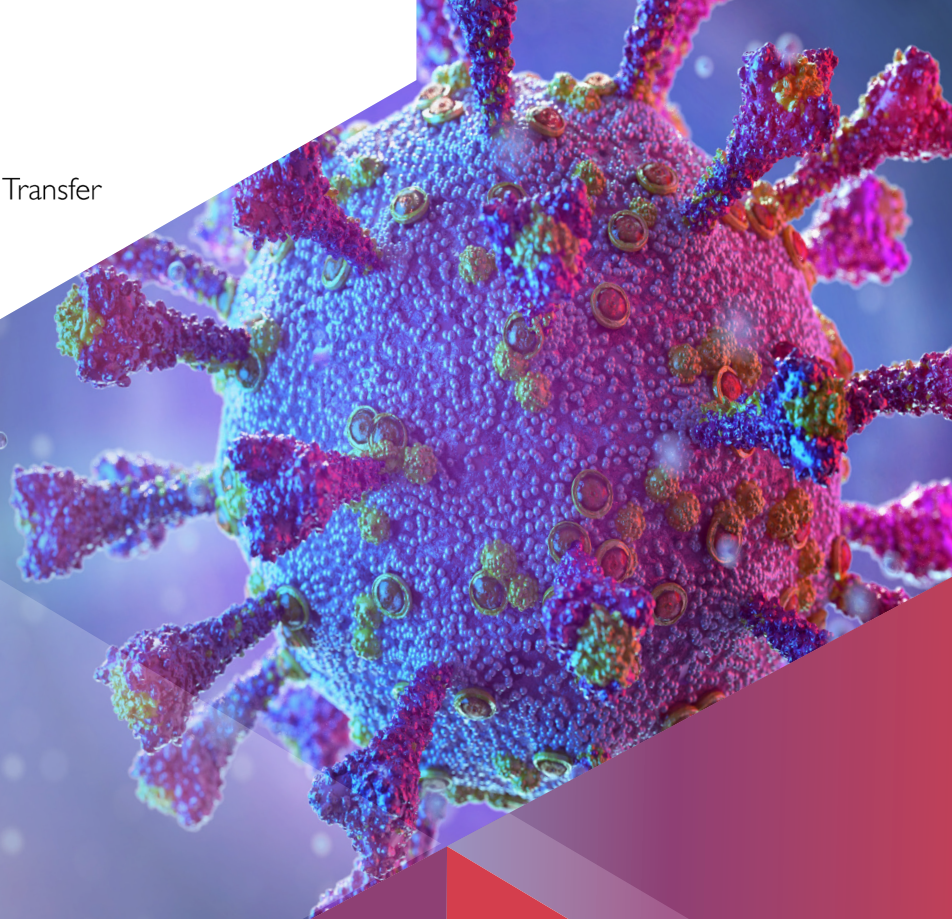




CTTC

Center for Technology Transfer
& Commercialization




FY20 **HIGHLIGHTS**

www.vanderbilt.edu/cttc



FROM PUSH TO PULL



FY2020 is by most accounts the most successful year we have had in terms of generating value for the University through income from licensing technology and industry research funding. But the statistics do not tell the whole story of the impact commercialization efforts have on the University.

Since the inception of the tech transfer office (CTTC) at Vanderbilt, the technology transfer function operated under a traditional academic model, focusing on the hard work of licensing of Vanderbilt intellectual property assets to the corporate sector, and providing some assistance to faculty entrepreneurs in starting their own companies when the opportunity and interest presented itself. The customary metrics for measuring performance focused on inventions disclosed, patents issued, licensing transactions executed and royalties generated.

This out-licensing model mirrored the conventional university “push mode” for

innovation management, where inventions from research are conceived and developed largely independent of market need and without input from end-users. Nonetheless, the technologies created by Vanderbilt researchers led to compelling outcomes and demonstrate Vanderbilt’s ability to innovate.

