November 9, 2015

Fred H. Cate  
Vice President for Research  
Distinguished Professor and C. Ben Dutton Professor of Law  
Carmichael Center, Suite 202; 530 E. Kirkwood Avenue  
Bloomington, IN 47408

Dear VP Cates,

Enclosed with this cover letter is the Grand Challenge pre-proposal from the IU School of Medicine. In addition, we have also enclosed biosketches for the key participants as well as support letters from key external partners as support for the proposal. Thank you for your consideration.

The title of the proposal: **Precision Medicine Initiative**

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A one-sentence summary: The Precision Medicine Initiative (PMI) is the grand challenge proposal from IUSM with three scientific pillars—genomic medicine, cell based therapies, and chemical biology—along with three cross-cutting initiatives of informatics, education programs, and a precision medicine patient cohort.

**Abstract:** Precision Medicine, *the science and practice of medicine through a more precise definition of the molecular, behavioral and environmental factors that contribute to an individual’s health and disease* is expected to transform biomedical research, health care innovations and the delivery of health interventions in the future. Therefore, IUSM has chosen the **Precision Medicine Initiative (PMI)** as its Grand Challenge proposal. This field will become a major focus of Federal funding of research and an essential need to provide the best health care for the people of Indiana, making this a compelling topic for IUSM. The PMI proposal will have three major pillars—genomic medicine, cell based therapies, and chemical biology—along with three cross-cutting initiatives that include informatics and computational sciences, new educational and degree programs, and a comprehensively-characterized Precision Medicine Cohort. When fully implemented, the PMI will be delivering access to precision medicine advances to nearly two million patients across Indiana and hire over fifty new research faculty hires in precision medicine. It will be foundational for our strategic goals of doubling IUSM’s research funding and raising our NIH ranking to the top 25 schools and creating strategic partnerships with Eli Lilly, Roche Diagnostics, and Cook Industries. Through its innovative education and degree programs, IU will also be creating the scientific workforce of the future for Indiana and beyond.
Indiana University School of Medicine Grand Challenge Proposal

Precision Medicine Initiative

1. The Grand Challenge

The Indiana University Bicentennial Grand Challenge proposal calls for bold initiatives addressing “major and large-scale problems facing humanity that can only be addressed by multidisciplinary teams of the best researchers” and plans to invest significant resources over the next decade to catalyze research. The IU School of Medicine (IUSM), through its own strategic plan to enhance the school’s clinical and research impact within Indiana and beyond, has identified key areas expected to transform health care innovation and delivery in the future. One major area of emerging transformation where it is essential that IU position itself as a leader is “Precision Medicine (PM)”, defined here as “the science and practice to refine our current diagnosis and treatments, as well as our understanding of prevention, onset, progression and health outcomes of diseases, through a more precise definition of the molecular, behavioral and environmental factors that contribute to an individual’s health and disease.” Therefore, IUSM has chosen the Precision Medicine Initiative (PMI) as its Grand Challenge proposal. IUSM and its partners propose a bold plan to generate novel research programs, new and expanded degree, certificate, and professional medical education programs, as well as innovative models for clinical care built on knowledge gained from the study of an individual’s genome, biology, behavior and psychosocial factors. The PMI proposal will have three major pillars—genomic medicine, cell based therapies, and chemical biology—along with three cross-cutting initiatives that include informatics and computational sciences, new educational and degree programs, and a comprehensively-characterized Precision Medicine Cohort (see Fig. 1 below). We believe that the PMI detailed below will make IU a leader in one of the most exciting new areas of health care discovery and innovation, and will have a transformative effect on not only IU, but also on the health, well-being and economy of the citizens of Indiana.
2. Goals
Biomedical research is poised to revolutionize our approach to patient care by introducing new genomic, biological and behavioral knowledge to provide personalized and precise medical care. High-throughput technologies for molecular characterization of an individual’s own genetic makeup are becoming more readily available and affordable. In the area of oncology, we are already at a point in time where personalized molecular medicine is required for certain select diseases and molecular subtypes. Examples of these include anti-HER2 (Herceptin receptor 2) targeted therapy for HER2-positive breast cancer, Epidermal growth factor (EGFR)-targeted therapy for EGFR-mutant lung tumors, and the mutation-selective kinase inhibitors for murine sarcoma viral oncogene homologue B1 (BRAF)-mutant melanoma \(^{1-4}\). This type of biomarker-based approach will soon become the standard of care for most patients with cancers—indeed, industry data suggests that from 2000 to 2015, genetic-based cancer drug sales have grown from 9% to nearly 50% of the market share \(^5\). President Obama singled out precision medicine as a key future direction (State of the Union address, 15 Jan, 2015), it is expected to be a major area of investment for the National Institutes of Health (NIH) as noted by Director Francis Collins \(^6\), the Patient Centered Outcomes Research Institute (PCORI) has partnered to form the One Million Americans Initiative \(^7\), and other federal funders are preparing to invest as well. Similarly, genetically modified cell therapies have begun to revolutionize the treatment of cancer and other conditions \(^8-10\). The PMI proposal from the IUSM and its partners will have three pillars of scientific programs supported by three cross-cutting platforms (see Fig. 1).

