

Request for Reissuance
of the



INNOVATIVE MOLECULAR
ANALYSIS TECHNOLOGIES

Request for Applications

Tony Dickherber

Office of Biorepositories and Biospecimen Research,
Center for Strategic Scientific Initiatives
Office of the Director

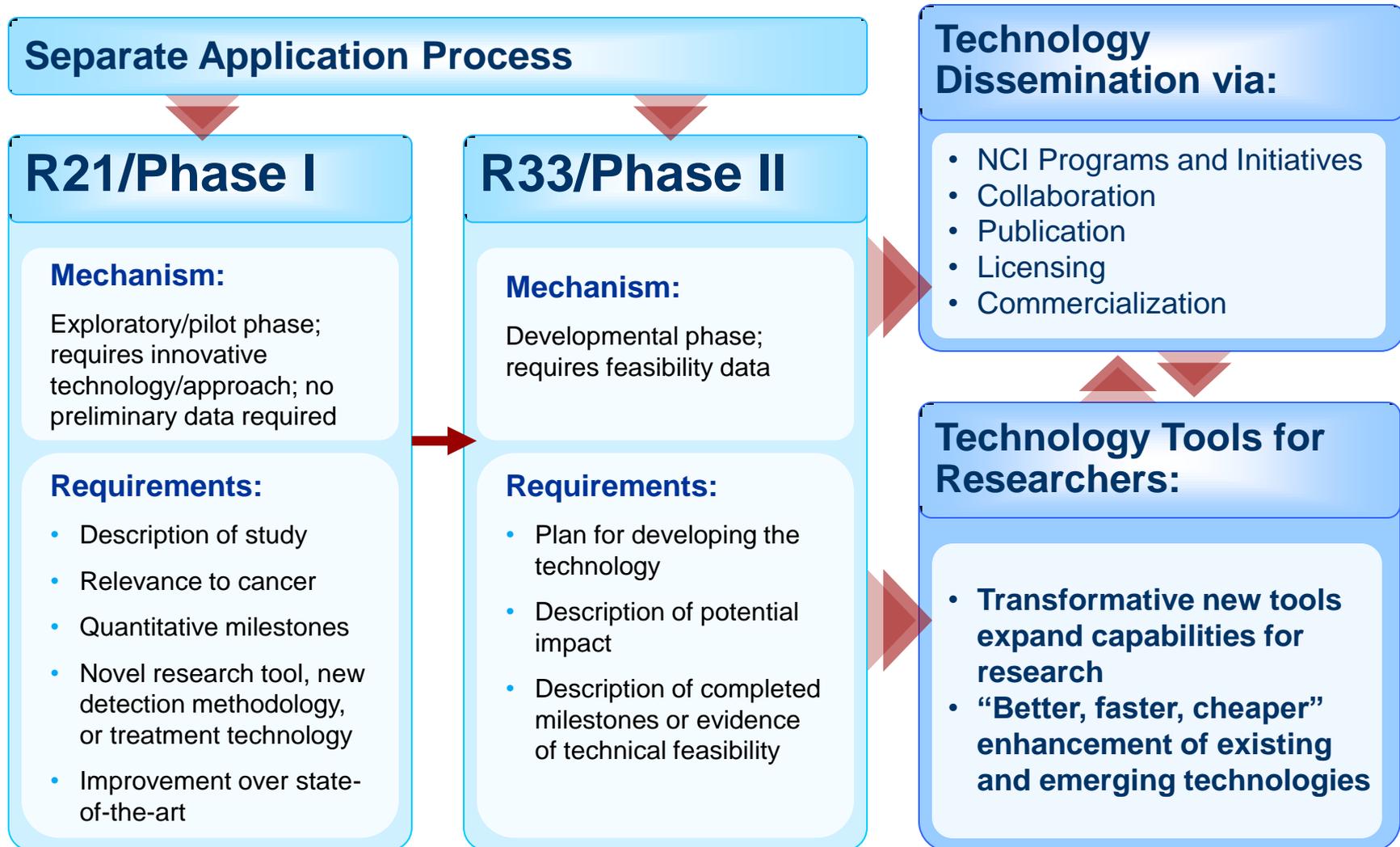
*National Cancer Institute
National Institutes of Health*