In the 5-year period from 2010 to 2014, Vanderbilt produced more than 850 invention disclosures, 147 patents issued, 281 executed licenses, and nearly \$56M in licensing revenues, with an additional \$12.5M in industry sponsorship of R&D related to licensing, as well as the launch of 16 start-ups.

As evidenced by this data, during this period CTTC began evolving toward less of a traditional “push” technology commercialization operation, focusing more on value creation for the University than solely out-licensing technology. Developing long term industry partnerships became more of a focal point, and a renewed emphasis on new venture creation is apparent. As the University more frequently leveraged its research capabilities as a value-add component of licensing, increased industry sponsorship for continued development of licensed technology resulted – “pulling” more technology from our academic labs into industry labs for commercial development.

Furthermore, Vanderbilt began to more effectively advance its reputation as an innovative institution, and these efforts continue. For four years running Vanderbilt has been awarded the prestigious R&D 100 Award. And Vanderbilt has been included in the rankings of the *Reuters Top 100 of the World’s Most Innovative Universities* over the last four years, and has emerged in the top 20 of this list for the past three years running. Over the past several years, Vanderbilt has been featured in numerous high-profile press releases announcing licensing and research partnerships with a number of

Fortune 500 partners. The Wond’ry – Vanderbilt’s Innovation Center – has served as an anchor for innovation and entrepreneurship on campus and has received national accolades for its facilities and programming.

The advancements on the innovation, licensing, entrepreneurship and industry partnership fronts over the past five years has had positive impact on Vanderbilt’s core innovation metrics. Innovation by our faculty, staff and graduate students from 2015 to 2020 have led to nearly 40 start-up companies. Additionally, during this time period there have been 1128 inventions disclosed, 358 U.S. patents awarded, 496 licenses executed, a total of \$78.5M in licensing revenue generated, and an additional \$83.2M in associated industry sponsored research during this period. While the numbers are impressive, the impact reputationally and in terms of generating resources to support the research mission will continue to be realized in years to come.



DEEPENING PARTNERSHIPS

VANDERBILT AND THE WARREN FOUNDATION



The introductory letter of this report discusses Vanderbilt's rise to prominence as an innovative institution, and how such a reputation opens up new avenues for discovery, development and ultimately improving the human condition. A shining example is the deepening of the partnership between Vanderbilt and the William K Warren Foundation to combat cognitive impairments and disorders of the brain.

Through the personal efforts of Provost Dr. Susan Wente and SOM Basic Sciences Dean Dr. Larry Marnett, Vanderbilt University received a \$20M grant from the Warren Foundation to establish the Warren Center for Neuroscience Drug Discovery. The Center, led by director Craig Lindsley, is comprised of nearly one hundred scientists and trainees working to develop new small molecule therapeutics that treat or prevent serious brain disorders, such as Parkinson's disease, schizophrenia, and Alzheimer's disease.

The Warren Foundation, located in Tulsa Oklahoma, supports healthcare innovation and medical research, among a variety of other charitable initiatives. The Warren Foundation grant will support ongoing drug discovery and development efforts, as well as create an endowment for the benefit of the Center.

In addition to this generous grant, the Warren Foundation has been a longstanding supporter and partner with Vanderbilt and the Center for Neuroscience Drug Discovery. The Foundation has supported seven endowed faculty chairs at Vanderbilt, and has provided previous grant support for specific Center projects. One such project is the development of therapies for Alzheimer's disease. This support has helped Center researchers develop a promising compound - VU319 - which has undergone human phase I clinical testing in the Vanderbilt University Medical Center. This compound was licensed to Acadia Pharmaceuticals in March, 2020 for further development and testing (see page 7 for information on the Acadia license).



