RESEARCH STRATEGIC PLAN

Driving high-impact discoveries in medicine through innovation, translation, and collaboration
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Letter from the Chair</td>
<td>1</td>
</tr>
<tr>
<td>Executive Summary</td>
<td>2</td>
</tr>
<tr>
<td>Context</td>
<td>4</td>
</tr>
<tr>
<td>Strategy 1: Invest in Our People</td>
<td>5</td>
</tr>
<tr>
<td>Strategy 2: Enhance Duke Partnerships</td>
<td>7</td>
</tr>
<tr>
<td>Strategy 3: Innovate in Data Science</td>
<td>9</td>
</tr>
<tr>
<td>Strategy 4: Strengthen and Invest in Scientific Infrastructure</td>
<td>11</td>
</tr>
<tr>
<td>Strategy 5: Accelerate Team Science</td>
<td>12</td>
</tr>
<tr>
<td>Division Scientific Vision</td>
<td>13-15</td>
</tr>
<tr>
<td>Research Planning Committee Membership</td>
<td>16</td>
</tr>
<tr>
<td>Division Chiefs Roundtable</td>
<td>16</td>
</tr>
</tbody>
</table>
LETTER FROM THE CHAIR

Colleagues,

Medicine is the largest department in the School of Medicine, and our size—combined with a tradition of innovation, collaboration, and leadership—means together we can drive the future of Duke.

I was eager to join this department because I knew the faculty, trainees, and staff had the ability to make fundamental and impactful basic, translational, and clinical contributions to the field of medicine through outstanding individual and team-based science.

In order to see this potential realized,

- We will play a leading role in clinical care at Duke Health and be influencers of medical practice locally, regionally, and nationally.
- We will broaden the support of our faculty and trainees in all missions, strengthen our development and mentoring programs, and deepen our pool of people with diverse experiences and knowledge.
- We will continue to attract the very best physicians and scientists and always celebrate and support those in our training programs.
- We will conduct research that transforms patient care through the development of innovative therapeutics, diagnostics, and devices.

We have invested considerable effort and resources to devising a strategic plan that will provide a roadmap for our research mission today and into the future.

This work was guided by a Research Planning Committee that convened throughout the first half of 2019, reviewing the current state of research in the Department, generating recommendations for strengthening our research efforts, and developing the following plan. Many of you participated and contributed ideas as part of this process—through interviews, a survey, and robust discussions at the 2019 Research Retreat.

The result of this combined effort is the clear, direct, ambitious, and ultimately achievable research strategic plan that follows.

I sincerely thank you for your many contributions as well as the passion and expertise that you bring to your discovery work. We are a great department because of you, and we will accomplish much more as we work together in the coming years.

Kathleen A. Cooney, MD, MACP
Chair
We will continue to advance this rich history of driving high-impact discoveries in medicine through innovation, translation, and collaboration.

EXECUTIVE SUMMARY

Since 1930, the Duke Department of Medicine (DOM) has been at the forefront of advancing research, patient care, and medical education nationally and internationally. Our researchers have made groundbreaking advancements in basic, translational, and clinical domains across the full spectrum of medicine sub-specialties.

We will continue to advance this rich history of driving high-impact discoveries in medicine through innovation, translation, and collaboration. We will do this while embracing the highest standards of scientific integrity and maintaining a clear patient-centered focus throughout all our research endeavors.

We identified five strategies for achieving this vision:

1. We will foster the success of our current faculty by enhancing our faculty development, mentoring, and funding programs while also strengthening the pipeline of the next generation of outstanding investigators in Medicine.

2. We will enhance our partnerships with other departments, centers, institutes, schools, and programs across Duke University.

3. We will solidify a leadership position in data science by leveraging the clinical disease expertise of our faculty; building our data assets; and improving our data collection, storage and analytics resources.

4. We will foster a community and culture of rich scientific investigation by making research easier while achieving the highest levels of research integrity.

5. We will invest in emerging research content and method areas that leverage our strengths and address important unmet patient-centered medical needs.