Reasons for RFA Reissuance

1. Substantial portion of NCI's technology-driven investigator-initiated research portfolio
2. Proven success record, enabled by a unique mechanism of NCI review
3. Continue to receive a large number of applications

- Utilizes **100% investigator-initiated** R21 and R33 Research Project Grants
- Emphasis on supporting development, testing, and validation of **high-risk/high-impact** multidisciplinary, cancer-relevant technologies
- **Trans-divisional**, cooperative initiative focused on technological innovation with specific exclusions to minimize overlap or duplication with other programs/initiatives [DCTD, DCB, DCCPS, DCP]

Technology Development Structure



Past IMAT credits ...

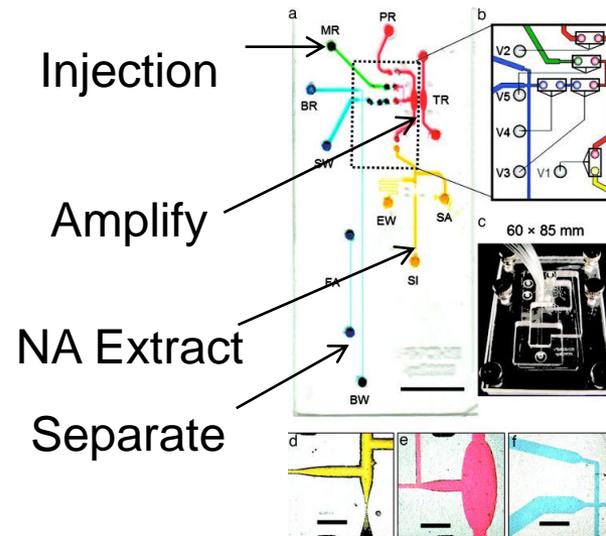
- **ICAT** by Applied Biosystems [2001]
- **Mudpit**, licensed by the Scripps Research Institute [2001]
- **Rolling Circle Amplification**, available from Amersham Biosciences (now GE Healthcare), [2002]
- Affymetrix **GeneChip**[®] and **CustomSeq**[®] arrays [2002]
- Illumina Bead technology (**BeadChip**, **Beadstation**, and **Sentrix BeadArray**) [2004]
- **Quantum Dots**, purchased by Invitrogen [2005]
- **MELT**[®] & **RNALater**[®] by Ambion [2005 and 2008, respectively]

Microfluidic Genetic Analysis

- Provides target-sequence detection from whole blood in less than 30 minutes
- >25 published articles utilizing this and several awarded patents
- 2008 Innovation of the Year Award, *Association for Laboratory Automation*,
- Licensed by both Lockheed Martin and ZyGEM [2009]



PI: James Landers, PhD
Professor, Dept of Chemistry
University of Virginia

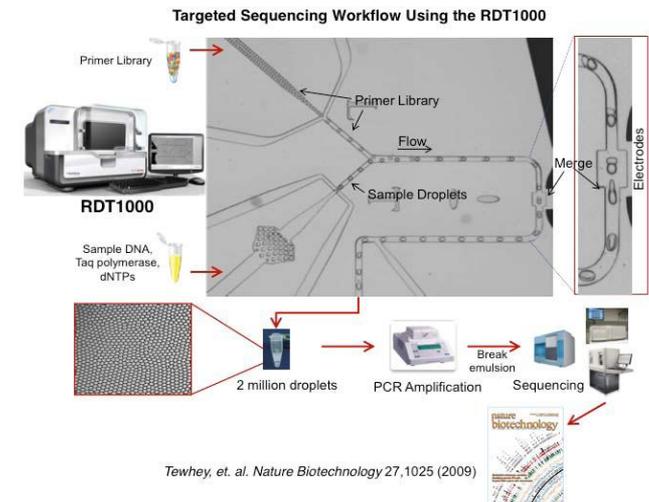
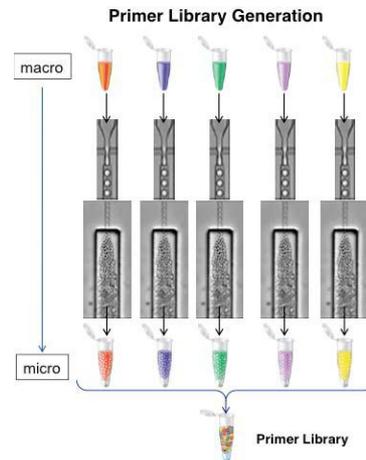