WARREN CENTER

FOR NEUROSCIENCE DRUG DISCOVERY

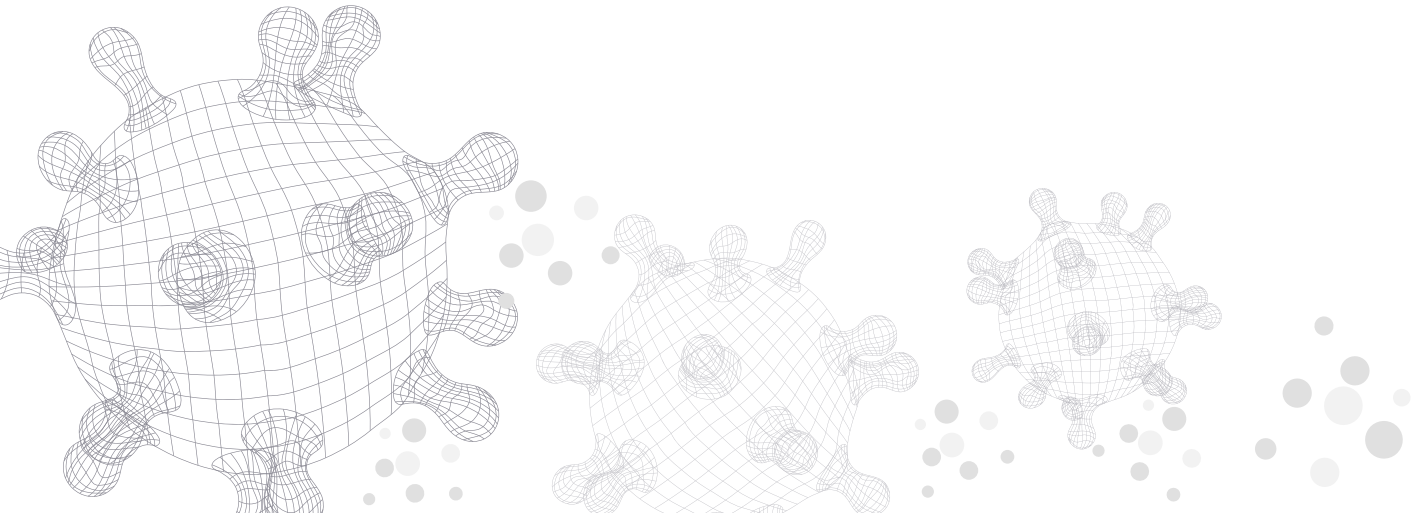
at Vanderbilt University

FY20 IMPACTFUL TRANSACTIONS

ASTRAZENECA

In response to the news that the virus SARS-CoV-2 was spreading widely, researchers in the Vanderbilt Vaccine Center conducted a campaign to find antibodies in the blood of previously infected individuals that could be developed into therapeutics. A number of antibodies were discovered with the potential to prevent COVID-19, or to treat COVID-19 in already infected patients.

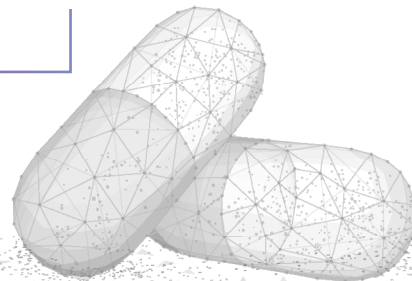
Several of these antibodies were licensed to AstraZeneca, which is developing a product which includes two antibodies, each of which block different parts of the SARS-CoV-2 virus. The AstraZeneca product is currently in clinical trials to test its safety and efficacy.



ACADIA PHARMACEUTICALS

Vanderbilt partnered with Acadia Pharmaceuticals Inc. for the development of novel drug candidates targeting the muscarinic M1 receptor with the potential to treat a range of central nervous system (CNS) disorders. These diseases could include Alzheimer's disease, Schizophrenia and other neurocognitive disorders. The collaboration will focus on positive allosteric modulators (PAMs) of the M1 receptor.

The M1 PAM program, developed within the Warren Center for Neuroscience Drug Discovery directed by Craig Lindsley, represents what we believe is one of the few instances of an academic institution taking a drug discovery program from the conception phase all the way into clinical development and Phase 1 trials without investment or partnership with a pharmaceutical or biotech company. For this program this was specifically important due to the history of pharmaceutical failures and unwanted muscarinic effects seen with past M1 agonists. Passing the program to Acadia will now bring the further expertise required to advance this program toward being available to treat patients.