The graphic on page 3 provides a visual representation of this vision and the existing and new initiatives for executing these strategies.
# Driving High-Impact Discoveries in Medicine through Innovation, Translation, and Collaboration

## Strategies

<table>
<thead>
<tr>
<th>Invest in our People</th>
<th>Enhance Duke Partnerships</th>
<th>Innovate in Cutting-Edge Data Science</th>
<th>Strengthen and Invest in Scientific Infrastructure</th>
<th>Accelerate Team Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Strengthen faculty career development programs</td>
<td>• Duke Clinical Research Institute</td>
<td>• Cultivate DOM data assets into open science platform</td>
<td>• Provide outstanding grants and administrative support to investigators</td>
<td>• Immunology, inflammation &amp; fibrosis</td>
</tr>
<tr>
<td>• Build a diverse and inclusive DOM</td>
<td>• Duke Cancer Institute</td>
<td>• Augment biostatistics &amp; bioinformatics resources</td>
<td>• Position Duke as a leader in site-based research</td>
<td>• Aging, resilience &amp; pain</td>
</tr>
<tr>
<td>• Foster culture of outstanding mentorship in the Department</td>
<td>• Durham VA Medical Center</td>
<td>• Create new leadership role for data science</td>
<td>• Develop next-generation biorepository capabilities</td>
<td>• Energy, obesity &amp; metabolic disease</td>
</tr>
<tr>
<td>• Expand physician-scientist recruitment and programmatic support</td>
<td>• Duke Molecular Physiology Institute</td>
<td>• Implement learning health units</td>
<td>• Catalyze innovation and entrepreneurship</td>
<td>• Precision medicine</td>
</tr>
<tr>
<td>• Launch DOM partnership hires program</td>
<td>• Pratt School of Engineering (MEDx)</td>
<td>• Continue implementation of Science Culture and Accountability Plan</td>
<td>• Expand international research efforts</td>
<td>• Population health &amp; disparities research</td>
</tr>
<tr>
<td>• Expand cadre of independent PhD investigators</td>
<td>• Duke Human Vaccine Institute</td>
<td></td>
<td></td>
<td>• And more</td>
</tr>
<tr>
<td></td>
<td>• Duke Global Health Institute</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Center for Applied Genomics and Precision Medicine</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Cross-Cutting Themes

- Immunology, inflammation & fibrosis
- Aging, resilience & pain
- Energy, obesity & metabolic disease

## Methods

- Precision medicine
- Population health & disparities research
- And more
INTRODUCTION

In early 2019, the Research Planning Committee (listed on page 16) and DOM leadership completed an assessment of the current state of the Department’s research portfolio, as reflected in the table below.

<table>
<thead>
<tr>
<th>AREA</th>
<th>HIGHLIGHTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>National Reputation</strong></td>
<td>• DOM has a number of prominent faculty recognized for their achievements:</td>
</tr>
<tr>
<td></td>
<td>○ 7 faculty are members of the National Academy of Medicine.</td>
</tr>
<tr>
<td></td>
<td>○ 50 are members of the American Society for Clinical Investigation.</td>
</tr>
<tr>
<td></td>
<td>○ Dr. Robert Lefkowitz is a Nobel Laureate, HHMI investigator, and member of the National Academy of Science.</td>
</tr>
<tr>
<td><strong>Faculty Trends</strong></td>
<td>• The total number of DOM faculty has increased 50% in the past 10 years due to significant growth in the number of non-tenure track (clinical) faculty.</td>
</tr>
<tr>
<td></td>
<td>• Across the Department, there are more than 350 research-focused primary investigators (PIs), i.e. those with ≥50% effort dedicated to research.</td>
</tr>
<tr>
<td></td>
<td>• In FY18, mid-career PIs (age 45-60) represented the largest proportion of both investigators and grants (48% of investigators and 55% of grants).</td>
</tr>
<tr>
<td><strong>Overall Research Portfolio Trends</strong></td>
<td>• DOM-owned research expenditures, i.e. research grants administered by the DOM, increased 3% from FY08 to FY18 ($81M to $84M).</td>
</tr>
<tr>
<td></td>
<td>• Total PI research expenditures, i.e. all research grants to DOM PIs, whether administered by DOM or not, increased 23% from FY08 to FY18 ($253M to $310M).</td>
</tr>
<tr>
<td></td>
<td>• The sizes of research programs across the divisions are highly variable; for many divisions, a significant amount of research activity takes place in Duke centers and institutes.</td>
</tr>
<tr>
<td><strong>NIH Portfolio Trends</strong></td>
<td>• DOM has maintained a top-five ranking in the Blue Ridge Institute’s ranking for NIH funding among clinical departments across the U.S.; for 2018, the DOM ranked fifth.</td>
</tr>
<tr>
<td></td>
<td>• NIH funding to DOM has grown modestly over the past 10 years — expenditures have shifted over this time from DOM-owned grants to center- and institute-owned grants.</td>
</tr>
<tr>
<td><strong>Industry Research Trends</strong></td>
<td>• Industry funding totals have stayed relatively flat over the past 10 years.</td>
</tr>
<tr>
<td></td>
<td>• DOM has achieved significant improvement in the average days to enrollment in clinical trials (dropped from an average of 122 days in FY12 to 78 days in FY18).</td>
</tr>
<tr>
<td><strong>Research Space</strong></td>
<td>• DOM administers some 147K square feet of research space.</td>
</tr>
<tr>
<td></td>
<td>• Research activities constitute 60% of the office, meeting, and laboratory spaced used by DOM and the divisions.</td>
</tr>
</tbody>
</table>
STRATEGY 1: INVEST IN OUR PEOPLE