Raindance® Microfluidic RDT-1000

- Platform for isolating nanoliter volumes of solution using oil droplets at rate of 10 million/hour at varying size. Allows isolation of target analytes for single-cell analysis, high-throughput sequencing, etc
- Runner-up for 2009 Innovation of the Year, *Association for Laboratory Automation*
- Commercialized by Raindance® (2009). Currently collaborating with Ambry Genetics on ADMESeq™



PI: Darren Link, PhD
Co-founder and VP of R&D
Raindance Technologies

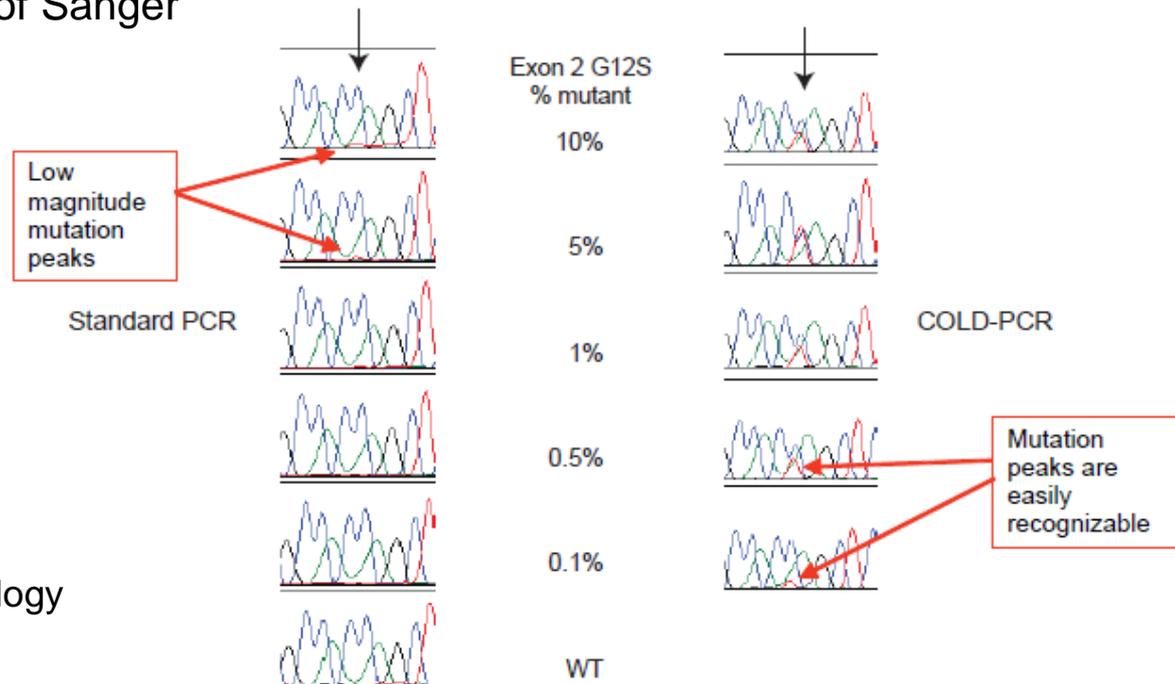




- Rare mutation detection methodology to preferentially amplify mutated DNA via low temperature denaturation during PCR
 - Better than 1 mutant in 1,000 WT copies sensitivity
- Licensed exclusively by Transgenomic [2009] and used in Surveyor suite of Sanger sequencing products



PI: Mike Makrigiorgos, PhD
Associate Professor, Radiation Oncology
Dana-Farber/Harvard Cancer Center