**Three Scientific Program Pillar Goals:**

**Goal 1:** Build capacity, expertise, and clinical service programs in Genomic Medicine

i. Implement new clinical initiatives and physician decision support in the areas of precision oncology, pharmacogenomics, cardiology and neurodevelopment

ii. Create a functional variant core to elucidate the biological mechanisms of genomic discoveries

**Goal 2:** Develop research and clinical programs in Cell-, Gene- and Immuno-Therapies

i. Build clinical and research programs in the area of cell and immune therapies

ii. Create a Cell and Gene Therapy Good Manufacturing Practice (GMP) facility

**Goal 3:** Create a Chemical Biology and Targeted Therapeutics program as a virtual network of partners

i. Creating a joint IUSM-IUB Center for Chemical Biology and Biotherapeutics (C2B2) to accelerate the pace of precision medicine biomarker and therapeutics discovery

ii. Expand the Molecular Therapeutics Program (MTP) to support precision medicine discoveries

**Three Cross-Cutting Theme Platform Goals:**

**Goal 1:** Build top Biomedical Informatics and Cyberinfrastructure programs

i. Build a collaborative and multidisciplinary basic and translational informatics research program

ii. Integrate precision medicine within the daily clinical workflow of our key healthcare partners

**Goal 2:** Develop new Degree, Certificate and Education programs related to precision medicine

i. Create new and expand existing education programs in genomic personalized medicine

ii. Develop a biomedical informatics graduate program in translational and biomedical data sciences

**Goal 3:** Compile a Precision Medicine Cohort of well-characterized (with genomic, health and behavioral data) and longitudinally followed patients

Successful completion of this initiative will position IU as a top institution in the field of precision medicine with one of the country’s premier, genomic medicine-guided, statewide healthcare delivery systems.
3. Proposed Research and its Impact

I. Three Scientific Program Pillars of PMI

1. Genomic Medicine:
Currently, IUSM has already developed pilot programs that are employing genomic medicine practices into clinical care. These include the cancer precision medicine clinic that has genotyped over 400 patients with non-responsive cancers and dramatically improved their outcomes using tumor genotype-based prescription of cancer drugs. Similarly, our cardiology genetics clinic has genotyped over 100 patients to identify and manage life-threatening cardiac arrhythmias. The Genomic Medicine pillar will expand this method broadly.

