BRINGING DARTMOUTH DISCOVERIES TO THE WORLD
THE DARTMOUTH INNOVATIONS ACCELERATOR FOR CANCER

PROGRAM OUTLINE
JANUARY 2020
Our Vision

Dartmouth College President Phil Hanlon ’77 has called upon the Dartmouth community to tackle the world’s challenges. The Call to Lead, a $3-billion campaign, is a bold invitation to Dartmouth’s global community to engage with the most pressing human concerns of our times and improve lives worldwide. Few issues in healthcare are as urgent and complex as cancer.

While some cancers have seen dramatic improvements in survival and even cures, the majority of cancers have proven to be highly complex and difficult to treat. Meanwhile, promising discoveries made in academic laboratories too often languish in the research pipeline, never making it to the marketplace and to patients. In the face of these challenges, our best hope for improving outcomes depends on bringing together the very best minds and insights of all disciplines, in an entrepreneurial environment where collaboration is easy and patients’ needs and values always come first. This is where Dartmouth and its Norris Cotton Cancer Center stand above peer institutions.

Dartmouth’s Norris Cotton Cancer Center is a Big Bet on Discovery in The Call to Lead campaign because—with visionary philanthropic investment—Dartmouth will lead the nation in translating scientific discoveries into revolutionary cancer prevention strategies and cures.

**Preventing Cancer in Current and Future Generations.** We will stop cancer before it starts by developing the tools needed to map any individual’s lifetime genetic, behavioral, and environmental risk factors for cancer, including in utero exposures, and create bold new strategies to mitigate those risks.

**Creating Cancer Cures.** We will develop new, more effective, and less toxic cancer therapies and technologies. These include groundbreaking cellular therapies; universal CAR T-cells; novel immunotherapies; new devices and imaging to improve cancer surgery; more precise and less-invasive screening and diagnostic tests; and new molecular therapies.

**Educating Innovators.** We will train the next generation of physicians, scientists, and healthcare leaders by providing all Dartmouth students with in-depth, experiential learning opportunities, preparing them to tackle the world’s biggest problems using non-siloed approaches.
The Core Strategy

Bolster Dartmouth’s biomedical entrepreneurial environment and collaborative research community to accelerate the development of our most commercially promising innovations.

Building on Dartmouth’s existing entrepreneurial spirit and ecosystem—strengthened over the past six years by the Magnuson Center for Entrepreneurship—Dartmouth now must provide specific attention to its biomedical innovators, beginning with the cancer center. Already a research and innovation powerhouse, the cancer center is an ideal area in which to pilot a Dartmouth biomedical accelerator.

With philanthropic investments, Dartmouth will emerge as a leading institution for translating cancer discoveries into the most impactful innovations in cancer prevention, diagnosis, and treatment. This is how Dartmouth will achieve its greatest impact in cancer care, nationally and internationally.

The Dartmouth Innovations Accelerator for Cancer

As outlined in this document, the Dartmouth Innovations Accelerator for Cancer will provide cancer researchers across Dartmouth with the support, entrepreneurial guidance, and infrastructure needed to translate innovations into the marketplace. There are many steps that a discovery made in a laboratory must go through before it will gain traction with potential partners who can bring it to market. Many of these steps lie outside the sources of funding typically available to academic researchers, as well as outside their areas of expertise. This so-called “Valley of Death” is where laboratory discoveries and cutting-edge innovations die: running out of traction before developing into potentially lifesaving treatments and providing value to society.

Through this initiative, and with guidance from alumni and industry leaders, the most promising research will be supported throughout the research development pipeline to commercialization.

Cancer Center Innovations Advisory Board. All proposals for funding will be reviewed by the Cancer Center Innovations Advisory Board, an external group comprised of local and national biotech leaders.
and venture capital fund managers. This group will be instrumental in hand-picking the projects with the most promise for commercialization and will also provide guidance and support to the faculty whose projects are not chosen. This group will be in a unique situation to guide the growth and success of Dartmouth’s entrepreneurial activities.

With each win, the Accelerator has the opportunity to advance a culture of innovation and calculated risk-taking; promote cross-disciplinary, Dartmouth-wide collaboration between researchers, faculty, students, and alumni; provide world-class experiential learning opportunities for students and trainees; and generate revenue to support future translational cancer research and entrepreneurship.

**Why now?**

**The Big Picture.** The outlook for cancer prevention and treatment is both more hopeful and more challenging than ever. Advances in imaging, computational sciences, genomics, proteomics, and other fields are fueling an explosion of discoveries and revealing promising new avenues. Although developments in cancer prevention, diagnosis, and treatment have already begun to have a positive impact, many of the most complex challenges, such as metastatic cancer, have yet to be solved.