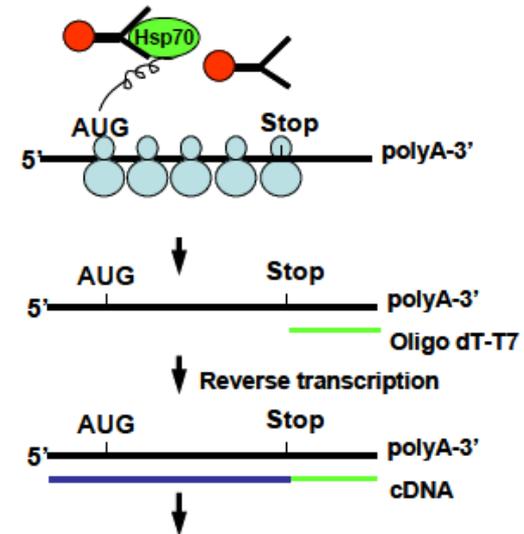


TrIP-Chip Technology

- Affinity capture beads that bind translationally-active mRNA only for high-throughput expression profiling
 - Enables investigation of translational control with limited sample quantities
- Licensed by OceanRidge Biosciences [2010]



PI: Jingfang Ju, PhD
Associate Professor of Pathology
Stony Brook University Medical Center

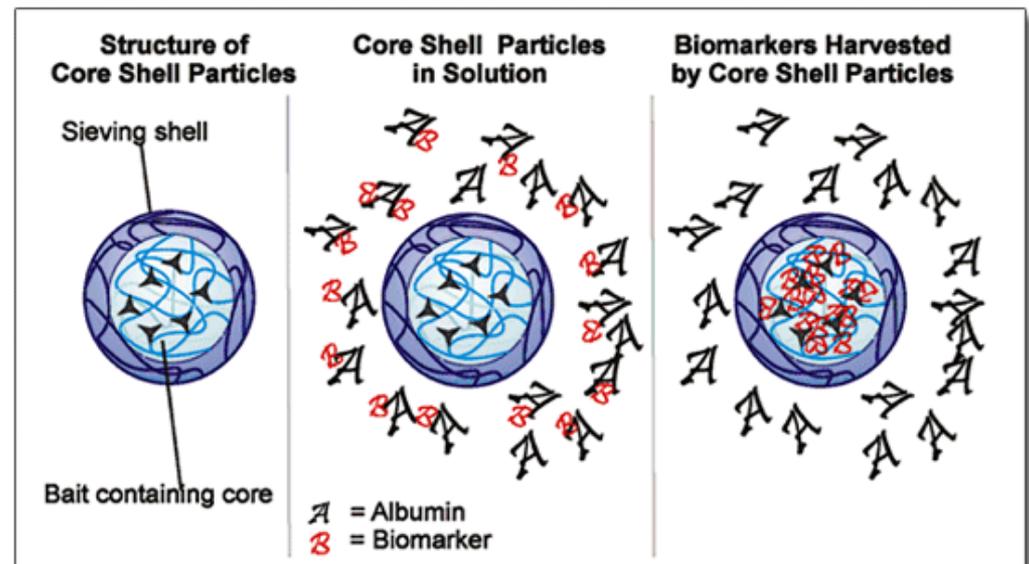


Gene Expression analysis (Microarray, qPCR and Sequencing)

- Porous core shell hydrogel nanoparticles with affinity via “bait chemistry” and size exclusion for selection of biomolecular target
- Allows for immediate preservation and conservation of low-abundance target biomarkers in complex solutions, including whole blood
- Licensed by Shimadzu Scientific [2010] and made available in partnership with Ceres Nanosciences and Nonlinear Dynamics

