Innovative Molecular Analysis Technologies (IMAT) Program

Program Mission:

To support the development, maturation, and dissemination of novel and potentially transformative next-generation technologies through an approach of balanced but targeted innovation in support of clinical, laboratory, or epidemiological research on cancer.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Grant Code</th>
<th>Budget</th>
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<tbody>
<tr>
<td>Feasibility/Proof-of-principle study</td>
<td>R21</td>
<td>$500k/3-yr direct cost cap</td>
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<tr>
<td>Highly innovative technology</td>
<td></td>
<td></td>
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<tr>
<td>No preliminary data required</td>
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<tr>
<td>Advanced development &amp; validation phase</td>
<td>R33</td>
<td>$900k/3-yr direct cost cap</td>
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<tr>
<td>Demonstration of transformative utility</td>
<td></td>
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<tr>
<td>Requires proof of feasibility</td>
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<tr>
<td>Development &amp; (regulatory) validation</td>
<td>R43</td>
<td>$150k/1-yr</td>
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<tr>
<td>Manufacturing &amp; marketing plan</td>
<td></td>
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<tr>
<td>Requires proof of feasibility and commercialization plan</td>
<td>R44</td>
<td>$1.5M/3-yr</td>
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<tr>
<td>Demonstration of transformative utility</td>
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IMAT Program Overview

- **Technology-focused.** Projects lacking a sufficient focus on early-stage technology development are barred from review.

- Emphasis on supporting development and validation of high-risk/high-impact molecular and cellular analysis technologies *to advance cancer research and clinical care*

- **100% Investigator initiated** research project grants, utilizing the R21 and R33 award mechanisms for phase-1 and phase-2 levels of support

- **Trans-divisional,** cooperative initiative focused on technological innovation with specific inclusions to minimize overlap or duplication with other programs/initiatives
IMAT by the numbers

• Solicited applications every year since 1998, 3 rounds of receipt/yr
  – No solicitations in CY2011, and only 1 round received in 2004

• Total of **3719 applications** received
  – 2965 R21 & 754 R33
  – Additional +944 SBIR/STTR-IMAT applications
  – Ave ~300-400 applications/yr (~4:1 ratio R21:R33)

• Total of 533 **Type 1 awards** given
  – 333 R21 and 106 R33 (+90 Type 4 R33 awards)
  – Additional 162 SBIR/STTR-IMAT awards
  – Ave ~30-40 awards/yr

• Current **success rate ~10%** across all solicitations

• **~75-100 active projects** any given time (90 as of Sept 2014)
Sampling of successful IMAT Technologies

Proteomics
- Dynamic Range Enhancement Applied to Mass Spec (DREAMS) (Smith CA081654)
- **Gateway** ORF Cloning Tool (Vidal CA081658)
- Multi-Dimensional Protein Identification Technology (MuDPIT) (Yates CA081665)
- Isotope-Coded Affinity Tags (ICAT) (Aebersold CA084698)
- Synchrotron Footprinting (Chance CA084713)
- Nanowire field effect transistors (NWFETs) (Lieber CA091357)
- Deuterium exchange Mass Spec (DXMS) (Woods CA099835)
- Nucleic Acid Programmable Protein Array (NAPPA) (LaBaer, CA099191)

Genomics
- Digital Optical Chemistry (Garner CA081656)
- Rolling Circle Amplification (Lizardi CA081671)
- Representational Oligonucleotide Microarray Analysis (ROMA) (Wigler CA081674)
- Multi-photon Intravital Imaging (MPIVI) (Condeelis CA089829)
- Recombomice (Engelward CA084740)
- Pyrophosphorolysis Activated Polymerization (PAP) (Sommer CA094334)
- Pair-end Sequencing to screen structural rearrangements (Collins CA103068)
- Digital Transcriptome Subtraction (Moore CA120726)
- Zinc Finger Nucleases for targeted double-strand breaks (Porteus CA120681)
- COLD-PCR (Makrigiorgos, CA138280)

Epigenomics
- Differential Methylation Hybridization (DMH) (Huang CA084701)
- Chromatin Immunoprecipitation with next gen Sequencing (ChIP-Seq) (Ren CA105829)

Clinical Diagnostics
- Paramagnetic chemical exchange saturation transfer (ParaCEST) (Sherry CA084697)
- **Near IR Probes** for in vivo diagnostics (Tung CA088365)
- MicroSOL IEF (Invitrogen as Zoom IEF Fractionator) (Speicher CA094360)
- Microfluidic Genetic Analysis (MGA) chip (Landers CA16115)
- Oncomap (Garraway CA126674)

Sample preparation
- Magnetic Cell Sorting, now available from Ikotech (Chalmers CA081662)
- Dielectrophoresis Field Flow Fractionation (DEP-FFF) available as ApoStream™ system from ApoCell (Gascoyne CA088364)
- Cryopreservation followed by culturing of CML cells (Sims CA105514)
- RainDance Oil Droplet Microfluidics (Link CA125693)
- NanoVelcro (Tseng CA151159)

Drug Screening or Delivery
- One Bead One Compound (OBOC) (Lam CA086364)
- Genetically modified T-cells for acute lymphoblastic leukemia treatment (Cooper CA116127)
Noteworthy IMAT-SBIR Awards:
- **GeneChip® CustomSeq®** resequencing arrays from Affymetrix (Oliner CA081949)
- **BeadArray** gene expression assay system from Illumina (Chee CA081952)
- **BeadChip** arrays, **BeadLab** and **BeadStation** enabling NGS from Illumina (Chee CA083398)
- **PI 3K inhibitor screening** platform from Echelon Biosciences (now Aeterna Zentaris) (Drees CA81835)
- **ActivePipettes** used in Rainmaker microarray dispenser from Engineering Arts (Wiktor CA083390)
- **TRIO** multispectral diagnostic imaging from CRi, now Perkin Elmer (Levenson CA088684)
- Functionalization of **Quantum Dots** from Quantum Dot Corporation (Bruchez CA088391)
- Mass Spec ImmunoAssays (**MSIA**) from Intrinsic Bioprobes (Nedelkov CA099117)
- **Light Activation System** from Syntrix, now SuperNova Life Sciences (Zebala CA099333)
- **PhosphScan®** kits from Cell Signaling Technology, Inc (Rush CA101106)
- **ONIX** microfluidic perfusion cell toxicity screening system by CELLASIC Corp (Lee CA120619)
IMAT FOA & Evaluation History

**IMAT PAR Released**
- 1 R21/R33
- 1 R41/R42
- 1 R43/R44

**IMAT RFAs Renewed**
- 3 R21 (3 yr awards)
- 3 R33
- 2 R41/R42
- 2 R43/R44

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- 2 R21 (3 yr)
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**IMAT RFAs Approved**
- 3 R21/R33
- 2 R41/R42
- 2 R43/R44

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- 3 R21 (3 yr awards)
- 3 R33
- 2 R41/R42
- 2 R43/R44

**Full Program Evaluation**

**Evaluative Update**

**Targeted Evaluation**

**Comprehensive Evaluation (until FY2016)**

**Ongoing Evaluation**

09/23/2014
• How to identify all unique stakeholders supporting innovative technology development and how to consider scope and attribution of respective roles?

• How to identify appropriate methods for assessing progress and characterizing unique contributions for technology development initiatives?