Growing and supporting a diverse and successful cadre of outstanding investigators is the key enabler for achieving our vision. As the market for scientific talent grows ever more competitive, the Department of Medicine must redouble its efforts to recruit outstanding scientists as well as support our trainees and junior faculty as their careers develop.

1.1 Strengthen existing DOM faculty career development programs and launch new programs to fill identified gaps.

- Clearly link all DOM financial support to individuals with the expectation that each will participate in DOM career- and grant-development programs (e.g., Concept Review, Faculty Development Academy), especially during career transition periods.
- Institute a DOM Loan Repayment Program, similar to the NIH Loan Repayment Program, to provide competitive support for DOM faculty with educational loans.
- Develop a DOM Mentor Academy to cultivate and support mid-career researchers who will be promising applicants for the NIH K-24 (Midcareer Investigator Awards in Patient-Oriented Research).
- Develop a “Best Practices” database for career and grant development in collaboration with Duke Clinical and Translational Science Institute (CTSI), School of Medicine Office of Faculty, and other teams with relevant tools and resources.
- Ensure all faculty embrace our culture of scientific rigor and are trained in best practices around data and data integrity.

1.2 Build a diverse and inclusive DOM.

- Commit to recruiting and retaining a diverse research workforce consistent with our department priorities.
- Further train and mentor our research teams in issues related to harassment and discrimination.

1.3 Foster a culture of outstanding mentorship in the Department.

- Create an “Expectation Statement” for guiding consistent research mentoring across DOM, with succinct, reasonable, and concrete goals.
- Enhance Department-level awards and incentives for research mentoring, including building on the DOM Research Incentive Plan.
- Support the formation of small peer-mentoring groups across the Department around specific research themes and challenges.
- In conjunction with Initiative 1.1, develop an inventory of best practices for mentorship.
1.4 **Expand the cadre of independent PhD investigators who can advance the DOM research vision.**

- Streamline the process for recruiting PhD faculty and enhance the coordination of faculty recruiting with the basic science departments.
- When possible, ensure that each DOM PhD has a secondary appointment in a basic science department; during the recruitment process, form a joint interview committee with the other department to vet each independent PhD investigator.
- Appoint a DOM faculty member to serve in a leadership role overseeing PhD faculty in DOM, serving as the leader and advocate for these individuals.
- Re-evaluate the pay scale and track classification of PhD investigators in order to enhance DOM competitiveness in attracting and retaining outstanding PhD scientists.
- Explore alternative funding models for tenure-track PhD faculty.

1.5 **Expand physician-scientist recruitment and programmatic support.**

- Strengthen the community of physician-scientist trainees by creating a DOM Physician-Scientist Training Program (PSTP); create the role of associate program director of physician-scientist training in the Internal Medicine Residency Program to oversee the PSTP.
- Ensure that each fellowship program identifies a physician-scientist to be a contact for physician-scientist trainees; formalize recruitment and mentoring responsibilities across the training programs.
- Expand support for residents interested in research in collaboration with the SOM Office of Physician-Scientist Development (OPSD), Burroughs Wellcome Fund award, and the Duke R38 Research Pathway.
- Expand the Medicine Chair’s Research Award program for supporting individuals in the transition from fellow to faculty.
- Increase the number of NIH T32 awards to support fellowship research.

