

EMERGING COMPANY PROFILE

IgGenix: antibody engineering for food allergies

BY LAUREN MARTZ, SENIOR EDITOR

IgGenix is pairing single-cell sequencing with antibody engineering to create a new class of food allergy therapies that selectively suppresses allergen-triggered immunity while sidestepping the risky steps of desensitizing immunotherapy.

The company launched in August with a \$10 million series A round it plans to use to de-risk the platform, build a pipeline of food allergy therapies and bring on a new CEO. Khosla Ventures led the round; Parker Ventures also participated.

IgGenix's platform, which was developed by scientific co-founders Stephen Quake and Derek Croote at Stanford University, is based on the idea the IgE antibodies responsible for most allergic reactions to food can be reengineered to reduce or prevent the inflammatory cascade they trigger.

Antibodies are made up of variable regions that bind specific antigens, and a constant region that interacts with the immune system. In IgE antibodies, the constant region binds mast cells, triggering degranulation and downstream inflammation.

IgGenix is decoupling the allergen-binding function of IgE antibodies from the inflammation-triggering function by replacing the constant region with an engineered version that doesn't engage mast cells.

"The engineered antibodies retain allergen specificity through their variable regions, but they're no longer capable of eliciting allergic reactions because we've replaced the IgE region that causes degranulation," said Croote.

The goal isn't to eliminate or change natural allergen-reactive IgE antibodies, but to outcompete them for allergen binding.

"IgE is the rarest of antibody classes. It's orders of magnitude lower than IgG, so we believe they can be outcompeted at a normal therapeutic antibody dose," Croote said.

The rarity of IgE antibody class is also the reason other companies haven't done this type of antibody engineering.

"What excited me when I joined the company was that it's finally possible to get to IgE-expressing B cells. They're really rare in the

COMPANY PROFILE IGGENIX INC.

South San Francisco, Calif.

Technology: IgE antibody isolation and engineering platform to treat food allergies

Origin of technology: Stanford University

Disease focus: Inflammation

Clinical status: Preclinical

Founded: 2019 by Derek Croote, Bruce Hironaka, Kari Nadeau, Stephen Quake

University collaborators: None

Corporate partners: None

Number of employees: 6

Funds raised: \$10 million

Investors: Khosla Ventures; Parker Ventures

CEO: Bruce Hironaka; Jessica Grossman to become CEO in late November 2020

Patents: None issued

blood, and until we came along, this was not technically feasible," said Richard Boismenu, who joined IgGenix as CSO in August.

The company is using single-cell sequencing to isolate the rare B cell clones expressing allergen-specific IgE antibodies. It has isolated "a large number of human IgE sequences to all of the major food allergen groups" in the few months since it began operations, and the team has started to generate and screen antibody candidates.

IgGenix doesn't have an official development timeline, but Boismenu expects to begin clinical testing in the next few years.

He noted that the therapies will likely be administered as monthly subcutaneous injections. While the first iteration of the technology will require continuous administration, Boismenu

said the company is creating additional therapeutic formats that may more durably reset the immune system.

The first food allergy drug was approved this year. Palforzia from Aimmune Therapeutics Inc. (NASDAQ:AIMT) is a carefully dosed peanut powder intended to reduce the severity of allergic reactions to peanuts upon accidental exposure. While effective in many patients, the desensitization protocol often triggers the same kind of allergic reactions it's intended to prevent.

Regeneron Pharmaceuticals Inc. (NASDAQ:RGEN) is also taking an antibody approach to suppress food allergies, but it uses a different antibody starting point than IgGenix. The big biotech is developing IgG antibodies, which suppress inflammation, that bind specific allergens. Regeneron has cat allergy candidate RGEN1908-1909 in Phase II and birch allergy therapy RGEN-5713-5714-5715 in Phase I.

According to Croote, working from IgE antibodies has an advantage over using an IgG base. "IgE antibodies have evolved to be extremely reactive to allergenic proteins. When we isolate them, our starting point is already highly advanced," Croote said.

IgGenix also uses antibodies of human origin, which should reduce immunogenicity concerns. In contrast, Regeneron leverages a mouse antibody discovery platform, said Boismenu.

Hironaka said IgGenix is open to partnerships, but will likely secure series B funding next year before entering a deal.

The company licensed core patent applications covering the technology from Stanford.

TARGETS

IgE - Immunoglobulin E

IgG - Immunoglobulin G

EDITORIAL & RESEARCH

NEWSROOM:
news@biocentury.com

SAN CARLOS, CA:
+1 650-595-5333

CHICAGO:
+1 312-755-0798

WASHINGTON, DC:
+1 202-462-9582

UNITED KINGDOM:
+44 (0)1865-512184

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BioCentury Inc.
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MAIN OFFICES
1235 Radio Road, Ste. 100
Redwood City, CA 94065-1217
+1 650-595-5333; Fax: +1 650-595-5589

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