After reviewing the grand challenges, contact Melissa Thompson, Assoc Director of Strategic Industry Initiatives (Melissa.Thompson@uth.tmc.edu) for more information, including the application template. Deadline is January 10, 2017.

**LIFA 2017 Grand Challenges**

A primary driver for the Lilly Innovation Fellowship Award Program is to stimulate pharmaceutical innovation through training of the next generation of drug discovery and development scientists. In selection of a research topic, applicants are encouraged to address one of the significant problems, or “Grand Challenges,” facing discovery or development of new pharmaceutical therapies. Proposals should be either directed at 1) key therapeutic area interests of Lilly, which include: diabetes, oncology, neurodegenerative disease, chronic pain and immunology (autoimmune disease) or 2) fundamental scientific areas relevant to drug discovery and development, including: chemistry (excluding structure activity relationships), formulations, biopharmaceuticals, translational science, novel in vitro and in vivo assay technologies/modeling, drug safety, pharmacokinetics/pharmacodynamics or analytics/biostatistics and bioinformatics. Some examples are provided below; however, this list is not exhaustive and should be considered as an illustration of the types of projects that would be of greatest interest for the LIFA program.

1. **To establish clinical efficacy and safety earlier in the drug discovery and development process for core areas of research interest to Lilly.**
   - Improved validation of human disease targets and their associated risks for:
     - **Diabetes**
       - novel targets with breakthrough potential in Type 2 Diabetes Mellitus (including robust weight loss, disease modification, addressing complications)
       - approaches for maintenance or regeneration of pancreatic ß-cells
     - **Oncology**
       - immuno-oncology efforts based on T-cell receptor with interests in T-cell stimulation, trafficking, infiltration and redirection as well as approaches removing suppressive signals on T-cells
       - bromodomain epigenetic targets
       - novel approaches and targets for manipulation of dysfunctional tumor microenvironment
       - identification of neoepitopes as targets for redirecting anti-tumor immune response
     - **Neurodegeneration**
       - novel approaches to inhibition of Tau propagation
       - approaches for neurorestoration and proteostasis in neurodegenerative conditions
       - innate/adaptive immune system and neuro-immunology approaches for neurodegenerative diseases
       - approaches for treating the symptoms of neurodegenerative diseases
     - **Chronic Pain**
       - identification of novel targets in areas of peripheral neuropathies, musculoskeletal, central neuropathic and headache prevention

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Immunology
- approaches targeting T-helper 17 cells, B-cells and immune checkpoint receptors
- approaches to utilizing immune checkpoints in development of auto-immune therapies

- Animal models that reliably and predictably translate to humans (e.g. animal models for diabetes-associated cardiac failure or nonalcoholic steatohepatitis, better animal models for pain and auto-immune diseases)
- Use of adaptive judgment-based systems for application to data assessments for a given target or a clinical study
- Technologies that predict likelihood of safety concerns with emphasis on translational safety.
- In vitro or in vivo models for reliable prediction of human tolerability and pharmacology to guide process and product development of biopharmaceutical products.
- Tissue compartment modeling and methods of studying disposition and subcutaneous absorption.

2. **To discover mechanisms that identify the right medicine for the right patient.**
   - Technologies (e.g. diagnostics, imaging, analytical chemistry, “big data” analysis) that best inform the choice of treatment in specific disease states of interest.
   - Pharmacogenomic approaches to targeted patient selection.
   - Physiologically-based pharmacokinetic (PBPK) modeling strategies to improve human drug clearance and drug-drug interactions.
   - Methods and techniques that improve patient monitoring for both efficacy and safety endpoints in clinical trials.

3. **To deliver exceptional patient outcomes.**
   - Combination strategies based on patient tailoring and underlying genetics.
   - Detection of micro-metastatic cancer.
   - Identification of novel factors or pathways leading to adverse cardiovascular, renal or hepatic outcomes in patients with diabetes.

4. **To simplify large-scale chemistry and protein production and minimize environmental impact.**
   - Flexible manufacturing strategies for delivery of “green” synthetic processes.
   - Novel protein expression methods and approaches to large-scale biomolecule production.
• Understanding ER-based protein folding and the use of cell engineering to improve the homogeneity of product.
• Improving the reliability of scale-down models and predictive tools to reduce cost and time of developing manufacturing processes for therapeutic proteins.
• Robust alternative (non-mammalian) expression systems for the production of proteins.
• Novel approaches for rapid-acting insulins and glucose-sensing insulins.
• Novel approaches for large scale manufacturing of therapeutic peptides.

5. **To target and deliver biologics and small molecule therapeutics precisely.**
   - Approaches for generation of orally bioavailable or brain penetrant large biomolecules.
   - Advanced analytical and informatics approaches to enable simultaneous optimization of molecules across multiple parameters.
   - Next generation formulation approaches to efficiently deliver potent oral drugs that have non-ideal physicochemical properties.
   - Directed delivery methods, such as antibody-drug conjugates and nano-technologies.