1.6 **Launch a Department of Medicine partnership hires program to support the recruitment of at least 10 outstanding faculty over the next five years in emerging areas of focus.**

- Initiate a recruitment program to identify and support partnership recruits between DOM divisions and other divisions, departments, and schools across Duke.
- Provide funding for partnership hires each year through a competitive application process with a focus on hires that align with the collaborative research areas outlined in Strategy 5.
- Reinvest in divisions as they seek to recruit these investigators.
STRATEGY 2: ENHANCE DUKE PARTNERSHIPS

The Department of Medicine has a long history of strong partnerships with centers, institutes, programs, and schools across Duke University and Health System. Given that such a significant amount of medicine research happens outside of the Department, strengthening and nurturing these relationships is a critical component of the DOM research strategy.

Below we detail a non-exhaustive list of the relationships we believe can be further strengthened over the next five years.

2.1 Duke Clinical Research Institute (DCRI)

- Identify opportunities to enhance alignment with DCRI as it begins to execute on its new strategic plan.
- Strengthen coordination between DOM division chiefs and research leadership and the DCRI therapeutic-area leads.
- Co-invest with DCRI on methods development in areas of mutual interest such as health data science and precision medicine.

2.2 Duke Cancer Institute (DCI)

- Identify opportunities to grow cancer research in partnership with DCI with focus on the Divisions of Medical Oncology and Hematologic Malignancies and Cellular Therapy.
- Grow cross-divisional collaborations with DCI, e.g., cardio-oncology.
- Develop initiatives to recruit, support, and retain cancer-focused physician scientists.

2.3 Durham VA Medical Center (DVAMC)

- Grow the amount of VA funding in DOM by pursuing additional VA Career Development Awards and Merit Review Awards (parallel funding mechanisms to NIH).
- Provide administrative support for VA grants through DOM Research Administration.
- Make it easier for DOM investigators to do VA research by providing support in navigating the DVAMC system, streamlining data transport between the DVAMC and Duke, streamlining duplicative IRB structures, and strengthening leadership ties.
- Work with hospital and Veterans Integrated Service Network leadership to align financial incentives with research productivity.
- Promote the use of VA research space available for DOM investigators.
2.4 Duke Molecular Physiology Institute (DMPI)

- Continue the strong history of joint recruitments of faculty between DOM and DMPI.
- Enhance support for junior and mid-career scientists already in DOM and DMPI through DOM bridge funding and other support programs.
- Explore opportunities to enhance and expand research in the Sarah W. Stedman Center for Nutritional Studies.

2.5 Duke Pratt School of Engineering

- Develop robust connections with MEDx and its education, research, and entrepreneurship strategies.
- Advocate for an expansion of Pratt’s Design Health Program and explore additional ways to support Pratt engineering design students who are interested in addressing issues in medicine.
- Develop and launch a joint DOM-Pratt fellow/post-doc training program.
- Encourage cross-school participation in various colloquia, events, and workshops.
- Strengthen collaboration with Pratt related to commercialization and industry relationships, consistent with SOM efforts to link with Office of Licensing and Venture (OLV) and Duke Innovation and Entrepreneurship Initiative, as well as with MEDx.
- Assign DOM leader(s) to be accountable for cultivating the relationship with Pratt.

2.6 Duke Human Vaccine Institute (DHVI)

- Develop an approach to bring DOM and DHVI together to pursue large extramural research program support.
- Partner on development of immunotherapy for autoimmune disease and malignant diseases.
- Partner on development of antibody therapy of opportunistic fungal infections.

2.7 Duke Global Health Institute (DGHI)

- Strengthen support for and collaboration with our international investigators.
- Consider mutually beneficial partner hires with international collaborators such as Duke-NUS Singapore and DGHI.
- Capitalize on existing programs such as Duke One Health to expand our global research portfolio.

2.8 Center for Applied Genomics and Precision Medicine (CAGPM)

- Leverage CAGPM’s work on RNA/proteomic signatures to develop novel clinical tools, with a focus on clinical validation and establishing clinical utility.
- Integrate the MeTree family history and risk calculation score software into the DOM genetics and genomics toolset.
- Partner with CAGPM on evaluation and implementation of digital health tools.
- Leverage CAGPM’s precision medicine education platforms (R25, T32, ‘Genome Academy’) to give DOM trainees and faculty the knowledge base needed to become accomplished practitioners of precision medicine.
STRATEGY 3: INNOVATE IN DATA SCIENCE

We are generating an unprecedented amount of data in our clinical practices and research studies. Harnessing these data and developing our data science capacity in emerging fields such as artificial intelligence and machine learning is essential to advancing basic, translational, and clinical research efforts across the Department.