**Dartmouth Is Ready.**

- Thanks to visionary leadership and support, **Dartmouth’s biomedical enterprise**—including Norris Cotton Cancer Center, the Geisel School of Medicine, and Dartmouth’s primary clinical partner, Dartmouth-Hitchcock—is flourishing as the center of collaborative research and innovation. **Our cancer center ranks among the top six cancer centers nationally in terms of National Cancer Institute-funded biotechnology start-ups, far ahead of many larger centers.**
- The **Magnuson Center for Entrepreneurship**—with its organizational maturity, national presence in key markets such as the Bay Area, programmatic expertise, and exponential growth in alumni engagement—is positioned and excited to be a strong partner and resource.
- The **Dartmouth Technology Transfer Office** is building networks throughout campus, reinvigorating processes, and serving as a major resource for commercially viable research. The staff’s breadth of experience and expertise in evaluating biomedical research is outstanding.
- **Dartmouth alumni** are among the top biotech investors and entrepreneurs and are recognizing the untapped potential in Dartmouth’s biomedical research enterprise. Harnessing their energy, expertise, and support—marrying their love of Dartmouth with their passion for biomedical entrepreneurship—will be key to the Accelerator’s development.
- **Dartmouth-Hitchcock Health** is the leading academic healthcare system in Northern New England and Geisel’s primary clinical partner. Led by Dartmouth alumna Joanne Conroy, MD, D’77, who serves as CEO and president, Dartmouth-Hitchcock encourages entrepreneurial activity among its physicians and researchers, especially within the Norris Cotton Cancer Center. Dartmouth-Hitchcock also collaborates with various regional organizations and the State of New Hampshire to promote innovation, economic development, high quality and accessible healthcare, and improvements in population health.
- **New Hampshire** is a business-friendly state, with a strong and growing biotech industry. The Upper Valley, where Dartmouth is located, is home to 120 software, biotechnology and medical technology companies. Southern New Hampshire, with its close proximity to Boston, also nurtures a growing biotech sector. For example, the Advanced Regenerative Manufacturing Institute, based in Manchester, New Hampshire, has attracted state and federal funding to make the region a global hub for tissue engineering and production.

**To Compete Among the Best.** Dartmouth’s biomedical research enterprise has consistently ranked amongst the best in the country, especially in the domains of cancer, microbiology, and immunology (see appendix). As other Ivy League and top research universities marshal big philanthropic investments in support of their biomedical research and entrepreneurial activities, Dartmouth must continue to invest in these areas to attract and retain top talent.

Dartmouth leadership is committed to developing programs and providing resources to ensure that we remain a top-tier research institution, a place where we are asking and answering the world’s most challenging questions, and a place where students learn alongside world-class scholars and innovators.

Why Dartmouth? Why Norris Cotton Cancer Center?

**The right size.** Dartmouth occupies a unique space in the biomedical research world. It is large enough to produce world-class scientific research and small enough to foster a highly collaborative, nimble culture of cross-disciplinary collaboration and shared purpose. Norris Cotton Cancer Center’s deep integration across all of Dartmouth drives innovation—a fact that has brought the National Cancer Institute to Dartmouth for two consecutive years to learn how a relatively small institution could yield so many successful start-ups (i.e., Medarex, Celdara, ImmuNext, CairnSurgical, and DoseOptics). In fact, the cancer center is the only National Cancer Institute-designated comprehensive cancer center to be fully integrated into a world-class liberal arts college, medical school, engineering school, business school, graduate school, and academic health system.
The right culture. Dartmouth biomedical researchers and physicians share a deep commitment to serving patients, to attending to patients’ values and goals of care, and to working toward a purpose larger than themselves. This ethos goes all the way back to Nathan Smith, founder of Dartmouth Medical School, and Dartmouth President John Sloan Dickey—and is embodied in our leadership today.