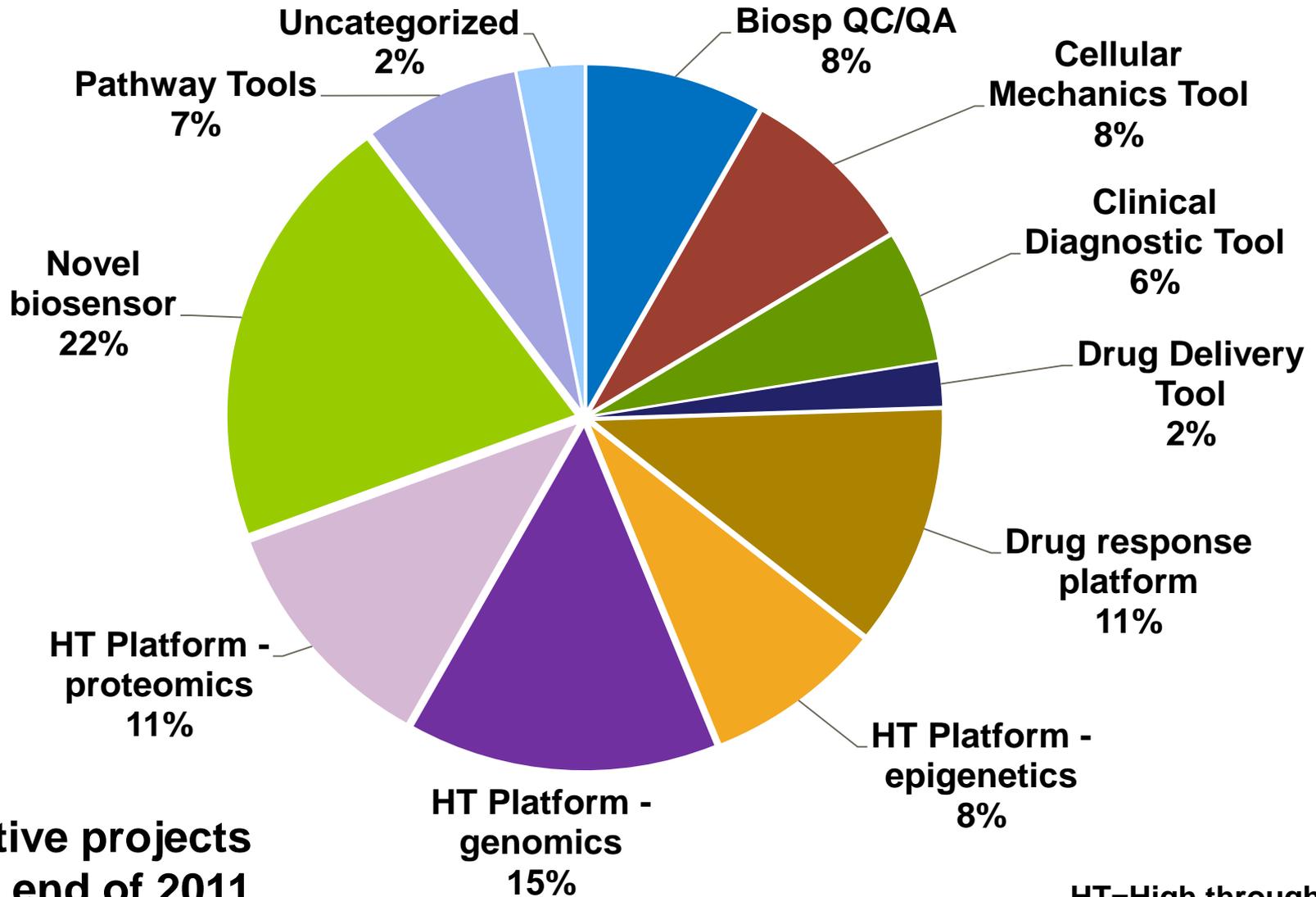


PI: Lance Liotta, MD, PhD
Co-Director, Center for Applied
Proteomics and Molecular Medicine
George Mason University



- Integrated genomic approaches to ID and validate cancer targets
 - William Hahn, Dana Farber Cancer Center (R33)
- MS-probing metabolic dynamics
 - Joshua Rabinowitz, Princeton University (R21)

Diversity of the current IMAT portfolio



98 active projects
at the end of 2011

HT=High throughput

RFA Reissuance Requested for

<p>Early-Stage Innovative Technology Development for Cancer Research [R21]</p>	<p>\$5,000,000 (est. 25 new awards)</p>
<p>Advanced-Stage Development, Application and Validation of Transformative Emerging Technologies for Cancer Research [R33]</p>	<p>\$3,500,000 (est. 10 new awards)</p>
<p>Innovative Technologies for Cancer Biospecimen Sciences [R21]</p>	<p>\$800,000 (est. 4 new awards)</p>
<p>Applied Emerging Technologies for Cancer Biospecimen Sciences [R33]</p>	<p>\$700,000 (est. 2 new awards)</p>