3.1 Cultivate DOM data assets into an open science platform.

- Create an inventory of all existing significant data assets (e.g., clinical trials data, electronic health record data, genotypic and phenotypic data) that are siloed, difficult to access, and in many cases, unknown to the DOM at large.
- Develop a searchable inventory of high-value data assets and the fields contained within those assets.
- Explore opportunities to partner with Duke Forge (Duke University’s center for actionable health data science), Duke Health Technology Solutions (DHTS), and others in this effort.
- Continue to explore different models for data access with consideration for ongoing university and school-wide efforts in this area.

3.2 Augment biostatistics & bioinformatics resources.

- Establish a memorandum of understanding with the Department of Biostatistics and Bioinformatics (B&B) for additional biostatistical support; a cadre of mixed-level biostatisticians (PhD, Masters, etc.) from B&B would be contracted to provide services to DOM investigators, with a particular focus on pre-grant needs.
- Biostatistical support made available by DOM should be subject to project management with tracking of appropriate outcomes, with a process to meter access and adjust as needed.
- Initiate programs to create and foster an effective and collegial community among DOM statisticians and investigators and provide navigational support for DOM faculty seeking biostatistics and bioinformatics resources.
- Continue to evaluate and ensure alignment with other biostatistics and bioinformatics resources at Duke including at DCI and the Department of Population Health Sciences.
3.3 Create a new leadership role for data science.

• Select a faculty leader to execute the DOM data science initiatives and coordinate with the SOM vice dean for data science and information technology, Duke Forge, DHTS, and other Duke data science efforts.

• This individual (and/or team) will serve as an educational resource with regards to the access of various campus-wide programs in data science.

• This role will coordinate data-related activities to support the Department’s Science Culture and Accountability Plan (see item 3.5).

3.4 Implement learning health units in DOM.

• Launch DOM learning health unit(s) in partnership with SOM to integrate clinical care, clinical research, and data science for enhancing care delivery and developing novel insights.

• Identify specific challenges to pursue; one potential area is ambulatory specialty care transformation.

3.5 Continue the implementation of the Science Culture and Accountability Plan (SCAP).

• Operationalize SCAP principles and recommendations in concert with the implementation of this strategic plan—in particular those initiatives related to innovation in data science and strengthening our scientific infrastructure.
STRATEGY 4: STRENGTHEN AND INVEST IN SCIENTIFIC INFRASTRUCTURE

Fostering a robust community of clinical investigators and a culture of conducting cutting-edge translational and clinical research is essential to new knowledge creation. This will require addressing the barriers to conducting site-based research and investigator-initiated trials while ensuring the highest levels of research integrity consistent with DOM’s Science Culture and Accountability Plan.

4.1 Provide outstanding grants and administrative support to investigators by enhancing the DOM Office of Research Administration (DOM-RA) operations and infrastructure.

- Enhance central support and infrastructure with standard DOM processes for regulatory and quality assurance.
- Develop a robust training program for DOM research administrators.
- Create an action plan and timeline for enhancing DOM-RA and clinical research unit operations based on findings from the 2019 faculty survey.
- Identify office touch-down spaces in divisional locations to facilitate interaction between faculty and DOM-RA staff.
- Partner with SOM and CTSI on implementing an interactive research roadmap and making research resources easier to find.

4.2 Position Duke as a leader in conducting site-based research.

- Assess the costs of site-based research at Duke in partnership with SOM and identify ways to make Duke more cost-competitive versus our regional and national peer academic medical centers.
- Work with SOM to find ways to accelerate the contracting and grant-review processes while maintaining research quality and research integrity.
- Expand new-faculty onboarding to include the full research spectrum—including training all DOM faculty in research conduct, regulatory, and compliance issues.

4.3 Develop next-generation biorepository capabilities with SOM.

- Develop a DOM biobanking strategy in conjunction with SOM bio-data repository planning efforts.
- Inventory existing freezers in use by DOM PIs and develop recommendations for enhancing coordination of freezer space, monitoring, and use.
- Integrate a freezer plan with the broader biobanking strategy.

4.4 Catalyze innovation and entrepreneurship activities in DOM.

- Strengthen relationships with the Duke Innovation and Entrepreneurship Initiative and Office of Licensing and Ventures (OLV).
- Appoint a director of research development to oversee DOM engagement in innovation and commercialization.
- Develop a stronger partnership with the Office of Licensing and Ventures by educating faculty on their services and enhancing cross-communication.
- Establish relationships with the Durham Innovation District, Fuqua School of Business, and other entities.