Launching the Dartmouth Innovations Accelerator for Cancer

Internal Leadership

Steven Leach, MD
Preston T. and Virginia R. Kelsey Distinguished Chair in Cancer
Director, Norris Cotton Cancer Center
Director, Dartmouth-Hitchcock Health Oncology Service Line

Duane Compton, PhD
Dean, Geisel School of Medicine
Professor, Biochemistry and Cell Biology

Barry Schweitzer, PhD, D’82
Senior Business Development and Licensing Manager, Technology Transfer Office

Jamie Coughlin
Director, Magnuson Center for Entrepreneurship

Initial Volunteer Leadership Team

Stephen Bloch, MD, D’84
General Partner, Canaan Partners
Geisel Board of Advisors

Hoyoung Huh, MD, PhD, D’91
Entrepreneur and Investor
Founder, Healthcare & Humanity Foundation
Geisel Board of Advisors

Ross Jaffe, MD, D’80
Co-Founder and Managing Director, Versant Ventures
Geisel Board of Advisors

Todd Sisitsky, MBA, D’93
Managing Partner, TPG Global
Geisel Board of Advisors
### Proposed Accelerator Functions

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<tr>
<th>FUNCTION</th>
<th>PURPOSE</th>
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<tr>
<td><strong>Funding</strong></td>
<td>~$250,000 - $500,000 allocated per project to support validation, proof-of-concept, and preclinical studies—which are critical to “de-risking” and preparing innovations for commercial investment. Examples include animal studies, pharmacokinetics, medicine chemistry, and prototyping. This work is not typically supported by federal grants and often requires contracting with external research, manufacturing, and/or engineering organizations.</td>
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<td><strong>Project Management</strong></td>
<td>Dedicated staff time and leadership is necessary to monitor every stage of a project’s development—beginning with the competitive proposal review process through project development and successful marketing of the innovation to investors. This new position will hold project members and contracting organizations accountable for meeting deadlines and milestones, and will provide guidance on future clinical and business development needs.</td>
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<td><strong>Project Proposal Review by the Cancer Center Innovations Advisory Board</strong></td>
<td>Project proposals will be reviewed by the Cancer Center Innovations Advisory Board, comprised of local and national biotech leaders and venture capital fund managers. This group will provide a rigorous and objective assessment of the proposed projects and recommend only the most innovative projects with the greatest potential for successful clinical translation for funding.</td>
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<td><strong>Mentoring</strong></td>
<td>The Accelerator will connect faculty innovators with experienced biotech entrepreneurs and investors, who will provide high-value, longitudinal mentoring and guidance. The Magnuson Center for Entrepreneurship has developed alumni networks and programs that will allow the Accelerator to quickly match Dartmouth biomedical innovators with external mentors.</td>
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<td><strong>IP, Tech Transfer</strong></td>
<td>In close collaboration with the Technology Transfer Office, the Accelerator will assist faculty innovators with protecting intellectual property, technology transfer, licensing, contracting, and related matters.</td>
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| **Entrepreneurial Programming for Faculty, Trainees, Students, and Staff** | In collaboration with the Magnuson Center and the cancer center, the Accelerator will coordinate activities such as lectures, seminars, workshops, and other efforts that strengthen Dartmouth’s culture of biomedical entrepreneurship and educate faculty, trainees, students, and staff about biomedical and clinical entrepreneurship. These activities will also provide public visibility and marketing opportunities to advance Dartmouth’s reputation in cancer research, innovation, and entrepreneurship, and to further engage with donors, alumni, and community members. |
| **Entrepreneurial Fellowships for Trainees and Students** | With sufficient philanthropic support, 2-4 fellowships could be made available each year. Fellows can be junior faculty, post-doctoral, post-graduate, or even at the student level. Fellows will have a strong interest in biotech entrepreneurship and will both contribute to the development of selected projects and receive mentorship from leaders and advisors. |
| **Subsidized Space** | In collaboration with the Magnuson Center and the cancer center, maker- and incubator spaces will be supported for the most promising projects. |

### Building on a Culture of Entrepreneurship

**Entrepreneurship Initiative at Dartmouth’s Norris Cotton Cancer Center.** A key part of the cancer center’s strategic plan, this initiative includes programming and modest support for faculty interested in entrepreneurship, and an advisory board. The Cancer Center Innovations Advisory Board (described in the table above), provides advice to faculty-inventors and evaluates competitive proposals from investigators who are seeking pilot funding from the J. Brian and Allie J. Quinn Scholars program, a philanthropic fund designated to support entrepreneurship.

**Ad Hoc External Advisory Panel.** The Technology Transfer Office and the Magnuson Center for Entrepreneurship recently convened a panel of Dartmouth and non-Dartmouth-affiliated investors and entrepreneurs at the service of five Dartmouth biomedical researchers. The faculty presented their research innovations and received expert feedback and mentorship around their respective paths for commercialization.

**D-H Cancer Faculty Fellows Program.** Dartmouth-Hitchcock and Norris Cotton Cancer Center have committed an annual $1 million investment from clinical revenues to provide 40% protected time, for three years, for a select cohort of clinicians to pursue a cancer-focused research project.