- Program presses biology to the forefront of science
 - 3-year R21 is a positive development
 - Suggest a 50% increase in the budget
-

Thank You

IMAT “Staff”

Officer	DOC	Position	Contact
Compton, Carolyn	NCI/OD/CSSI	Acting Director	comptcar@mail.nih.gov
Dickherber, Tony	NCI/OD/CSSI	Program Analyst	dickherberaj@mail.nih.gov
DeClue, Jeffrey	NCI/DEA/SRLB	Scientific Review Officer	decluej@mail.nih.gov
Divi, Rao	NCI/DCCPS	Program Director	divir@mail.nih.gov
Knowlton, J. Randy	NCI/DCB	Program Director	knowltoj@mail.nih.gov
Rasooly, Avraham	NCI/OD/CRCHD	Program Director	rasooly@nih.gov
Sorbara, Lynn	NCI/DCP	Program Director	lynns@mail.nih.gov
Tricoli, James	NCI/DCTD	Program Director	tricolij@mail.nih.gov
Wagner, Paul	NCI/DCP	Program Director	wagnerp@mail.nih.gov

Extra Slides

Program Mission:

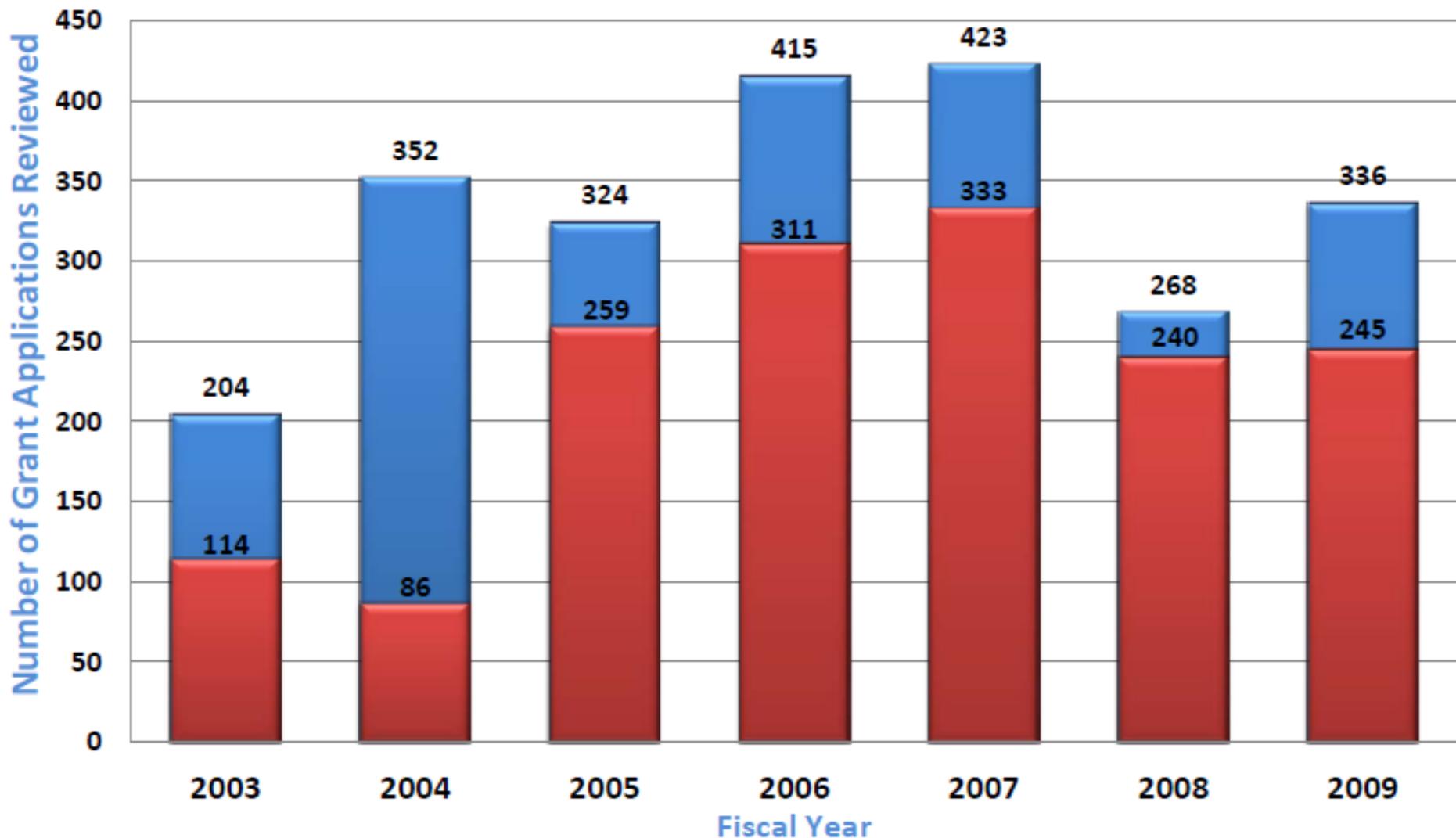
To support the development, maturation, and dissemination of novel and potentially transformative next-generation technologies through an approach of balanced but targeted innovation in support of clinical, laboratory, or epidemiological research on cancer.