4.5 Further develop international research resources to expand international research.

- Inventory, collate, and record all international research projects and faculty.
- Link to SOM and its international infrastructures to allow investigators to move smoothly from Department to School rules/regulations.
- For DOM’s immediate investment in international studies, the Duke-NUS Singapore connection is likely to be most productive.
# STRATEGY 5: ACCELERATE TEAM SCIENCE

DOM will invest in research areas that build on existing strengths and accelerate our scientific impact. We have identified five collaborative research areas for investment and will continue to evaluate these and new areas over the coming years. To advance our science in these areas, we will consider these areas when identifying priorities for DOM colloquia, pilot projects, joint research efforts, and faculty recruitment.

<table>
<thead>
<tr>
<th>Content Area Goals, Activities, and Key Relationships</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DEPARTMENT OF MEDICINE GOALS</strong></td>
</tr>
</tbody>
</table>
| 5.1 Immunology, Inflammation, & Fibrosis | • Build expertise and national reputation as a leader in research in immunology, inflammation and fibrosis. | • Partner with the Department of Surgery to shape vision and have co-ownership with DOM around Translating Duke Health (TDH) efforts. | • Department of Surgery  
• Department of Immunology  
• TDH Immunology and Transplant Initiative |
| 5.2 Aging, Resilience, & Pain | • Position DOM as the leading department in the country for the study of aging, resilience, and pain. | • Invest in developing and recruiting expertise in the research of disease conditions related to aging, resilience and pain. | • Center for the Study of Aging and Human Development  
• Department of Anesthesiology  
• DCI |
| 5.3 Energy, Obesity & Metabolic Disease | • Develop a critical mass of investigators connecting basic science to clinical research, building on strengths at DMPI. | • Understand scope of ongoing research.  
• Identify opportunities to enhance connectivity of investigators across Duke around this theme. | • DMPI  
• Department of Population Health Sciences (DPHS)  
• DCRI |
| 5.4 Precision Medicine | • Individualize best treatment for patients based on clinical and genetic factors or biomarkers.  
• Take leadership role in cohort studies by defining cohorts and precise phenotypes. | • Understand models where this has been effectively implemented (e.g., oncology/asthma)  
• Identify ways to build trainee skills for leading in this area. | • Genomic Medicine Collaboratory  
• DCI  
• Industry Partnerships |
| 5.5 Population Health & Disparities | • Develop health system-wide models of care for managing populations.  
• Study specific issues that impact patient outcomes for under-represented minorities, including provider bias. | • Identify and integrate existing efforts across the Department. | • DPHS  
• Duke Margolis Center for Health Policy  
• Duke Population Health Management Office  
• Duke Center for REACH Equity |
### DIVISION SCIENTIFIC VISION

As part of the research strategic planning process, each division chief prepared a summary of their division’s scientific priorities for the next five years, summarized below.

<table>
<thead>
<tr>
<th>DIVISION</th>
<th>SCIENTIFIC PRIORITIES</th>
</tr>
</thead>
</table>
| **Cardiology** | • Personalization of cardiovascular therapies.  
• Increase the discovery-to-translation pathway evolving work across the department.  
• In ten years, we will have engaged patients and a method to deeply phenotype our patients so that we can better align care and therapy (and leverage that for basic discoveries). |
| **Endocrinology, Metabolism, and Nutrition** | • To improve diabetes care and outcomes for patients.  
• Preclinical translational research to interrogate the biology critical to understanding pathophysiology and therapeutic targets.  
• Clinical translational research to compare the physiology of diabetic and nondiabetic humans. This work can be extended to mechanism of action and first-in-human studies of potential therapies, and to clinical trials.  
• Implementation of novel and refined strategies for diabetes treatment. |
| **Gastroenterology** | • Priority areas include colorectal cancer, esophageal disorders, gut-brain axis, non-alcoholic fatty liver disease, pancreatic diseases, and healthcare disparities.  
• To develop collaborations with scientists engaged in gastroenterology research in other divisions and other departments across the campus.  
• To support the career development of the research fellows and junior faculty physician-scientists recruited to the Division in the last several years.  
• To expand biobanking of samples from patients to facilitate research.  
• To expand site-based research in clinical trials of gastroenterology diseases. |
| **General Internal Medicine** | • Develop a Center of Excellence actively generating impactful grant funded studies in chronic disease prevention and outcomes, leveraging methods common to population and patient oriented studies. Build breadth, depth, and strength of faculty capable of developing their own and collaborative research platforms. Build strength both in ambulatory research as well as research conducted within hospital settings.  
• Double current NIH and other externally funded research.  
• Grow hospital medicine research programs to include funded studies. |
| **Geriatrics** | • Expand research in physical resilience as a fertile area for basic and translational work.  
• Build capacity for translational and health services research in Alzheimer’s Disease and related dementia by forming an Alzheimer’s Disease Center.  
• Models of care lend themselves to testing in embedded Pragmatic Clinical Trials (ePCTs), an emerging area of interest to NIH. Duke (DCRI) has the coordinating center for ePCT Collaboratory.  
• Continue to integrate aging and geriatrics research across the medical specialties.  
• Leverage big data and clinical informatics in research to improve recruitment strategies, clinical trial design, and intervention delivery. |

