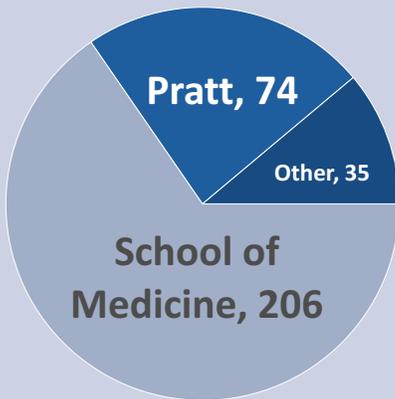


## Disclosures from Duke Faculty



### By the numbers

Start-ups  
**11**

Issued US Patents  
**85**

New US Patent Applications  
**205**

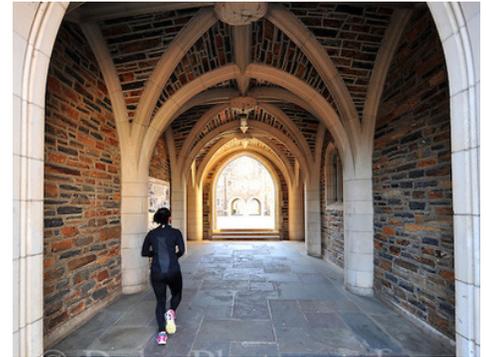
Total License Revenue  
**\$45M**

Inventions  
**315**

Agreements  
**115**

## A Record Setting Year for Innovation

From idea to industry—Duke University researchers continue to participate in the invention process. This past fiscal year saw researchers from across campus working with the Office of Licensing & Ventures (OLV) team to break records for the number of inventions, agreements, and start-ups. OLV is striving to improve its processes, communications, and service to our stakeholders to further enhance innovation and entrepreneurship at Duke.



## HIGHLIGHTS



**Kinnian Dong**

Use of the Arabidopsis thaliana TBF1 gene for engineering disease resistance in plants

Plants don't have immune systems like us—they are either all defense or all growth, but not both at the same time. Dr. Dong's research could help us learn how to bolster plant immune systems and reduce the use of crop pesticides. Two papers published in *Nature* this past May describe a system that provides disease resistance without reducing crop yield.



**Harrison Jones**

One-Way Gas Valve Adapter for the Assessment of Maximum Inspiratory and Expiratory Pressures

Dr. Jones has developed two devices that extend the capability of currently marketed respiratory exercise trainers (RET). Used to develop the respiratory muscles of patients with muscle disease or in elite athletes/vocal performers to achieve greater performance, these RET devices are being used in clinical trials with Pompe's Disease patients.



**John Sampson**

Phase II Cancer Immunotherapy Technology Targeting Cytomegalovirus (CMV)

Duke start-up, Annias Immunotherapeutics, an immuno-oncology company, has granted an exclusive sublicense to Immunomic Therapeutics for IP rights related to targeting antigens of cytomegalovirus in cancer as well as for methods of improving cancer vaccination. Duke licensed the patented CMV immunotherapy platform to Annias in 2015.



**Levo Therapeutics**

Use of the drug Carbetocin, for the treatment of Prader-Willi Syndrome

Dr. Yong Hui Jiang is an expert in Prader-Willi syndrome (PWS), a genetic condition that causes extreme hunger and severe obesity beginning in childhood. Un-silencing the expression of PWS genes from the maternal chromosome is a focus of Levo Therapeutics, which has recently completed Series A financing and is in the process of finalizing a license to this

# NEW RECORDS!

**\$45M**

Total Revenue  
up 30%

*Increased sales of Duke licensed pharmaceuticals and a variety of other agreements resulted in record revenues.*

**11**

Start-ups  
up 22%

*Our renewed focus on assisting faculty start-ups resulted in a record total of 11 start-ups, seven from the Pratt School of Engineering.*

**315**

Inventions  
up 6

*With six more than last year, we broke a record for total invention disclosures. 206 inventions came from the School of Medicine, 74 from Pratt, and 35 from the other schools.*

**115**

Agreements  
up 50%

*The number of total agreements with our commercial partners reached 115, increasing 50% over the previous year. There were 95 agreements for technologies out of the School of Medicine, 18 from Pratt, and two from the other schools.*

## Grid Therapeutics

*An emerging bio-therapeutic start-up specializing in innovative cancer treatment.*

Edward (Ned) Patz, Jr., MD, and his laboratory have discovered a novel antibody against a unique target for the treatment of lung cancer. There are further applications for this antibody in multiple cancer types. Dr. Patz's lab used an innovative strategy that explored the host response in a distinct group of lung cancer patients with early-stage disease that never developed metastasis. This first-in-class antibody will enter phase 1 clinical trials by the end of 2018.