Program Goals:

- To focus innovative technology development on cancer
- To solicit highly innovative technology development projects from the scientific and medical communities
- To accelerate the maturation of meritorious technologies from feasibility to development
- To support the development of a diverse, qualified workforce to accomplish the above goals and mission

**All Technology Initiatives
Applications Reviewed by NCI/DEA
FY03-09**

Technology Applications
IMAT(R21/R33) Applications



Withdrawn applications not included. All data obtained from NCI DEA Annual Reports.

Internal Evaluation [eSPA]

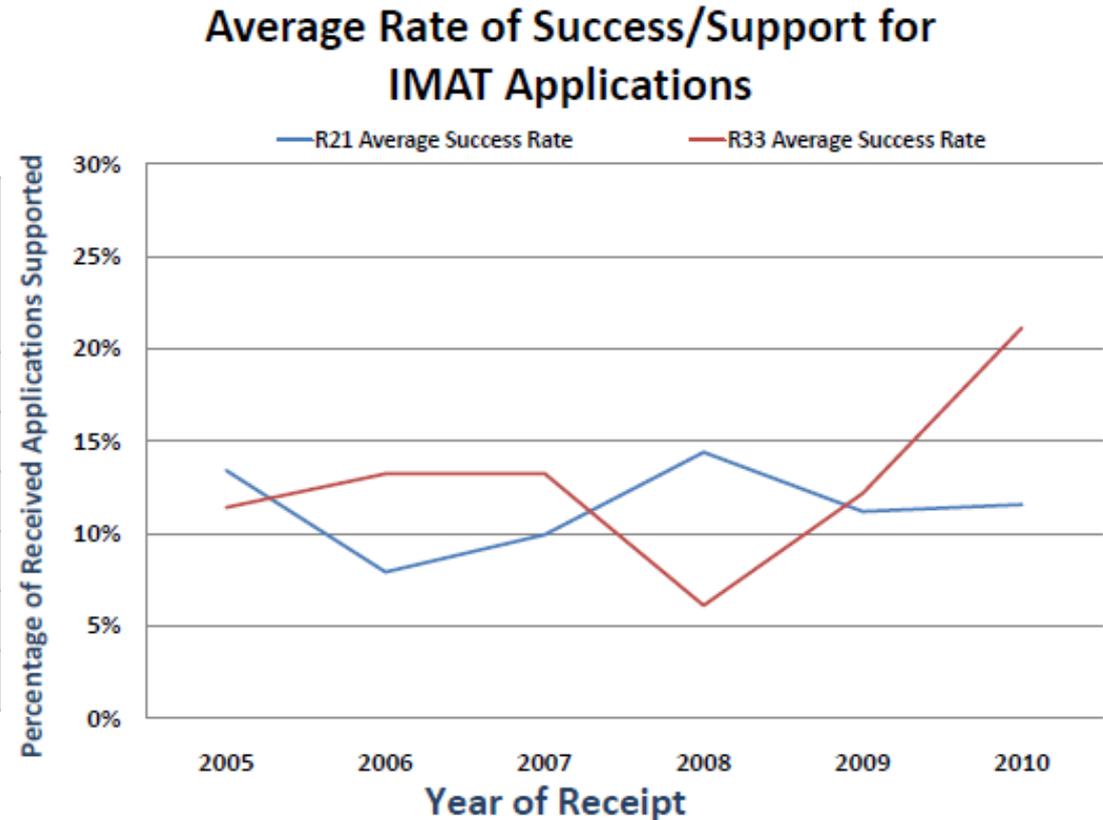
- 46 FOAs from FY99 – FY10 (multiple receipt dates for many of these)
 - Not counting 41 awards pending for FY11

	# Projects	Average Priority Score (old)	Average Priority Score (new)	Average Success Rate	# Publications	Average # of publications per project	Average journal impact factor	Average times cited w/o self
IMAT R21	172	160	24.2	11%	307	1.8	4	10
IMAT R33	171	162	24.2	12%	1,124	7.5	6	37
Total	343	161	24.2		1,431	4.1	5	31

- Top 10% of all R21's account for over 50% of all R21 publications
- Top 15% of all R33's account for 50% of all R33 publications.

Motivation for reissuance request

Year of Receipt	Ave Score of Supported R21's	Ave Score of Supported R33's
2005	154.2	160.6
2006	162.3	153.2
2007	154.8	146.1
2008	156.8	157.7
2009	24.2	24.2
2010	22.9	22.7



- IMAT has become a well-known, highly-competitive source for supporting innovative technology ideas, with the benefit that these ideas are directed towards cancer researchers
- The technology development investment of the NCI is small, and IMAT has traditionally represented a significant component of this overall investment

Detailed Historical Record

RFA's CA05-CA10	Mechanism	Success Rates by Receipt Year and Solicitation							
		CA05	CA06	CA07	CA08	CA09	CA10	Overall	
Biospecimens	R21	12.1%	12.5%	13.2%	19.2%	12.9%	11.1%	13.4%	
	R33	14.3%	28.6%	0.0%	0.0%	14.3%	22.2%	13.3%	
EMAT	R21	9.9%	9.6%	3.1%	4.5%	13.7%	16.9%	7.2%	
	R33	13.5%	11.1%	11.1%	26.2%	11.8%	20.9%	16.0%	
IMAT	R21	16.7%	6.3%	11.7%	12.4%	10.0%	9.0%	10.8%	
	R33	7.7%	12.9%	19.4%				14.0%	
		Average Scores for Supported Grants by Receipt Year and Solicitation							
		CA05	CA06	CA07	CA08	CA09	CA10	Overall (Old Scale)	Overall (New Scale)
Biospecimens	R21	151.50	174.50	164.29	154.20	27.50	28.00	160.08	27.71
	R33	165.00	161.00	NA	NA	32.00	25.50	163.20	27.67
EMAT	R21	161.63	160.50	152.67	157.67	23.57	23.36	153.92	23.44
	R33	153.40	135.00	140.83	157.27	22.25	22.11	151.47	22.15
IMAT	R21	151.94	157.44	156.45	157.25	23.50	21.67	156.73	22.55
	R33	164.00	150.50	143.57				143.57	

Detailed Historical Record

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EMAT	R21	9.9%	9.6%	3.1%	4.5%	13.7%	16.9%	7.2%
	R33	13.5%	11.1%	11.1%	26.2%	11.8%	20.9%	16.0%
IMAT	R21	16.7%	6.3%	11.7%	12.4%	10.0%	9.0%	10.8%
	R33	7.7%	12.9%	19.4%				14.0%
		Number of Applications Received by Receipt Year and Solicitation						
	Mechanism	CA05	CA06	CA07	CA08	CA09	CA10	Total
Biospecimens	R21	33	32	53	26	31	27	202
	R33	7	7	8	7	7	9	45
EMAT	R21	81	94	293	67	51	65	651
	R33	37	27	54	42	34	43	237
IMAT	R21	102	144	247	129	140	167	929
	R33	26	31	36				