STARTUP SPOTLIGHT

MERU BIOTECHNOLOGIES

Meru Biotechnologies is a Richmond, Virginia-based company that is developing analytical instrumentation, reagents and services based on Darryl Bornhop's "Backscattering Interferometry" technology. The technology improves the drug discovery process by providing more accurate and sensitive measurements of drug-target interactions.

It combines the strengths of existing label-free approaches in a straightforward platform powered by advancements in compensated interferometry and uses a single laser to measure experimental and reference samples in the same microfluidic channel simultaneously. In addition to life science applications, the company's methodology and hardware can be applied to many other fields including agriculture, environmental science, forensics, and biological agent testing.

The company is pursuing Federal SBIR/STTR grants to support this R&D effort and has raised seed stage private investment.

For more information, visit <https://www.merubio.com>

ELEMENO

Laurie Cutting and Neena Saha in the Peabody School's Department of Special Education have developed a new measure of text decodability, called the DSyM. The DSyM scores words and larger texts according to how difficult they are to decode, or learn to read. This allows books to be matched to early readers more appropriately. A web-based interface to the DSyM algorithm was created with a small amount of funding from CTTC and the assistance of developers from Research IT Services in the Office of the Vice Provost for Research. The web-based interface is now being used by researchers at several universities after it was presented at a reading conference in 2019, and has contributed to several published research projects and many more in preparation.

Saha graduated from Vanderbilt in 2020 and moved to the research triangle area of North Carolina, where she founded Elemeno® (pronounced as "LMNO"). Elemeno's mission is to bridge the research-to-practice gap in early literacy by packaging scientific knowledge into useful tools for practitioners. Elemeno licensed the DSyM technology from Vanderbilt and plans to provide web-based access to the DSyM tool, decodability scoring for its clients, and individualized person-to-text matching assessments. This tool, and the patent-pending algorithm behind it, could be useful for parents and teachers to ensure that books align with their children's and student's needs, but also for educational publishers to ensure that their curricula match their practice texts and that they gradually increase in difficulty.

For more information, visit <https://www.elemeno.us/>



FY20 THE NUMBERS

*3yr average includes FY18, FY19, FY20

Licenses & Options Executed



94

3yr average: 88

End-User Licenses Executed



208

3yr average: 196

Confidentiality Agreements Executed



78

3yr average: 83

Sponsored Research/Collaboration Agreements Reviewed



104

3yr average: 99

Revenue Generated

\$22,548,764



3yr average: \$17,758,720

Clinical Trial Agreements Reviewed



36

3yr average: 38

168
NEW INVENTION
DISCLOSURES

3yr average: 193



112
FIRST-TIME

Vanderbilt Disclosure

Submitters 3yr average: 120

Vanderbilt Related New Ventures



5

3yr average: 5



317
TOTAL

Individual Vanderbilt

Submitters 3yr average: 322



63
TOTAL

3yr average: 72

Different Departments, Divisions,
Institutes & Centers (represented
by submitters of new disclosures)

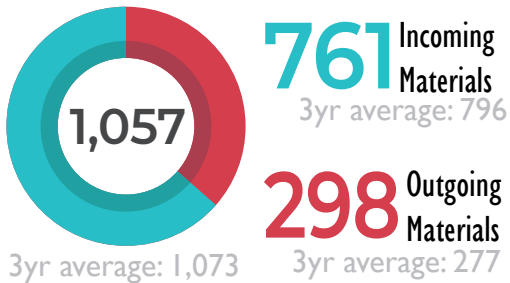
Sponsored Research Related to Licensed Technologies