1a) Develop innovative clinical genomics medicine initiatives and physician decision support in the areas of pharmacogenomics, precision oncology, cardiology and neurodevelopment that leverage IUSM research advances synergistically with national recommendations and guidelines. IU already has established infrastructure with the Indiana Institute for Personalized Medicine (IIPM). As recommendations and guidelines are developed, we will establish state-of-the-art Clinical Decision Support (CDS) and provider education to assist Indiana physicians in the utilization of these genomic tests for use in their practice. A computerized CDS will alert clinicians about recommended testing (using well-curated level I or II clinical evidence) and help physicians and patients interpret and act on the results. The programs will include: i) precision genomics clinics; ii) physician scientist recruitment; iii) new genetic markers research and implementation science programs; iv) and risk prediction research, all supported by informatics.

1b) Create a Clinical Genomics Program with the following components: i) Data sciences core: The key objective is to link genomic and other “omic” information to an individual’s disease risk prediction, diagnosis and optimal treatment. By linking genomic data, clinical information and behavioral data, we are uniquely positioned to broadly impact precision medicine. These data and associated computational methodologies will engender new research pathways and related grant applications, and serve as the basis for new graduate education in biomedical informatics. The PM Research cohort (detailed below) will be a key deliverable for the data sciences core. ii) Functional variant core: Genetic discoveries will require new in silico and bench research to understand why and how genomic variants contribute to disease. The functional variant core will accomplish this goal via novel predictive methods, genome editing technologies, animal modeling and stem cell technologies for targeted functional evaluation.

2. Cell-, Gene- and Immuno-Therapies:

2a) Create a program in Cellular Immunotherapy and Clinical Immunology: A revolution is occurring in cancer therapy, where immunologic approaches are curing patients who are refractory to conventional therapy. In addition, technologic advances in gene therapy are now making it increasingly likely that monogenic disorders will be corrected effectively on a more routine basis. The primary goal would be to create a nationally recognized program of cell based therapies for specific cancers in which IUH sees a high volume of patients, such as myeloma and pancreatic cancer: i) Tumor immunotherapy: Areas of interest include research on tumor-specific T cells and basic biology of T cells. ii) Innate immunity: This focused area will integrate with researchers that examine myeloma, myeloid leukemia or lymphoma in distinguishing the normal versus transformed biology of the immune cell(s) of interest. iii) Humoral Immunity: This area is critical both for our understanding of the pathogenesis of disease (where B cell depletion is increasingly being used as a treatment) and for the technical production of clinical-grade antibodies. To complement the above initiatives, additional recruitments could be made to study related scientific areas such as microbiome regulation of immunity and clinical immunology.

2b) Gene Therapy for Specific Disorders: Bone marrow, hematopoietic stem and progenitor cells are established therapies with extensive history and IUSM is a leader in this field. Recruitment of investigators in the areas of gene-therapies and gene-editing technologies will further consolidate our strengths in this area.

3. Chemical Biology and Targeted Therapeutics:

3a) Create an Indiana Center for Chemical Biology and Biotherapeutics (C2B2) The deployment of precision medicine to change patient outcomes requires timely access by IU scientists to advanced analytical technologies used to identify molecular targets against which next-generation therapeutics can be found and
optimized. Sophisticated medicinal chemistry, assay development and structural/cell biology capabilities are needed, with the goal to discover new molecules for disease diagnostics or efficacious treatments. The C2B2 will catalyze these efforts in translational research “from bench to bedside” by establishing an integrated, virtual center with complementary expertise and physical facilities on the Indianapolis and Bloomington campuses that creates multiple entry portals for IU scientists (Fig. 2). Chemical probe, diagnostics and therapeutics discovery efforts will be integrated in an IU open-source therapeutics platform that will accelerate the pace of discovery. IU Informatics and Computing faculty will provide IT and programmatic support in chemo-informatics and computational biology. The PMI envisions a nimble C2B2 capable of developing targeted therapeutics that exploit unique characteristics from specific patients or patient groups, e.g., those identified as strong responders to a particular chemotherapy regimen, thus becoming an integral element of precision medicine at the IUSM.