**Dartmouth SYNERGY Clinician-Entrepreneur Fellowship.** This one-year fellowship program was developed by Aaron V. Kaplan, MD, professor of medicine at Geisel, interventional cardiologist at the Heart and Vascular Center at Dartmouth-Hitchcock, and leader of the Academic-Industry Core for Dartmouth SYNERGY. This award provides a clinician with one day per week of protected time to
develop entrepreneurial skills. At the end of this fellowship, it is expected that the fellow will have developed an in-depth business plan and have a deep understanding of the challenges involved in becoming a clinician-entrepreneur.

**Philanthropic Support**

In a matter of weeks, the Dartmouth Innovations Accelerator for Cancer concept has generated a groundswell of interest and excitement among Dartmouth alumni and potential donors. The vision for this program is to be fully funded through philanthropy with a mix of current-use and endowed gifts, providing donors with the opportunity to see the exponential impact of their gift as successes are realized.

The total fundraising goal for this effort is $15 million, which will create a robust effort putting Dartmouth on par with its peers. Programs like Yale’s Blavatnik Fund for Innovation and Brown’s Biomedical Innovations to Impact fund have launched with much excitement and early impact. Dartmouth’s realized successes will place us at the front of the pack.

**To launch this effort, we are seeking initial philanthropic commitments of $4.5 million in the next three months.** With the first influx of pledge payments before June 30, 2020, the Dartmouth Innovations Accelerator for Cancer will launch the first call for proposals at the start of the 2020-21 academic year. Given the cyclic nature of academia, committed support this fiscal year is imperative to harness the momentum built thus far, to achieve initial milestones, and to avoid delaying the project proposals and investments for an entire academic year.

Gifts of all sizes are welcome and will directly support a number of programmatic needs. Those making leadership gifts of $1 million and more will be invited to serve on the volunteer leadership team, helping to direct the promotion and success of the accelerator.

Those who provide the leadership gifts to launch the Accelerator will be recognized widely for their vision and generosity. The public launch of the Accelerator will bring national visibility and media attention not just to Dartmouth and its cancer center but also to the entrepreneurial success and expertise of the Dartmouth alumni community.

The support, investment, and engagement of Dartmouth’s biomedical alumni community will be essential to the successful launch and growth of the Accelerator—and, eventually, its expansion beyond cancer to other biomedical research. To that end, the Accelerator will be a major topic of discussion and promoted broadly at Dartmouth events in the coming months, including the Toronto Global Summit, the Dartmouth Entrepreneurs Forum, and the Boards of Advisors meetings for Geisel and the Magnuson Center. This new program will get front and center attention at many College events with a plan for national media coverage upon the official launch.

The impact of initial philanthropic support will be exponential—and realized in the deepening of Dartmouth’s entrepreneurial culture, the mentoring and support provided to faculty innovators, the
unparalleled experiential learning opportunities provided to students and trainees, and the first successful revenue-generating project.

Now is the time. Moving this effort forward with urgency will ensure that lifesaving discoveries are in the hands of physicians and patients who need them most. Support for this effort will improve the lives of cancer patients worldwide.

TO LEARN MORE, CONTACT:
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Dartmouth-Hitchcock Health and Geisel School of Medicine at Dartmouth
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APPENDIX I
Norris Cotton Cancer Center: Key Facts & Figures

NATIONAL EXCELLENCE

- 1 of 5 designated gene-sequencing centers for the National Cancer Institute’s precision medicine cancer treatment trial.
- Ranked 6th among all 51 National Cancer Institute-designated Comprehensive Cancer Centers in the number of Small Business Innovation Research (SBIR) grants received over the past 10 years. (MD Anderson had 40; Johns Hopkins, 26; University of California San Diego, 23; Duke, 21; Stanford, 21; and Dartmouth, 20.)
- Ranked among the very top nationally for patient satisfaction (more than 32,000 patients served annually from a five-state catchment area).
- 1 of only 30 National Cancer Institute Clinical Trials Network Lead Academic Participating Sites.