1

*A protein in the body called complement factor H, or CFH, helps protect the body's cells against an attack.*

2

*Patients with cancer that didn't metastasize had a specific antibody that worked against the CFH protein.*

3

*With the antibody present, the protective layer of CFH is disabled allowing the cancer cells to be destroyed.*



**Grid**  
THERAPEUTICS

## DiGeorge Syndrome therapy named 'Breakthrough Therapy' by FDA

Enzyvant, a biopharmaceutical company with a rare disease focus, announced in April that RVT-802 was granted Breakthrough Therapy designation, Regenerative Medicine Advanced Therapy designation, and orphan drug designation by the FDA.

RVT-802 is an investigational tissue based therapy for the treatment of complete DiGeorge Syndrome (cDGS) and was invented by Dr. M. Louise Markert, Professor of Pediatrics at Duke University. cDGS is a rare genetic disorder caused when a part of chromosome 22 is missing, resulting in the poor development of several body systems. With a Breakthrough Therapy designation, RVT-802 will be afforded expedited development and review, offering hope for speedy and judicious access to this new treatment.



## HIGHLIGHTS

### New Start Ups



Providing a comprehensive platform for personalized surgical risk prediction.

### Host Response

Developing diagnostics based on the body's response to respiratory infection



Surgical innovations for enhancing hernia surgery



Platform to develop completely human derived antibodies for the treatment of multiple types of cancer.



Fang-Fang Yin,  
Jackie Wu

Patient-Specific Prescription: Knowledge Based Optimal Organ Dose Sparing Prescription for Intensity Modulated Radiation Therapy Treatment

Duke entered into an exclusive license agreement with a major hospital equipment manufacturer for this treatment technology delivering high-precision radiotherapy to patients.



Thomas Tedder  
Collective BioTherapy

CBT is an early-stage biotech spinout from Duke focusing on unique aspects of regulatory B cells that are involved in regulating a variety of autoimmune diseases and inflammatory immune responses. Eshelman Ventures supported funding of this Duke Spinout for \$2.5 million in the first round.



Ehsan Samei  
Computed Technology (CT) Organ Dosimetry Technology

Duke completed a license with GE Healthcare for Dr. Samei's CT organ dosimetry technology which enables automatic calculation of CT organ dose, helping the clinician to better estimate the radiation exposure to the patient. This technology will reduce the time needed to perform assessments.



Sharon Fekrat Akshay Thomas

Enclosure device to isolate dropped lens material in the eye.

Along with Dr. Thomas, Dr. Fekrat has developed a device for retrieving and holding foreign materials in the vitreous cavity of the eye. During a vitrectomy, this device will allow for the safe removal of dropped lens material or other foreign matter in the vitreous cavity of the eye.



## A new record for Pratt! Realtime Robotics among 7 new start-ups

Pratt has broken its previous record of five start-ups in a year to seven in 2017. From quantum information processors to tiny silicon microspheres, the School of Engineering is demonstrating the entrepreneurial spirit.

One of these start-ups, Realtime Robotics, founded by Dan Sorin, Professor of Electrical & Computer Engineering, invented a specialized processor for generating safe robot motion plans in microseconds, enabling robots to function in unstructured, collaborative workspaces, reacting to other movements as soon as they are perceived.

## HIGHLIGHTS



Guillermo Sapiro

SmartfaceID, Inc.

Automatic face recognition in unconstrained conditions is subject to pose, expression, and illumination variability and is, perhaps, among the most challenging machine vision tasks. Dr. Sapiro has developed a unique system and method for large scale face identification and verification.



Warren Grill

Optimized Methods of Spinal Cord Stimulation

Spinal cord stimulation is a type of therapy for treating chronic pain. Dr. Grill has developed computational modeling systems and methods to reduce the time required for the effective treatment of patients with the added benefit of increased treatment efficacy.



JungSang Kim

IONQ

Using a trapped ion approach, IONQ can combine physical performance, perfect quantum bit replication, optical networkability, and highly-optimized algorithms to create a scalable quantum computer capable of multiple uses in many industries.



Zehra Parlak

Qatch Technologies

Aiming to disrupt a \$1 billion portion of the point-of-care diagnostics industry, former Pratt postdoc Zehra Parlak is developing a smaller and more robust microfluidic sensor technology device that can measure blood coagulation times using a fraction of the blood needed for testing.

## New Start-ups



Developing world-leading general-purpose quantum information processors.



High throughput screening that allows for the manipulation of single cells



Reconfigurable chips for robotics motion

## Element Genomics

Using gene regulatory elements to identify new DNA targets

## SmartfaceID

Large scale face identification and verification

## Encapsio

Revolutionary silicone microspheres for the encapsulation and delivery of active ingredients in product formulations

## Gateway

Alternative to PEGylation of proteins/nucleic acids (POEGMA)