3b) Expand academic-industry collaborative Molecular Therapeutics Program (MTP)
The C2B2 will be charged with developing stronger links to Eli Lilly and Company’s automated compound synthesis capability, compound collections and medicinal chemistry. We envision a pioneering model of academic-industry collaborative therapeutics discovery, where scientists at IU work together with other academic partners identified via the Molecular Therapeutics Program (MTP) on projects of mutual interest.

II. Three Cross-Cutting Thematic Platforms of PMI:

1. Biomedical Informatics and Cyberinfrastructure:

1a) Integrate precision medicine with the daily clinical workflow of our healthcare partners: Key to making people healthier through precision medicine is to make the information available and actionable to clinicians, patients and caregivers, especially in partnership with IU Health and, where feasible, other partners such as Eskenazi and VA Health. We will build a computerized CDS to alert clinicians and help physicians and patients interpret and act on the results, and assist with appropriate follow-up. CDS must span the continuum of patient care, ideally from before the patient sets foot in the clinic to when they recover at home. The IT infrastructure necessary to support these clinical scenarios consists of four components. First, collect and operationally integrate data about each patient, such as “omics,” health and healthcare, and behavioral and patient-reported information. Second, the information must be available for analyses by CDS and inferencing algorithms. Third, both data and inferencing results need to be presented in an appropriate format to enable practical decision-making. Fourth, all data must be stored and analyzed with strict adherence to modern security and privacy-preserving protocols. In the areas of high performance computing and big data infrastructure, the PMI anticipates important interactions with the proposed Indiana University Strategic Computing Initiative (IUSCI), and existing resources in Bloomington such as the Center for Genomics and Bioinformatics (CGB) genome sequencing facility.

1b) Build a collaborative and multidisciplinary basic and translational informatics research program: The practical implementation of precision medicine must be supported with a strong and comprehensive research program. This research program requires the ability to seamlessly integrate and model "all of the omics", cellular, animal, behavioral and clinical data that characterize diseases and/or drug response; perform research workflows traversing the spectrum from molecular- to population-level data and vice versa; and implement strong feedback loops between basic science and clinical care. This initiative will leverage the historical strength of IU and the Regenstrief Institute in clinical and health informatics, and build strong linkages to bioinformatics and clinical and translational research informatics.

2. Degree, Certificate and Education Programs Related to Precision Medicine:
As noted under each of the scientific program pillars, the PMI will both expand existing and develop several new degree, certificate and continuing education programs.
2a) **Create and expand educational and training opportunities:** Faculty and staff hired for these efforts will, in part, also lead new research programs; however, specially trained professionals in certain fields will be critical to ensure program competency. The specific educational programs will be: i) a genetic counseling program; ii) a clinician-genetic fellowship program; iii) professional certificates in precision medicine; iv) continuing medical education (CME) programs in specific areas of precision medicine; v) hands-on training modules in the area of precision medicine for health professional school curriculum; and vi) a biomedical informatics training program.

2b) **Develop new educational programs in Chemical Biology:** The C2B2 will leverage assets within the CTSI-supported Molecular Therapeutics Program as well as existing graduate and postdoctoral training grant support (NIH T32) on both campuses, and promote collaborative research teams among chemists and biologists to find solutions to major problems in human health.

2c) **Develop a biomedical informatics graduate program in translational and biomedical data sciences:** We envision the program as having two tracks: (1) the biomedical informatics track will focus on educating graduates in conceptualizing, implementing and evaluating precision medicine, data-based research and diagnostic/therapeutics development programs; and (2) the bioinformatics track will focus on informatics at the molecular, cell and biological level.