DARTMOUTH’S BIOMEDICAL RESEARCH POWERHOUSE

- 50% of all research funding to Dartmouth from the National Institutes of Health is obtained by Norris Cotton Cancer Center members.
- More than 120 senior scientific investigators from 21 departments (Geisel, Thayer, Guarini, and Arts & Sciences) attract more than $50 million annually in research grants and contracts.
- More than 200 research projects plus 160 open clinical trials.
- #1 provider of research opportunities for Dartmouth undergraduates, with approximately 100 undergraduates working with cancer center investigators per term.
- Deeply engaged in the teaching of medical students, residents, and fellows; two-thirds of Geisel MD-PhD students pursue their thesis work in cancer center labs.
APPENDIX II

Extraordinary Potential for Success

EXAMPLES OF POSSIBLE ACCELERATOR PROJECTS

ENHANCING CANCER IMMUNOTHERAPY USING PLANT VIRUS NANOPARTICLES
Steve Fiering, PhD, Professor of Microbiology and Immunology and of Genetics, Geisel School of Medicine

- Developed scalable platform using cowpea mosaic virus nanoparticles that provides long-term anti-tumor effects in a variety of metastatic cancers and delivery modalities.
- Needs $400,000 for manufacturing pilot.

NEW “DRUG-LIKE” SYNTHETIC STEROID FOR BREAST CANCER AND GLIOMAS
Glenn Micalizio, PhD, New Hampshire Professor of Chemistry Arts & Sciences, Dartmouth College

- Using a proprietary platform, Professor Micalizio has developed a highly selective ER-β (breast cancer) agonist and demonstrated efficacy in patient-derived glioma xenografts.
- Needs $250,000 for pharmacokinetics, pharmacodynamics, and toxicology (by contract research organization).

NEW POTENTIAL THERAPY FOR TUMORS WITH RAS SIGNALING DYSREGULATION
Yolanda Sanchez, PhD, Associate Professor of Molecular and Systems Biology, Geisel School of Medicine

- Discovered novel target in neurological tumors with Ras hyperactivity and identified model small molecule for further development.
- Needs $300,000 for medicinal chemistry and animal models.

IMPROVING AND EXPANDING CAR T-CELL THERAPIES FOR SOLID TUMORS
Charles Sentman, PhD, Professor of Microbiology and Immunology Geisel School of Medicine

- Demonstrated robust anti-tumor activity for a wide range of cancers with novel bispecific T-cell engager and CAR T-cell formats.
- Needs $250,000 for additional animal model work.
APPENDIX III

A HISTORY OF SUCCESSFUL ENTREPRENEURSHIP
THREE EXAMPLES OF DARTMOUTH CANCER CENTER SPINOFFS

Medarex (est. 1987)

FOUNDED: By three immunologists at Dartmouth’s medical school and Norris Cotton Cancer Center: Mike Fanger, PhD, Paul Guyre, PhD, and Edward Ball, MD.

INNOVATION: At a time when most of biotech shied away from cancer immunotherapy, Medarex invested in two promising antibodies—anti-CTLA-4 and anti-PD-1—designed to essentially take the brakes off immune cells so they can attack tumors.

IMPACT: The therapies became the blockbuster, life-saving cancer drugs ipilimumab (Yervoy) and nivolumab (Opdivo) and led to the 2018 Nobel Prize in Physiology and Medicine being awarded to the scientists who brought anti-CTLA-4 and anti-PD-1 to Medarex. Bristol-Myers Squibb purchased Medarex in 2009 for $2.4 billion; a portion of those profits fund translational research at Geisel.

ImmuNext (est. 2010)

FOUNDED: By Dartmouth immunologist and Norris Cotton Cancer Center researcher Randy Noelle, PhD, to develop two therapies based on Noelle’s discoveries.

INNOVATION: Known as immune checkpoint inhibitors, the ImmuNext therapies target immune system proteins VISTA and CD154—both of which regulate immune cells and play important roles in cancer and a range of autoimmune diseases, such as lupus and multiple sclerosis.

IMPACT: In 2016, ImmuNext granted Roche a worldwide, exclusive license to develop and commercialize therapeutics that target the VISTA immune system pathway. In 2017, ImmuNext granted Sanofi an exclusive, worldwide license to develop and commercialize INX-021, a CD40L monoclonal antibody. Preclinical studies indicate a high potential for the medication to treat a range of autoimmune diseases, including lupus and multiple sclerosis.

DoseOptics (est. 2015)

FOUNDED: By Dartmouth engineers and Norris Cotton Cancer Center researchers Brian Pogue, PhD, and Scott Davis, PhD, in collaboration with tech entrepreneur William Ware, Jr.

INNOVATION: Developed the world’s first Cherenkov imaging system to provide real-time video monitoring of radiation therapy to minimize damage to healthy tissues and organs.

IMPACT: The imaging system is now available to research customers, and systems have been successfully deployed at leading academic institutions across the United States.