



March 30, 2022

Whom It May Concern

Company: KYORIN Holdings, Inc.
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KYORIN and Lumen Bioscience Reach Collaboration Research Agreement

KYORIN Holdings, Inc. today announced that its wholly owned subsidiary of KYORIN pharmaceutical Co., Ltd. (Head office: Chiyoda-ku, Tokyo, President & CEO: Shigeru Ogihara, “KYORIN Pharmaceutical”) has entered into a collaboration research agreement with Lumen Bioscience, Inc. (Head office: Seattle, WA, CEO: Brian Finrow, “Lumen”) to obtain a development candidate toward clinical study.

Under the terms of the agreement, KYORIN Pharmaceutical and Lumen will promote the collaboration research to obtain a clinical candidate for targets in the disease areas of interest to Kyorin Pharmaceutical by utilizing Lumen’s spirulina genetic protein engineering technology.

Biologic drugs (including antibodies) have conventionally been produced from *E. coli*, yeast, or mammalian cells. Lumen is the first company to establish a scalable method for manufacturing biologic drugs by genetically engineering spirulina instead of using these conventional methods. Spirulina, which is a well-known and healthy food product, can solubly express therapeutic proteins like these at extraordinarily high levels within its cytoplasm. And because both spirulina itself is safe to eat, the entire biomass—including the therapeutic proteins within—can be consumed orally without the costly and inefficient downstream purification steps required with conventional approaches. This technology is expected to provide safe orally deliverable biologic drugs at much lower costs than current approaches.

KYORIN Pharmaceutical believes that this opportunity to collaborate with Lumen’s breakthrough technology will enhance our research capabilities.

About Lumen Bioscience, Inc.

Foundation: April 2017
CEO & Chairman: Brian Finrow
Employees: 70 (as of March 31, 2021)
Overview: Lumen discovers, develops, and manufactures biologic drug candidates for several prevalent, worldwide diseases—many of which currently lack any effective treatments. The company's unique drug development and manufacturing platform offers the potential to transform the biologics industry through increased speed, mass-market scale, and exponentially lower costs than current approaches. Lumen's clinical pipeline includes investigational biologic drugs for *C. difficile* infection, Covid-19, cardiometabolic disease, inflammatory bowel disease, norovirus, and traveler's diarrhea. For more information, visit: www.lumen.bio.

About Lumen's Spirulina Genetic Modification Technology

Lumen is radically changing previous assumptions about the cost, scale and time at which biologic drugs such as antibodies can be manufactured by genetically engineering spirulina, a type of blue-green algae that is cultivated and consumed around the world. Lumen engineers spirulina to serve as both a low-cost factory and a safe delivery vehicle for antibodies and other protein therapeutics. No purification of the therapeutic protein is needed for oral delivery; instead, the final drug product is whole, unrefined spirulina biomass containing large amounts of the therapeutic proteins. This means that the cost is just pennies per dose, and the robust safety record of both oral therapeutic proteins and spirulina itself reduces the cost and risk of clinical development.

About KYORIN Pharmaceutical Co., Ltd.

Foundation: December 1923
President & CEO: Shigeru Ogihara
Annual Sales: JPY89.674 billion (Fiscal Year ending on March 31, 2021)
Employees: 1,471 (as of March 31, 2021)
Overview: Trusted among patients and professionals in the medical industry, KYORIN Pharmaceutical strives to be the pharmaceutical company recognized as a one with social significance by improving its presence in the specific therapeutic areas and through global discovery of novel drugs. KYORIN Pharmaceutical uses franchise customer strategy where its marketing efforts are focused on respiratory medicine, otolaryngology and urology. In drug discovery, it is deploying 'selection and concentration' and promoting activities aimed at first-in-class drug discovery, such as actively searching for and introducing external drug discovery themes as well as multi-tiered program development.