3. **Precision Medicine Cohort:**
This will be a critical resource for PMI and a key deliverable for the data sciences core. The platform will be a collection of well annotated family history (FH) of medical illnesses from all of our clinical subjects (over 2 million individuals are seen in our health systems annually) linked to our electronic medical record (EMR) system to provide an exception resource for future genomics medicine research and services. For a select subset of patients, we will enrich this EMR and FH dataset with tissue and genotyping (select gene panels, whole exome and whole genome sequencing) data to foster research and practice of precision medicine. IU School of Nursing (IUSON) plans to build a personalized and tailored behavioral assessments and interventions program to help patients and families comply with provider recommendations and manage medical conditions.

**III. Significance and Impact:**
Successful completion of the PMI will catapult IUSM into one the leading research medical centers in the country. Once fully implemented, the PMI will impact nearly two million patients across Indiana through IUSM’s health care partner IU Health, by delivering access to precision medicine advances. The impact of this initiative on IU will be transformative, creating an enterprise with over fifty new faculty hires in precision medicine. The Precision Medicine Initiative is foundational for our strategic goals of doubling IU’s research funding and raising the NIH ranking of IUSM to the top 25 schools and IUSON to the top 10 schools. It will create strategic partnerships with the state’s three major biomedical industry partners: Eli Lilly, Roche Diagnostics, and Cook Industries. As new faculty members are hired and scientific programs develop, the initiative will also create hundreds of new high-paying jobs. Importantly, with innovative education and degree programs, IU will contribute tremendously to creating the scientific workforce of the future for Indiana and beyond.

**4. Resources**

**Personnel:**
We will be recruiting scientific leaders in each of the three thematic and cross-cutting areas listed in the PMI. Although there are several outstanding researchers and assets already in place, to reach the desired level of excellence and impact, a substantial investment must be made in terms of new faculty and resources.

**Facility:**
In addition to the detailed resources noted below for individual sections, IUSM plans to build a $25 million new research/clinical facility, **Precision Medicine Building**, expected to be completed by about 2022.

1. **Genomic Medicine:**
   Faculty hires:  a) Clinician scientists: 6 faculty; b) Informaticians: 6 faculty; c) Basic science researchers: 3
faculty; Genetics educators: 3 faculty.  Staff hires:  a) Genetic counselors: 10 staff.  Equipment/ Infra-
structure: Partner with Roche on next-generation sequencing; additional equipment and informatics tools.

2. Cell-, Gene- and Immuno-Therapies:
Faculty hires:  a) Human immunology program: Director and 6 faculty recruits;  b) Cell GMP facility faculty:  
Director and 2 research investigators; c) Viral vector core: Director and 2 faculty recruits; d) Stem cell 
transplant, regenerative medicine and tissue engineering: 3 faculty; e) Precision immunology research 
services research/service faculty members: 2 faculty.  Staff hires: Cell GMP personnel: Technicians, quality 
control, regulatory, protocol development, study coordinating staff.
Construction of a new Cell GMP facility
Precision immunology research services (PILS) core

3. Chemical Biology and Targeted Therapeutics
Faculty and staff hires:  a) Tenured or tenure-track faculty (10 = 5 IUSM, 5 IUB): These hires will include a  
C2B2 Director and additional IUSM and IUB faculty to develop chemical biology, systems biology, molecular, 
pharmacology expertise with appropriate research scientists and post-doctoral fellows.
Equipment and compound libraries

4. Biomedical Informatics and Cyberinfrastructure
Faculty hires: a) A multidisciplinary team (10 hires) of basic and translational research faculty (and research 
staff) with expertise in bioinformatics, biomedical informatics, and clinical informatics.  Special expertise is 
needed in single cell data analysis, system pharmacology, natural language processing, ontologies, 
visualization, machine learning, etc.  The PMI will complement traditional bioinformatics research by 
developing mechanism-based computational models to be hosted at an IUB Institute for Virtual Tissues.
Computational, knowledge and information technology resources: a) Integrated database, encompassing “omics”, drug data knowledgebase, bioinformatics tools; b) Precision medicine-focused computerized decision, knowledgebase and/or search tools for the clinically-actionable molecular markers, presentation 
and visualization support for clinicians and patients; c) High performance computing resource for "omics" 
data analysis and other large scale health-care data integration and analysis; d) Rigorous computational 
program involving artificial intelligence and its sub-disciplines.