\$23,226,362

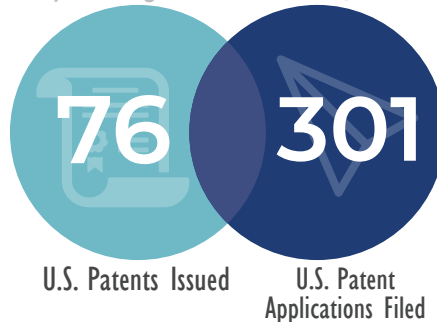
3yr average: \$16,098,209



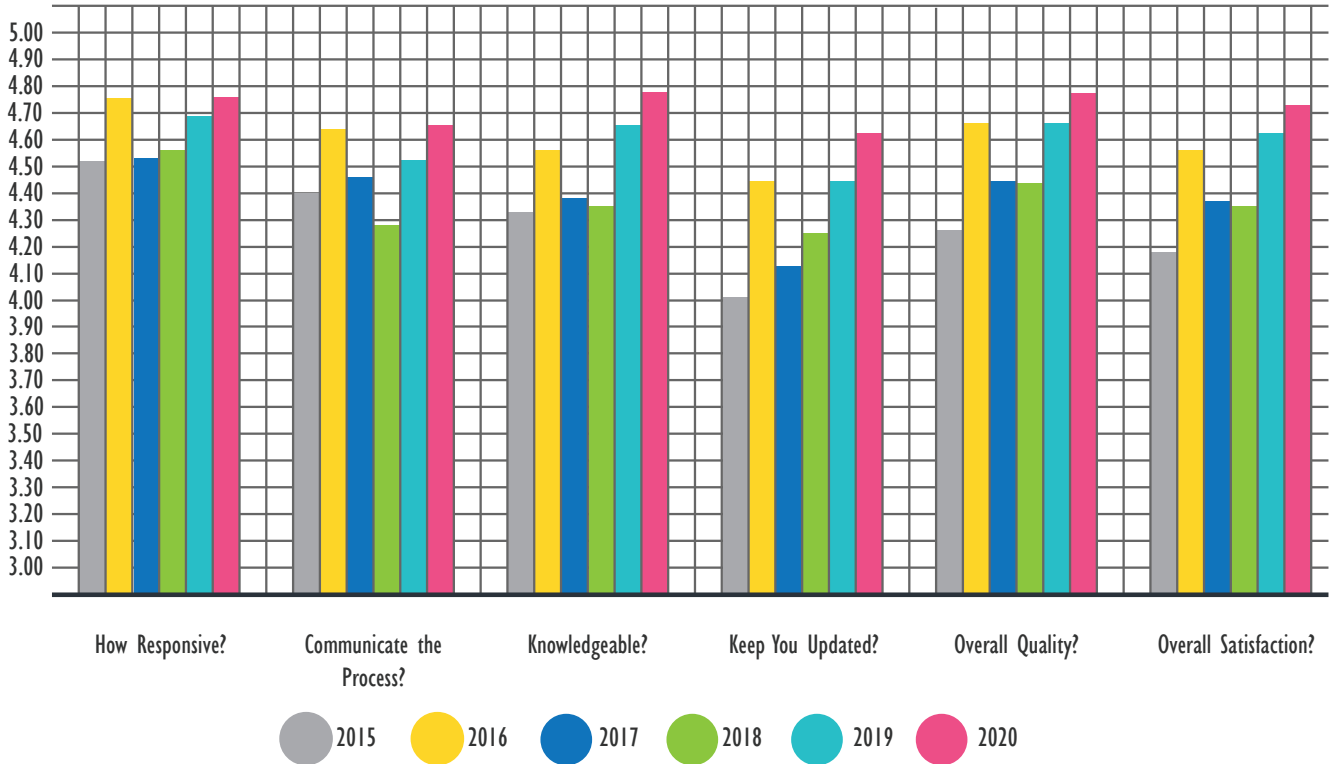
Material Transfer Agreements Reviewed

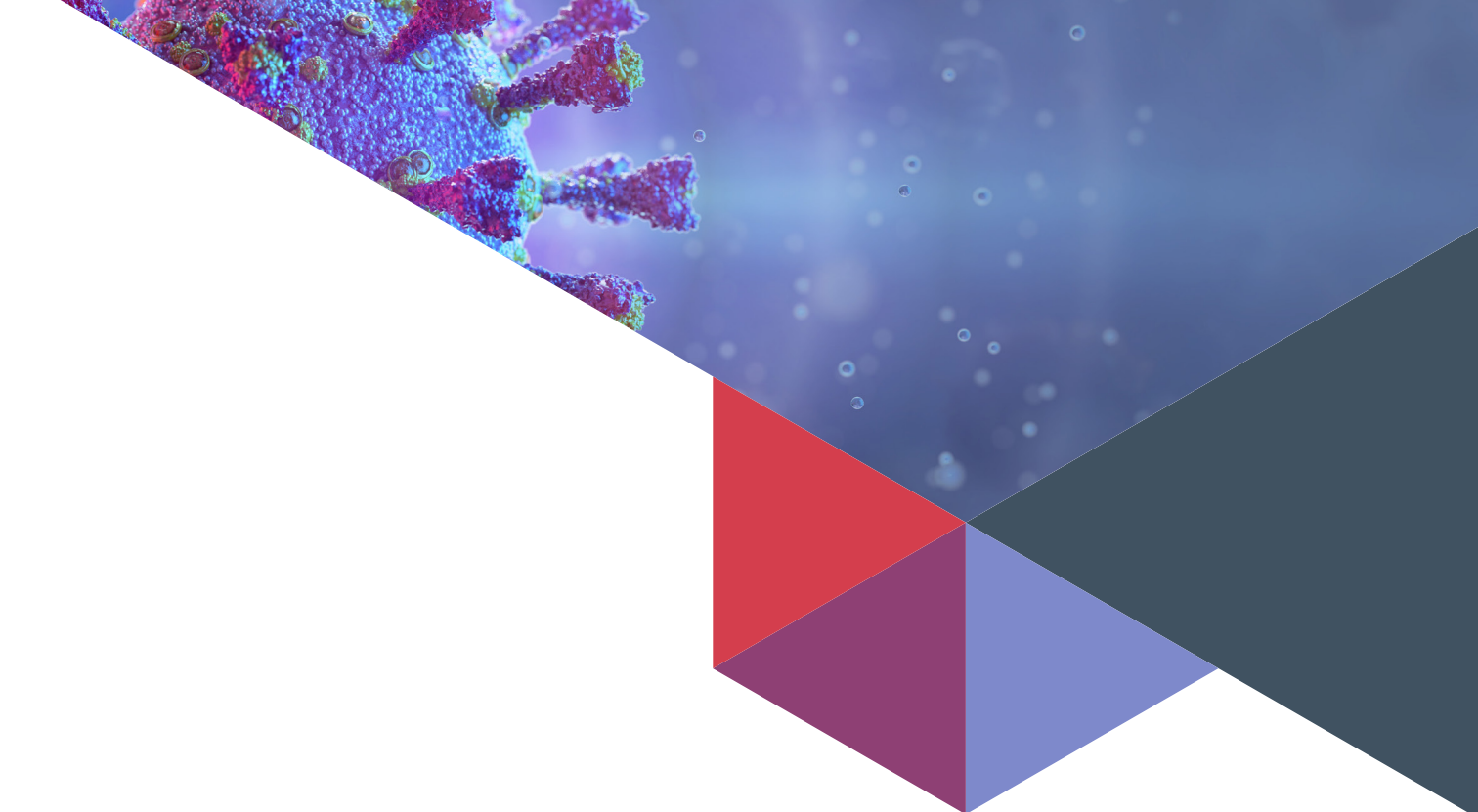


3yr average: 70 3yr average: 284



INVENTOR SATISFACTION





VANDERBILT
UNIVERSITY

CTTC

Center for Technology Transfer
& Commercialization

www.vanderbilt.edu/cttc