A University of Pennsylvania/Syracuse University joint venture

CANTIUS THERAPEUTICS

THE NUCLEUS OF CNS DRUG DEVELOPMENT

Incorporated:	September, 2019
Prior Investors:	Founders; PENN; SU
Industry:	Pharma
Markets Served:	Cachexia / Nausea & Emesis
Traction:	NDAs with 'Big Pharma'; Strategic partners / investors Penn Corporate Innovation;
Raising:	$2 M USD
Investor Relations:	Neal Lemon PhD, MBA (nlemon@upenn.edu)

PRODUCT DESCRIPTION

Cantius Therapeutics, LLC has a unique and well-placed strategy to treat cachexia and block nausea/emesis. Our *GRASP* technology utilizes small peptides that can penetrate into the brainstem and antagonize the GFRAL-Ret receptor complex. This receptor complex expressed exclusively in the brainstem was recently established as the sole mediator of GDF15 (MIC-1) signaling, a cytokine critical in disease-induced cachexia, anorexia, and emetic behaviors from cancer, chemotherapy, and pregnancy-induced morning sickness.

MARKET

Cantius' GRASP technology is designed to treat cachexia, a condition of extreme weight loss, muscle wasting, anorexia, nausea, vomiting and general malaise conditions that are most commonly associated with reduced quality of life and survivorship in cancer progression, chemotherapy/radiation therapy, chronic renal failure, HIV, multiple sclerosis and in the late stages of almost every major chronic illness.

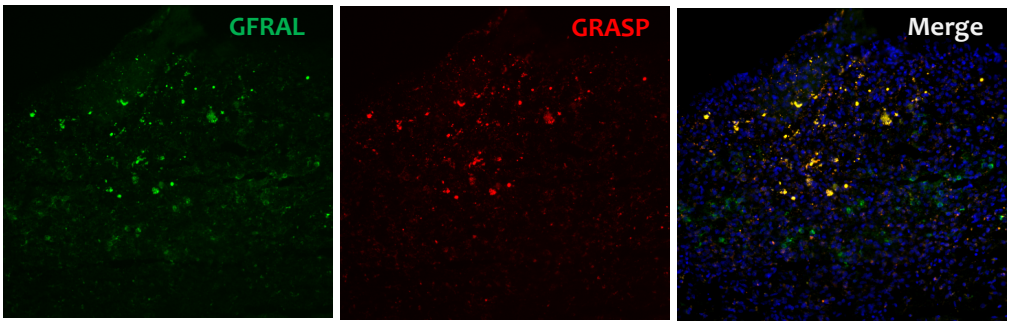
The impact of cachexia and unfortunately, the medical profession's inability to effectively treat it, is reflected by the widespread current incidence of the condition across clinical foci. Cachexia affects up to 40% of people with heart failure, 50-80% suffering from cancer and cancer treatment (with an estimated 20% of cancer patients dying directly from cachexia), 30% of those with chronic obstructive pulmonary disease and up to 60% of people with kidney disease.

The total addressable market for cancer cachexia (alone) in the US (alone) is ~ 1 billion USD. Given the current inability to effectively treat cachexia, Cantius Therapeutics believes that it will be able to capture a significant percent of this market over the next 10 years. It is estimated that 9 million patients world-wide suffer from cancer related cachexia alone, a number that is growing. The increasing prevalence of cachexia, especially in the US, Japan, and Europe, is the main factor behind the significant growth of the market for cancer cachexia alone, expected to have a CAGR of ~ 5% between now and 2023.

In addition to the principal cancer cachexia market, Cantius Therapeutics projects multiple-endpoints for the technology, being used in a variety of additional illnesses as noted above, both alone or in combination with other technologies. The total addressable market is projected to be several billion USD per annum. The likely *Exit Strategy* is licensing to, or acquisition by, a large pharmaceutical company with whom we are currently in contact or collaboration with on other projects (Novo Nordisk, Pfizer, BI, BMS) at IND filing or Phase I clinical trial.

COMPETITION

The competition is Pfizer, Novo Nordisk, NGM Biopharmaceuticals, to name a few. Each of these Big Pharma programs have failed to date to create a peptide-based antagonist of the GDF15-GFRAL system and instead are developing antibody technology to bind released GDF15 in the blood or to target GFRAL receptor in the more exposed region of the brain (a circumventricular nucleus known as the area postrema).



Cantius' **competitive advantage** lies in the fact that we have a small peptide antagonist (GRASP), and are developing a library of similar peptide antagonists, that can readily penetrate throughout the blood brain barrier and bind GFRAL receptors in all regions of the brainstem (see image above). Given that GDF15 is also produced directly in the brain by the cells that make up the blood brain barrier, GRASP's unique ability to completely block action at all brainstem GFRAL receptors negates both the peripheral AND centrally produced cytokine action.

Other major advantages of the GRASP technology are its versatility and stability. Unlike antibodies, small peptides like GRASP are cheaper to produce and store long-term, have minimal if any side-effects, and, in terms of scope, allow for facile modification to improve a given property (half-life/solubility/CNS penetration, *etc*). In addition, peptides can be modified at the amino acid level to introduce polypharmacy within a single peptide, such that it targets multiple receptors simultaneously. These advantages offer hope to produce new therapeutics to treat many of the co-morbid illnesses where cachexia prevalence is so common.

MANAGEMENT.
The Cantius team comprises of Profs. Matthew Hayes (PENN; Psychiatry), Bart De Jonghe (PENN; Biobehavioral Health Sciences) and Robert Doyle (SU; Chemistry), who came together via a New York Academy of Science symposium in NYC in 2015, where it became clear that the peptide therapeutics being developed in the Doyle lab could be adapted to effect physiological pathways uncovered in the Hayes and De Jonghe groups. Their combination of expertise in peptide polypharmacy became combined with that of target discovery and validation, led to several publications and the recent GRASP patent (all GRASP work is unpublished). In addition, the team consists of Associate Director of Licensing Dr. Neal Lemon (PENN) who brings extensive research and IP development experience. The team has worked with multiple 'Big Pharma' companies over the past decade, including in a collaborative research and/or Consulting and/or scientific advisory board capacity. The team has licensed IP to large multinationals. The team consists of leading experts in the underlying physiology of food intake control, obesity, emesis/nausea and the development of peptide-based therapeutics.

INTELLECTUAL PROPERTY

- Joint Penn/ SU Intellectual Property with five company members as named inventors.
- U.S. Provisional Patent Application No. 62/801,391 filed February 5, 2019.
- UPENN is the IP and Commercialization Lead.
- Patent exclusively optioned to Cantius Therapeutics LLC.

FUNDING REQUIRED

Cantius Therapeutics is seeking $2 million USD for studies necessary to complete a basic and pre-clinical research plan, which will enable us to enter into an IND for phase I clinical trials. We are building a world-class team, with a highly targeted and focused approach adding strategic partners to bring a first-in-class drug to the market and establish standard of care for millions of cachexia sufferers worldwide.