Continued on the next page
<table>
<thead>
<tr>
<th>DIVISION</th>
<th>SCIENTIFIC PRIORITIES</th>
</tr>
</thead>
</table>
| Hematologic Malignancies and Cellular Therapy | • Continue established track record of innovative approaches to allogeneic transplantation, including umbilical cord blood transplantation, and cord blood derived regenerative medicine, leveraging the resources of the Marcus Center for Cellular Cures, home transplant, and microbiome manipulation.  
• Develop a comprehensive effort on cellular therapies focused on enhancing immunity to tumors, infectious agents or other autoimmune states.  
• Bench-to-bedside projects in GvHD treatment and prevention, focusing on B-cells, enhancing tumor responses by blocking myeloid suppressor cells, continued work on understanding endothelial cell damage and how to mitigate this.  
• Grow “-omic” approaches to various malignancies.  
• Continue to develop understanding of cell adhesion and its impact on metastasis.                                                                                                                                                                                                                                                                                                                                                   |
| Hematology                          | • Establish and sustain a healthy pipeline of researchers who leverage and expand on existing research programs in sickle cell disease, hemostasis/thrombosis and apheresis.  
• Emerging areas of interest spearheaded by junior faculty members include complement biology, aging, and transfusion medicine.                                                                                                                                                                                                                                                                                                                                                         |
| Infectious Diseases                 | • Basic science, translational and clinical work in fungal, bacterial and viral pathogenesis and drug resistance.  
• Antibiotic Stewardship and Infection Control Standards.  
• Global and One Health focus.  
• Transplant Infectious Diseases (create and maintain the premier program in the world based on clinical, translational and basic science levels).  
• Examine the chronic health issues of HIV infection and research delivery of care to HIV patients.  
• Pursue and maintain a malaria consortium to challenge parasite management and epidemiology.  
• New diagnostics for infectious diseases and application of old diagnostics.                                                                                                                                                                                                                                                                                                                                                                         |
| Medical Oncology                    | • Continued development of targeted therapeutics program; linking molecular profiling to appropriate databases, Molecular Tumor Board and to our portfolio of clinical trials including CTEP/ETCTN/NCTN trials.  
• Immuno-oncology including development of adoptive T-cell therapy and laboratory/translational work to understand de novo and acquired resistance to immune checkpoint inhibitors.  
• Expand research into outcomes in oncology including care reimbursement models, “financial toxicity,” oncoprimary care, and cardio-oncology.  
• Research into novel therapeutic approaches to brain metastases.                                                                                                                                                                                                                                                                                                                                                                          |
<table>
<thead>
<tr>
<th>DIVISION</th>
<th>SCIENTIFIC PRIORITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nephrology</strong></td>
<td>• Become a national leader in clinical trials in nephrology.</td>
</tr>
<tr>
<td></td>
<td>• Grow our existing base of basic and clinical investigation.</td>
</tr>
<tr>
<td></td>
<td>• Develop a multidisciplinary kidney precision medicine program based on genomics, single cell sequencing, metabolomics, ex vivo glomerulus-on-a-chip technology, and digital pathology with image recognition.</td>
</tr>
<tr>
<td></td>
<td>• Become a leader in basic and clinical research in kidney transplantation.</td>
</tr>
<tr>
<td></td>
<td>• Grow our K recipient pool as the foundation for our next generation of independent investigators.</td>
</tr>
<tr>
<td><strong>Pulmonary, Allergy, and Critical Care Medicine</strong></td>
<td>• Increase research collaborations within the Division, initially leveraging existing strengths in acute lung injury, transplantation COPD, IPF, PAH.</td>
</tr>
<tr>
<td></td>
<td>• Increase collaborations and co-research mentoring groups outside of the division; sleep clinical and translational research would be a good start, given that joint recruitments are already taking place.</td>
</tr>
<tr>
<td></td>
<td>• Transition trainees from T-to-K, K-to-R; diversity funding portfolio (PPGs, VA, Department of Defense).</td>
</tr>
<tr>
<td></td>
<td>• Identify what normal lung aging is and how aging affects severe lung diseases.</td>
</tr>
<tr>
<td></td>
<td>• How do we leverage endogenous host responses to address lung injury, repair and resilience?</td>
</tr>
<tr>
<td><strong>Rheumatology and Immunology</strong></td>
<td>• Discover new approaches to lupus management that improve patients’ quality of life and decrease long-term organ damage (expand registry and build biorepository, identify new biomarkers, build and disseminate new measures of lupus activity, identify and test new treatment protocols).</td>
</tr>
<tr>
<td></td>
<td>• Integrate clinical care with research, health data, and information technology to promote continuous learning and improved care in rheumatology. OR: Use real-world health data efficiently and effectively to guide and assess changes in rheumatologic care.</td>
</tr>
<tr>
<td></td>
<td>• Explore new mechanisms of innate immunity in RA and autoinflammatory disease</td>
</tr>
<tr>
<td></td>
<td>• Transform the management of rheumatic diseases in pregnancy through the dissemination and implementation of the new American College of Rheumatology Reproductive Health Guidelines.</td>
</tr>
</tbody>
</table>
RESEARCH PLANNING COMMITTEE MEMBERSHIP

