in July 2015.

The hospital is one of the largest for pediatric patients in the country and thus has access to a significant number of rare disease cases. “We see a lot of patients with rare disease, and the new fund aligns our two organizations based on our common interest in rare disease,” said Robinson.

The collaboration with CCHMC is the first of this kind for the biotech. Until now, Alexion has partnered with other companies,

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academia and independent investigators, but it has not worked directly with a hospital to fund the commercial transition of selected projects.

In February, Alexion gained an exclusive option to acquire **Prothelia Inc.**, a rare-disease company developing PRT-01 to treat merosin-deficient congenital muscular dystrophy type 1A (MDC1A), and to license PRT-01 directly from the **University of**

Nevada, Reno. PRT-01 is laminin-111 protein replacement therapy that Prothelia had licensed from the university. The compound has orphan drug designation in the U.S. to treat MDC1A and Duchenne muscular dystrophy.

In January, Alexion formed an exclusive strategic agreement with **Moderna Therapeutics Inc.** to develop mRNA therapeutics to treat rare diseases. The deal includes a \$100 million upfront payment for 10 product options. Alexion will lead the discovery, development and commercialization of those products, while Moderna will design and manufacture them.

Alexion markets Soliris, a humanized anti-complement 5 (C5) mAb, to treat atypical hemolytic uremic syndrome (aHUS) and paroxysmal nocturnal hemoglobinuria (PNH). Eculizumab has orphan drug status for both indications in the U.S., Europe and Switzerland, for aHUS in Australia and for PNH in Japan. The drug also is in clinical trials for a host of rare disease indications.

Alexion’s pipeline also includes Asfotase alfa, which is in registration for hypophosphatasia (HPP)—an inherited, ultra-rare metabolic condition characterized by defective bone mineralization. Asfotase alfa is a fusion between a bone-targeting peptide and the catalytic domain of human tissue non-specific alkaline phosphatase (TNSALP; ALPL).

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COMPANIES AND INSTITUTIONS MENTIONED

Alexion Pharmaceuticals Inc. (NASDAQ:ALXN), Cheshire, Conn.
Cincinnati Children’s Hospital Medical Center, Cincinnati, Ohio
Moderna Therapeutics Inc., Cambridge, Mass.
Persepsys Biomedical LLC, Cincinnati, Ohio
Prothelia Inc., Milford, Mass.
University of Nevada, Reno, Nev.