

**Title of proposed program:** Evolution Informed Analytics (EIA) Using evolutionary information to overcome barriers in the development of diagnostics and therapeutics

**Submitting Source:** Strategic Planning Meeting

**What is the major obstacle/challenge/opportunity that the Common Fund should address?**

A new paradigm for therapeutics development -- called "evolution-informed analytics (EIA)" -- is envisioned that would capitalize on existing knowledge of the evolution of gene variants in human and non-human species to inform a new approach to data reduction, integration, and analysis to hasten the identification of promising new therapeutic targets and drugs. High volume centers would be created to develop and apply new approaches to analyzing genetic and genomic data sets across evolutionary lines, and a public database and visualization tools would be established to enable new studies of biological discovery and drug development broadly in the research community. A specific application could be development of novel therapies that overcome adherence problems by co-evolving with pathogen such that therapeutic delivery occurs with transmission of pathogen between infections individuals or within tissues such as tumors.

**What would the goals of the program be?**

This program would have 5 goals:

- Define the specific barriers to drug development that can be addressed using EIA
- Develop new knowledge on variants in non-human species and model systems to apply EIA approaches
- Assemble collections of biological samples for multiple species to apply EIA approaches
- Develop new data reduction and analytical approaches to advance EIA
- Use the resources developed through the program to conduct proof of concept studies

**Why is a trans-NIH strategy needed to achieve these goals?**

EIA has positive implications to advance biological discovery and therapeutics developed across a wide range of diseases of interest to the NIH. The concept merits a trans-NIH strategy.

**What initiatives might form the strategic plan for this topic?**

- Define the specific barriers to drug development that can be addressed using EIA
  - Sponsor a workshop to identify existing barriers
- Develop new knowledge on variants in non-human species and models to apply EIA approaches
  - Support high volume production centers and coordinate with other ongoing efforts in evolutionary biology
- Collect and make available biological samples from multiple species to apply EIA approaches
  - Create a public sample repository and set of standardized sampling and analysis approaches for the community
- Develop new data reduction and analytical approaches to advance EIA
  - Develop new novel methods, databases, and visualization tools to support development
- Develop evolution proof therapies, including novel therapeutics
  - Support high risk projects

**If a Common Fund program on this topic achieved its objectives, what would be the impact?**

If successful, the program will create a new paradigm for therapeutics development at relatively low cost by leveraging existing knowledge from evolutionary studies to inform the development of new diagnostics and therapeutics based on EIA.