The development of the Department of Medicine Research Strategic plan was guided by the Research Planning Committee, listed below. To gain input for the plan, the Department conducted a survey of DOM research faculty (88 respondents), conducted a thorough current-state assessment (including interviews with 35 faculty and leadership), held a Department-wide research retreat (170 attendees) and convened a Division Chief’s Roundtable to discuss division-specific and cross-cutting priorities. The Committee convened four times from February through May 2019 and worked in between those meetings to develop the recommendations encompassed in this plan.

Kathleen Cooney, MD, Committee Chair
Christina Barkauskas, MD
Ebony Boulware, MD, MPH
Megan Clowse, MD
Chris Kontos, MD
Richard Lee, MD
Rodger Liddle, MD
Susanna Naggie, MD, MHS
Scott Palmer, MD, MHS

Steve Patierno, PhD
John Perfect, MD
Howard Rockman, MD
Stefanie Sarantopoulos, MD, PhD
Heather Whitson, MD, MHS
Myles Wolf, MD
Cathy Wood, MBA
DOM Support: Erica Malkasian, Ashton Spicer and Anton Zuiker
Manatt Support: Jared Augenstein, Zerrin Cetin, and Tom Enders

DIVISION CHIEFS ROUNDTABLE

Kathleen Cooney, MD
Chair
Roundtable chair
Scott Palmer, MD, MHS
Vice Chair, Research
Roundtable facilitator
James Abbruzzese, MD
Chief, Division of Medical Oncology
Ebony Boulware, MD, MPH
Chief, Division of General Internal Medicine
Nelson Chao, MD, MBA
Chief, Division of Hematologic Malignancies and Cellular Therapy
Cathleen Colon-Emeric, MD
Chief, Division of Geriatrics
David D’Alessio, MD
Chief, Division of Endocrinology, Metabolism and Nutrition

Andrew Muir, MD
Chief, Division of Gastroenterology
Thomas Ortel, MD, PhD
Chief, Division of Hematology
Manesh Patel, MD
Chief, Division of Cardiology
John Perfect, MD
Chief, Division of Infectious Diseases
Patty Lee, MD
Chief, Division of Pulmonary, Allergy and Critical Care Medicine
William St. Clair, MD
Chief, Division of Rheumatology and Immunology
Myles Wolf, MD
Chief, Division of Nephrology
Design
Addison-Design.com

Photography
Ted Richardson
Shawn Rocco
Duke Photography

Editors
Elizabeth McCamie, Ashton Spicer, Anton Zuiker