5. Degree, Certificate and Education programs
All of the named educational programs would need to recruit training program directors, faculty mentors, 
administrative support, trainees and fellowships as part of the faculty and staff hires.

6. Precision Medicine Cohort
Cohort resources: It will include genetic sequencing, behavioral data collection and curation, and analytics 
resources.  There will need to be appropriate personnel to generate and manage the cohort data.

5. Team leaders
The overall leads and the key faculty for each of the thematic and cross-cutting areas are noted below.  As 
this initiative is implementation, the expectation is that we will recruit national leaders in each these areas to 
assume lead roles in designing and implementing the programs outlined in the proposal.
(See Appendices for Biosketches and information about additional participants)

<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
<th>Title</th>
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<tbody>
<tr>
<td>Anantha Shekhar, MD, PhD</td>
<td>Overall PI, Contact Person</td>
<td>Executive Associate Dean for Research, IUSM</td>
</tr>
<tr>
<td>Genomic Medicine</td>
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<tr>
<td>Tatiana Foroud, PhD</td>
<td>Team Co-Leader</td>
<td>Chair, Department of Medical and Molecular Genetics, IUSM</td>
</tr>
<tr>
<td>Mark Geraci, MD</td>
<td>Team Co-Leader</td>
<td>Chair, Department of Medicine, IUSM</td>
</tr>
<tr>
<td>Jamie Renbarger, MD</td>
<td>Key Team Member</td>
<td>Interim Director, Indiana Institute for Personalized Medicine, IUSM</td>
</tr>
<tr>
<td>Bryan Schneider, MD</td>
<td>Key Team Member</td>
<td>Director, IU Health Precision Genomics Program</td>
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<tr>
<td>Gail Vance, MD</td>
<td>Key Team member</td>
<td>Professor, IUSM</td>
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6. Sustainability

Clinical: The clinics developed as part of this proposal will become destination services and Centers of Excellence. We are also poised to develop a strategic partnership with Roche Diagnostics in this area to begin exploring and implementing the next generation of genomic medicine initiatives clinically. In addition, there will be increased demand for the IUSM diagnostic laboratories to generate molecular test results, as well as patient referrals to the newly-established precision medicine clinics. Expected outcomes: In five years, 1) All of our cancer patients and majority of patients with all other disorders will be treated using genomic medicine support; 2) We will provide cell-based therapies for a wide-range of cancer patients that do not respond to traditional therapies with cell- and gene-therapies; 3) We will have a robust data sciences center with a large precision medicine cohort and informatics expertise.

Research: Precision medicine is a high priority for the NIH and President Obama included a $215 million investment in his 2016 Budget. In addition, the NIH is currently issuing a number of requests for applications (RFAs) in this area. The programs developed with the PMI will be resources for IU investigators to compete for federal funding focused on improving the health of Indiana residents. Expected outcomes: In five years, 1) Each of the areas of focus (pillars and cross-cutting themes) within PMI will have recruited nationally-recognized experts to lead them and will have a P01 or large U01 grants to support their major programs; 2) There will be at least $50 million annually in Federal and non-federal funding for PM at IU.

Education: The education programs that will be expanded or developed as part of this initiative will generate revenue for the institution. For example, the CME and certificate programs provide short-term medical education that must be renewed regularly; with broad-based marketing to health professionals, a robust influx of attendees can be expected. Expected outcomes: In five years, 1) Each of the areas of focus will have extramurally funded, nationally-recognized training programs; 2) There will be well developed programs to educate providers, consumers and health systems about the best practices to utilize precision medicine information for best outcomes.
7. Partners:

External Scientific Consultants: In order to guide the design and implementation of this ambitious program, IUSM expects to engage a panel of outstanding national experts, and some who have already accepted our invitation are named below:

- Genomic Medicine: Christopher O’Donnell, MD (NIH) and Charis Eng, MD, PhD (Cleveland Clinic)
- Cell-, Gene- and Immuno-Therapies: Carl June, MD (U Penn) and Madhav Dhodapkar, MD (Yale)
- Chemical Biology & Targeted Therapeutics: Jeffrey Kelly, PhD (Scripps) and Jeff Aubé, PhD, (UNC)
- Biomedical Informatics & Cyberinfrastructure: Michael Becich, MD, PhD (U Pittsburgh) and Atul Butte, MD, PhD (UCSF)

Corporate Partners: We have also identified corporate partners who are equally enthusiastic to join IU to implement the precision medicine program in Indiana and agree that this would be a great benefit to the health of Indiana citizens, but equally important, to the economic success of the state.

- IU Health: see support letter from Dennis Murphy, President
- Eli Lilly and Company: see support letter from Dr. Andrew Dahlem, COO, Lilly Research Laboratories
- Roche Diagnostics: see support letter from Jack Phillips, CEO
- Cook Regentec: see support letter from Rob Lyles, CEO

8. Metrics

Expected 5 - 7 year outcomes - The PMI will provide both short-term and long-term clinical, research and education deliverables to IU as detailed below. In five years, we expect the following deliverables from this initiative: 1) IUSM will recruit senior, national recognized experts to lead each of the key areas of the PMI; 2) All of cancer patients and majority of chronic disease patients treated by IUSM health care partners will have access to genomic testing; 3) IUSM affiliated hospitals will provide cell-based therapies for a wide range of cancer patients that do not respond to traditional therapies with cell- and gene-therapies; 4) IUSM will grow its research funding to be ranked among the top 25 medical schools for NIH funding in the country; 5) There will be program projects and center grants in each of the major components of the PMI with a total annual funding (federal and non-federal) of at least $50 million; 6) There will be a fully-established Center for Chemical Biology and Biotherapeutics (C2B2) with newly recruited leadership and statewide collaborations; 7) An IU Precision Medicine Data Sciences Center (PMDSC) will exist with appropriate leadership and resources; 8) a new Precision Medicine Building on the IUSM campus will house all the PMI programs.

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<thead>
<tr>
<th>Goal.</th>
<th>Target Metric</th>
<th>Tracking</th>
<th>Evaluation Methods</th>
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<tbody>
<tr>
<td>1</td>
<td>Recruit senior experts to lead each area</td>
<td>Quarterly</td>
<td>Number of recruits and milestones met</td>
</tr>
<tr>
<td>2</td>
<td>Genomic medicine for all cancer patients</td>
<td>Quarterly</td>
<td>Number of patients eligible, enrolled and system metrics reached</td>
</tr>
<tr>
<td>3</td>
<td>Cell based therapies for select cancer and other diseases</td>
<td>Quarterly</td>
<td>Number of patients eligible, number treated, and metrics reached</td>
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<tr>
<td>4</td>
<td>Top 25 research ranking in NIH funding</td>
<td>Annually</td>
<td>Total funding achieved as well ranking</td>
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<tr>
<td>5</td>
<td>PMI programs obtain PPG, Center and other large grants totaling $50 million</td>
<td>Annually</td>
<td>Number of grants and total funding obtained</td>
</tr>
<tr>
<td>6</td>
<td>Establish Center for Chemical Biology (C2B2)</td>
<td>Annually</td>
<td>Monitor progress and build out the programs to create C2B2</td>
</tr>
<tr>
<td>7</td>
<td>Build the IU Precision Medicine Data Sciences Center (PMDSC)</td>
<td>Annually</td>
<td>Monitor progress and build out the programs to create PMDSC</td>
</tr>
<tr>
<td>8</td>
<td>Construct the Precision Medicine Building</td>
<td>2020-22</td>
<td>Monitor progress of building</td>
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References:


