Career Development and Research Funding/Grantsmanship for Pathology House Staff

Dept. of Pathology
Residency Career Development Series

May 8, 2017

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College of Physicians and Surgeons
Columbia University

Course: "Funding and Grantsmanship for Research and Career Development Activities"

http://grantscourse.columbia.edu/

Topics to be Discussed

- **Types of Awards**
  - Fellowships (F's), Training grants (T's), Career Development awards (K's), Research grants (R's), Loan Repayment Program
- **Funding Agencies**
  - Federal
    - National Institutes of Health
  - Voluntary Health Organizations, Professional Societies, Foundations
- **Approaches for Competitive Applications**
  - Career Development and Research Proposals

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Not All Funding Opportunities Are the Same

- **Different mission statements**
  - Fellowships (F's)/Training grants (T's)
  - Career development (K's)/ Scholar awards
  - Research project (R's)
- **Different funding**
  - Stipend/Salary
  - Pilot awards vs. Comprehensive research costs
- **Different time frames**
  - Not renewable: e.g. 5 years (K's), 3 years (F's), 2 years (T's)
  - Renewable: 4 - 5 years (R01) each competitive period

Types of Awards

- Individual fellowships
- Training grants
- Career transition awards
- Career development awards
- Research grants
- Program Projects
- Administrative supplements
- Cooperative agreements
- Institutional Clinical & Translational Science Award (CTSA)
- Subcontracts
- Contracts
- Loan Repayment Program

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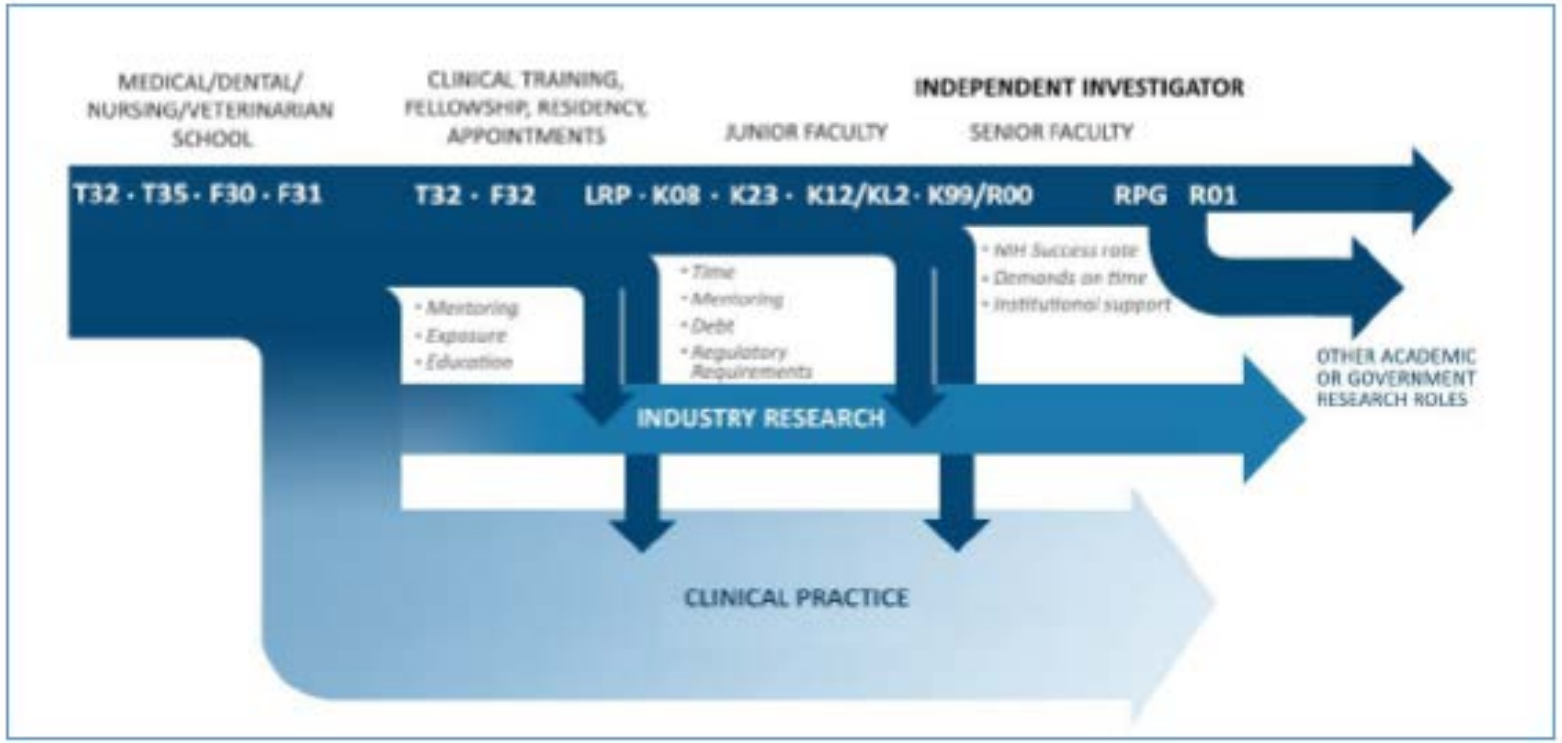
Physician-Scientist Pathway



Timeline of Funding for Junior Investigators

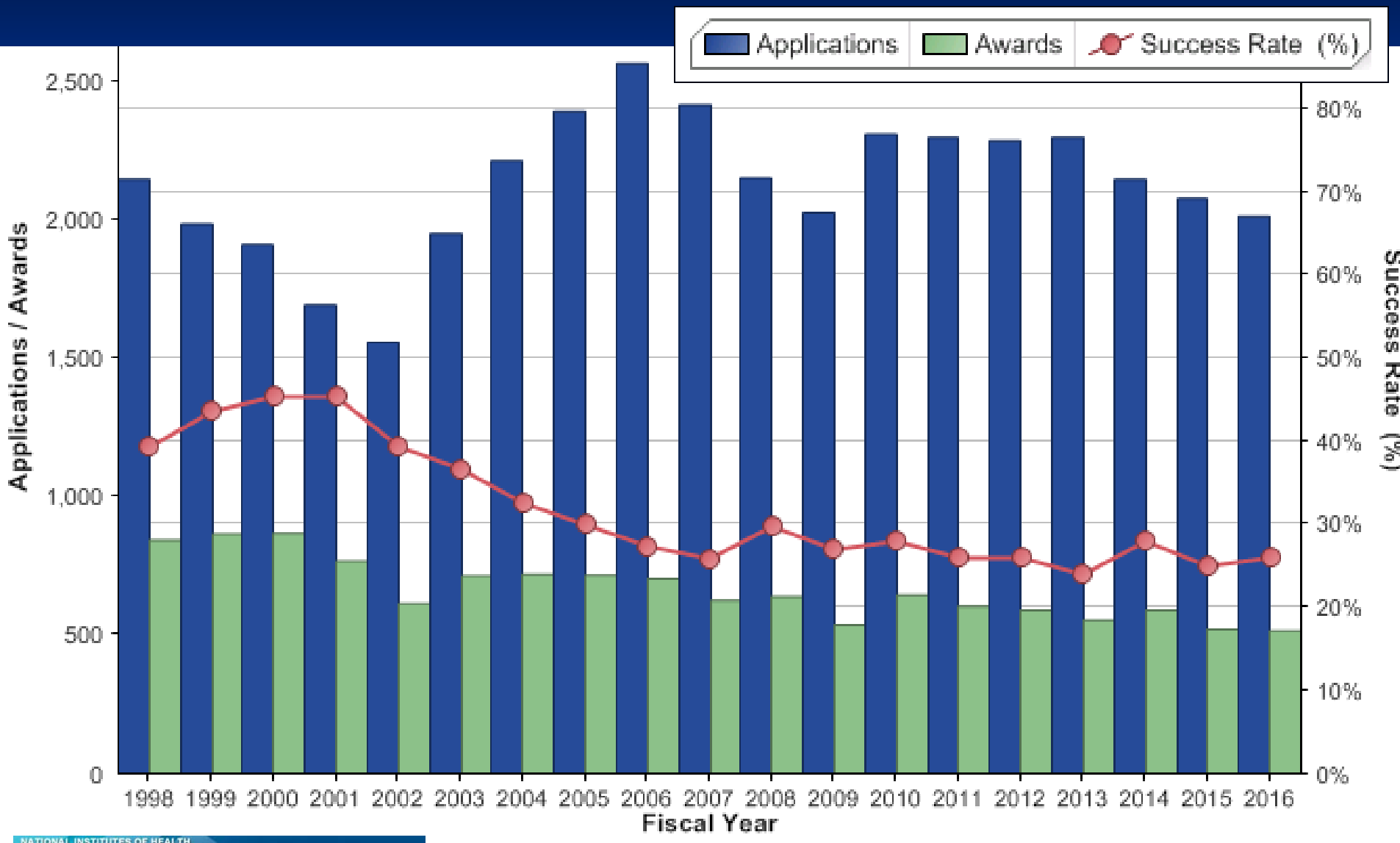
Post-doc: Institutional Training Grant (NIH-T32)

- Post-docs selected by institution
- Research training in specific area
- Defined number of slots
- Stipend, health fees, tuition, travel

Post-doc: Individual Fellowship

- Supports specific individual
- Stipend, health fees, tuition, travel
- NIH: F32
- Review criteria:
  - Individual fellow
  - Mentor
  - Research project
  - Research environment

Post-doc Fellowships (F32's)
Applications, awards, and success rates



Post-doc: Individual Fellowships

Non-government, non-profit agencies

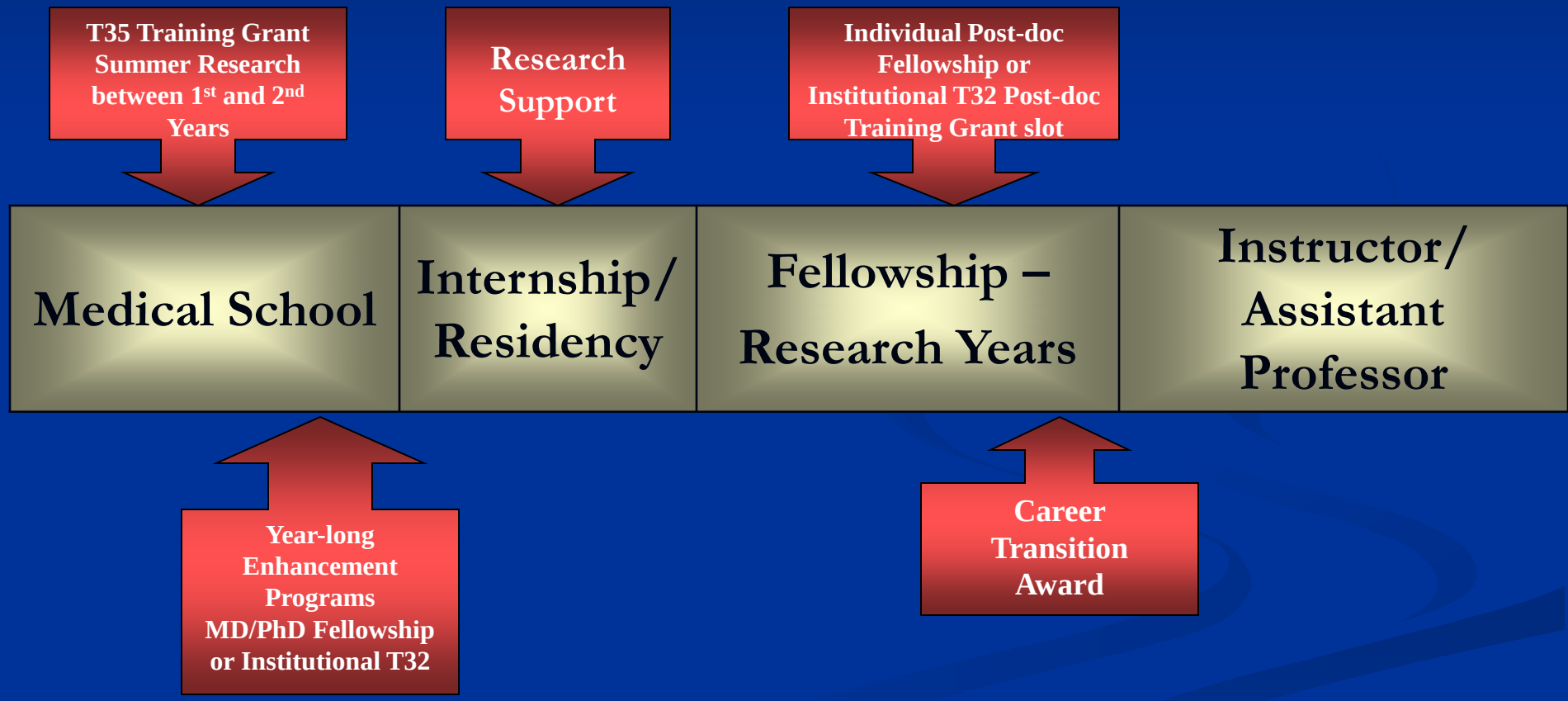
- Voluntary Health Organizations
- Professional Societies
- Private Foundations

Post-doc: Individual Fellowship

- Voluntary Health Organizations, Foundations, Professional Societies -

- **American Cancer Society**
  - Postdoctoral Fellowships
- **American Philosophical Society**
  - Daland Fellowships in Clinical Investigation
- **Damon Runyon Cancer Research Foundation**
  - Damon Runyon Fellowship Award

Timeline of Funding for Junior Investigators



NIH: Pathway to Independence Award

- Career Transition Award (K99/R00)
- No citizenship requirement
- Applicants must:
  - Have earned a clinical or research doctorate;
  - Have no more than 4 years of research experience since completing the requirements of the doctoral degree
  - Have not been the principal investigator of an NIH research grant (e.g., R01, R03, R21), career development award (e.g., K01, K07, K08, K23, K25), other peer-reviewed NIH or non-NIH research grant over $100,000 direct costs per year, or have been a project leader on a sub-project of a program project (P01) or a center (P50) grant.

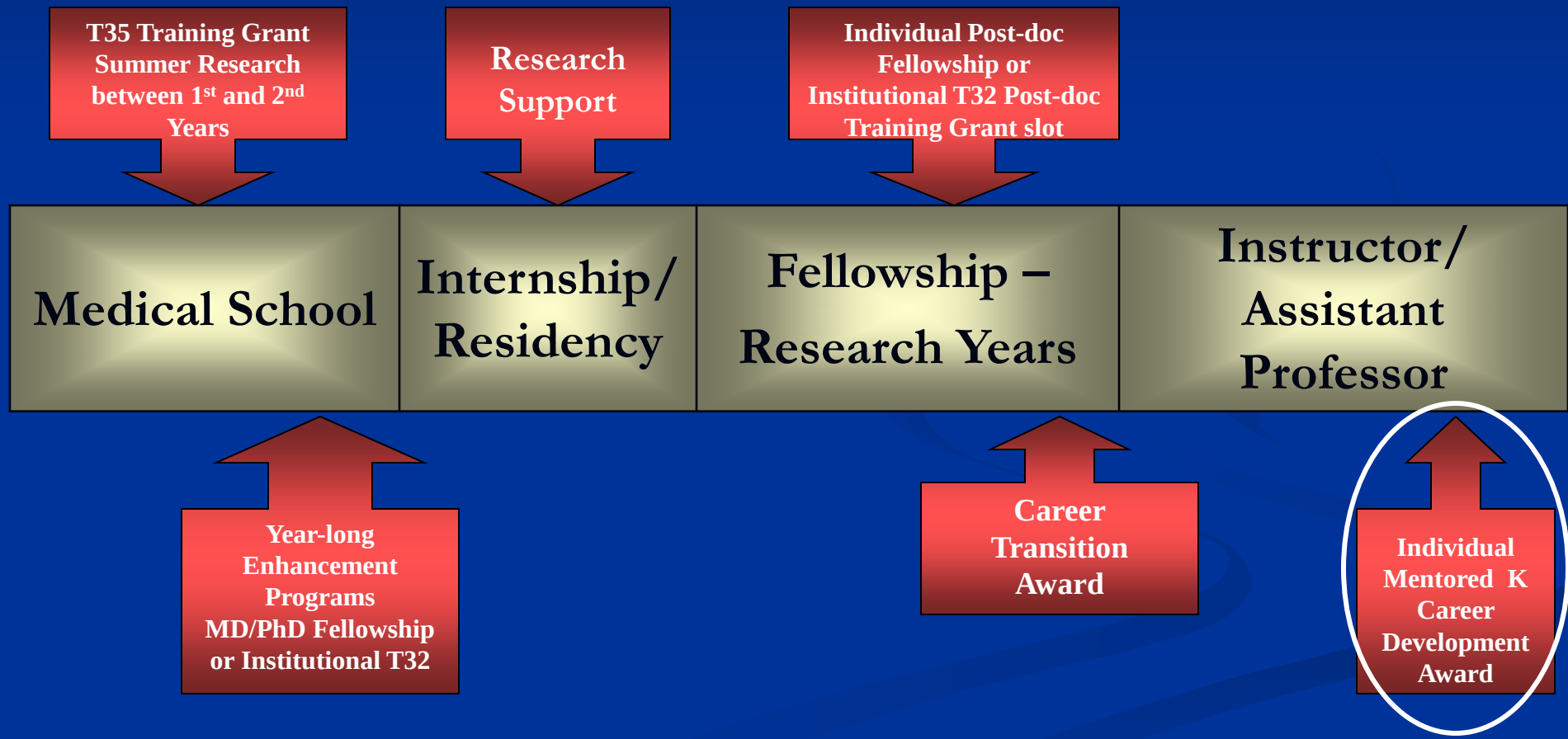
- 1-2 years as a mentored K award for "post-docs"
  - Funding level is Institute-specific
    - NIDDK, NIA: $75K for salary plus fringe benefits, $25K for research support (+ 8% I.C.)
  - 75% effort
- 3 years as a Research award for independent investigators
  - Total/year:=$249,000 (salary and research expenses)
    - D.C. + institution's I.C. rate
  - Must have an independent research position

Career Transition Awards

BWF: Career Awards for Medical Scientists

- Supports physician-scientists to bridge advanced postdoctoral/fellowship training and the early years of faculty appointment
- Must hold an M.D., D.D.S., or D.V.M.
- 75% effort to research-related activities
- Funding: $700,000 over five years
  - Postdoctoral/Fellowship Portion: Years 1 and 2
    Annual Total: $95,000
  - Faculty Portion of the Award: Years 3-5
    Annual Total: $170,000

Timeline of Funding for Junior Investigators



Research Career Programs (K)

- Provides predominantly salary support
- Minimum requirements for the amount of effort that must be devoted to research and career development (e.g. 75%, some exceptions to 50%)
- Up to 5 years
- Specified salary levels
- US citizen/permanent resident.
- Can reduce effort to 50% in last 2 years if PI of NIH research grant

Mentored Clinical Scientist Development Award (K08)

- Support to develop outstanding independent clinician research scientists
- Basic and translational science

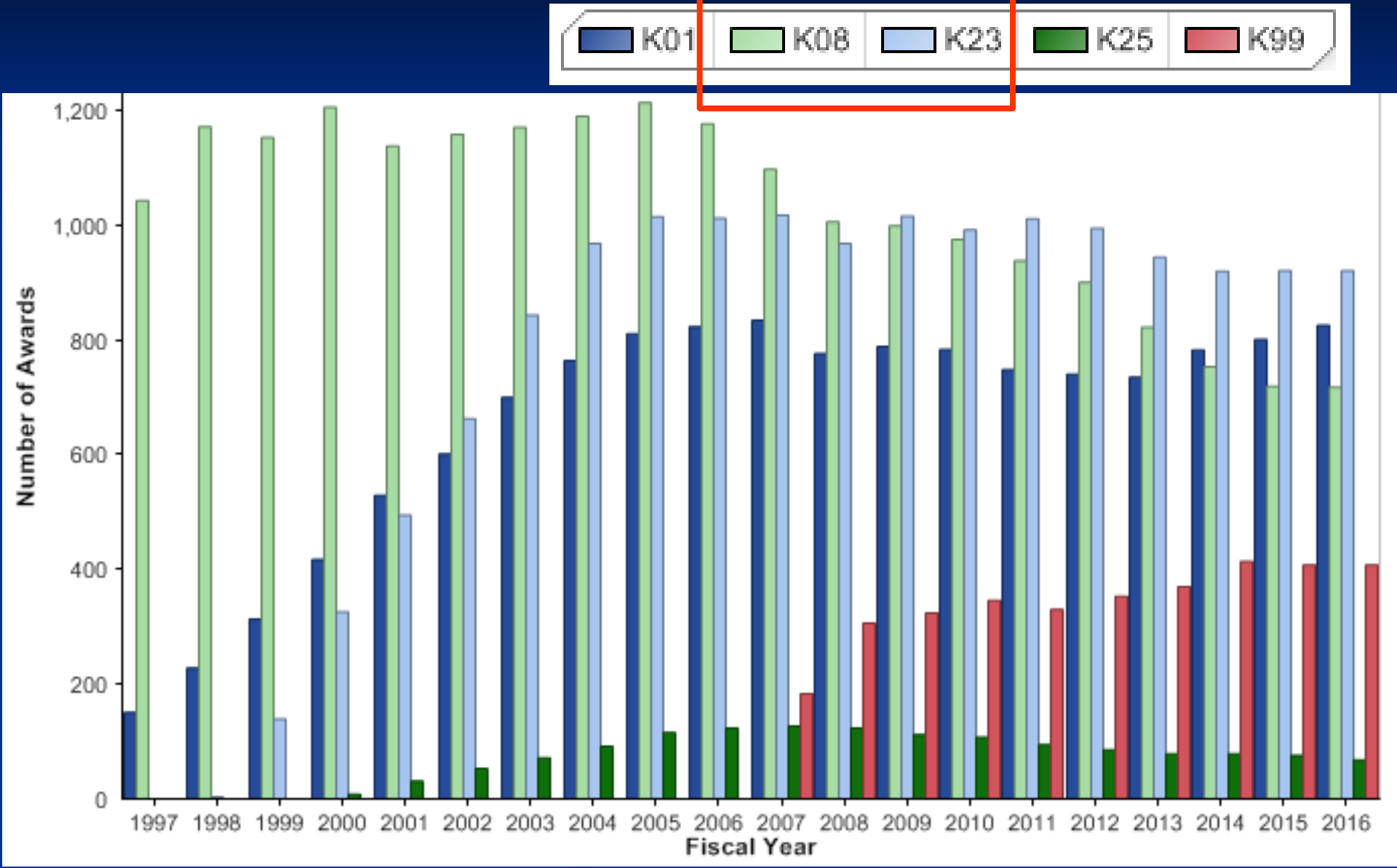
Mentored Patient-Oriented Research Career Development Award (K23)

- **Patient-oriented research**: Research conducted with human subjects (or on material of human origin) for which an investigator directly interacts with human subjects
- **Research areas**: (1) Mechanisms of human disease, (2) Therapeutic interventions, (3) Clinical trials, and (4) Development of new technologies

Cancer Prevention, Control, Behavioral, and Population Sciences Career Development Award (K07)

- NCI program
- Support individuals with health professional or science doctoral degrees who are not fully established investigators

Research Career Development Awards

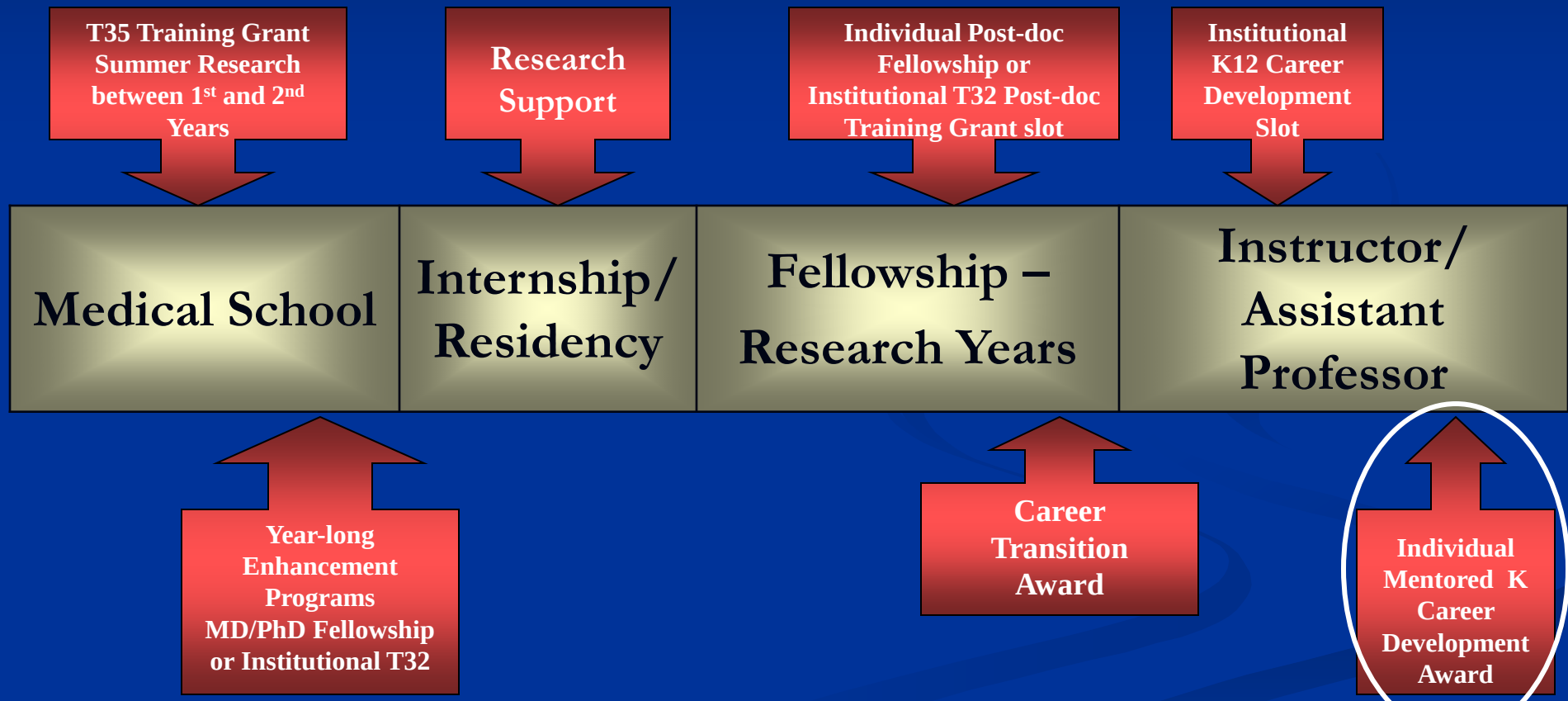


Fiscal Year	Activity Code	NIH Institute / Center	Number of Applications Reviewed	Number of Applications Awarded	Success Rate[2]	Total Funding[3]
2016	K23	NCI	31	5	16.1%	$825,671
2016	K23	NHLBI	101	45	44.6%	$8,086,510
2016	K23	NIDCR	5	2	40.0%	$263,164
2016	K23	NIDDK	62	28	45.2%	$4,964,021
2016	K23	NINDS	41	6	14.6%	$1,124,099
2016	K23	NIAID	42	17	40.5%	$2,943,258
2016	K23	NIGMS	6	4	66.7%	$661,996
2016	K23	NICHD	76	15	19.7%	$2,022,733
2016	K23	NEI	17	8	47.1%	$1,717,613
2016	K23	NIEHS	4	3	75.0%	$457,410
2016	K23	NIA	36	13	36.1%	$2,042,013
2016	K23	NIAMS	16	7	43.8%	$1,200,701
2016	K23	NIDCD	11	4	36.4%	$725,296
2016	K23	NIMH	62	22	35.5%	$3,844,905
2016	K23	NIDA	37	15	40.5%	$2,669,200
2016	K23	NIAAA	14	5	35.7%	$929,949
2016	K23	NINR	9	5	55.6%	$716,110
2016	K23	NIBIB	1	1	100.0%	$197,424
2016	K23	NCCIH	4	2	50.0%	$273,682
2016	**K23**	**Activity Total**	**575**	**207**	**36.0%**	**$35,665,755**

Research Career Development/ Scholar Programs

- **American Cancer Society**
  - Mentored Research Scholar Grant
- **Damon Runyon Cancer Research Foundation**
  - Clinical Investigator Award
- **Doris Duke Charitable Foundation**
  - Clinical Scientist Development Award
- **Robert Wood Johnson Foundation**
  - Harold Amos Medical Faculty Development Program

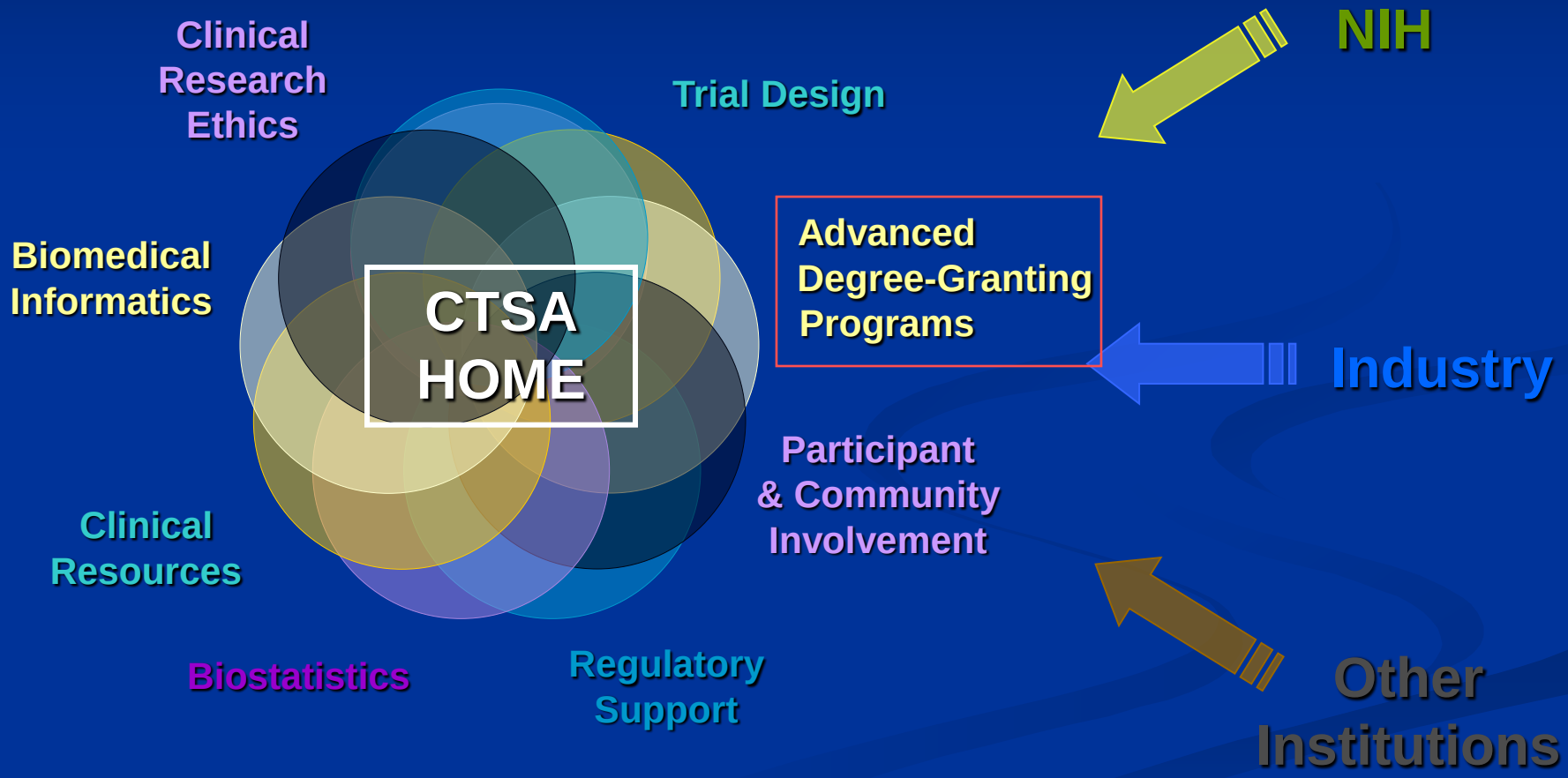
Timeline of Funding for Junior Investigators



Mentored Clinical Scientist Development Program Award (K12)

- Support to an institution for career development experiences for clinicians leading to research independence.
- Institutions recruit and select candidates into their programs
- Candidates must meet the same criteria as for the individual mentored clinical scientist development award.

CTSA Awards:
A Home for Clinical and Translational Science



Source: Zerhouni (NIH) [9/06]

Mentored Clinical Scientist Development Program Award (K12)

- **CTSA - Clinical and Translational Scientist Award**
  - TRANSFORM Scholars Mentored Career Development program [Training and Nurturing Scientists for Research that is Multidisciplinary]

CU Irving Institute/CTSA Funding Programs

- **TRANSFORM TL1 Postdoctoral Precision Medicine Training Program:** Two-year mentored training program combining integrated didactic training, mentoring, and multidisciplinary research.
- **Precision Medicine Research Fellowship:** Two-year program to train physicians/researchers to use genomics and complex clinical data to improve clinical care and clinical outcomes by tailoring prevention, screening, and medical interventions based upon individual patient characteristics.

CU Irving Institute/CTSA Funding Programs

- **KL2 Program:** TRANSFORM KL2 Scholars Mentored Career Development program
- **Irving Scholars:** Florence and Herbert Irving Clinical Research Career Awards - $60,000/year for 3 years
- **Irving Institute/CTO Pilot Awards:** $50,000 awards for P&S junior faculty to conduct pilot studies leading to future independent funding
- **Imaging Core Pilot Awards:** Funding for junior investigators: magnetic resonance imaging (MRI), optical imaging, PET tomography, single photon emission computed tomography/computed tomography (SPECT/CT), and ultrasound

CU Irving Institute/CTSA Funding Programs

- **Collaborative and Multidisciplinary Pilot Research Awards (CaMPR):** Two-phase program that provides planning and start-up funding to newly-configured investigative teams to support the planning of novel, cross disciplinary projects.
- **CaMPR-BASIC Awards:** Two-phase program that provides funding to form a new collaborative team consisting of two principal investigators at the Assistant Professor level: one from a Basic Science department and one from a Clinical department.

CU Irving Institute/CTSA Funding Programs

- **Health Practice Research Pilot Awards:** For junior investigators to pursue an informatics-based project in an operational clinical setting (w/ the Dept of Biomedical Informatics)
- **Personalized Medicine Pilot Awards:** For research focused on approaches to tailor medical care (prevention, diagnosis, and/or treatment) to the individual patient. Studies may include the use of biomarkers, genomic data, aggregated clinical data, and/or patient reported data to develop personalized medical care.

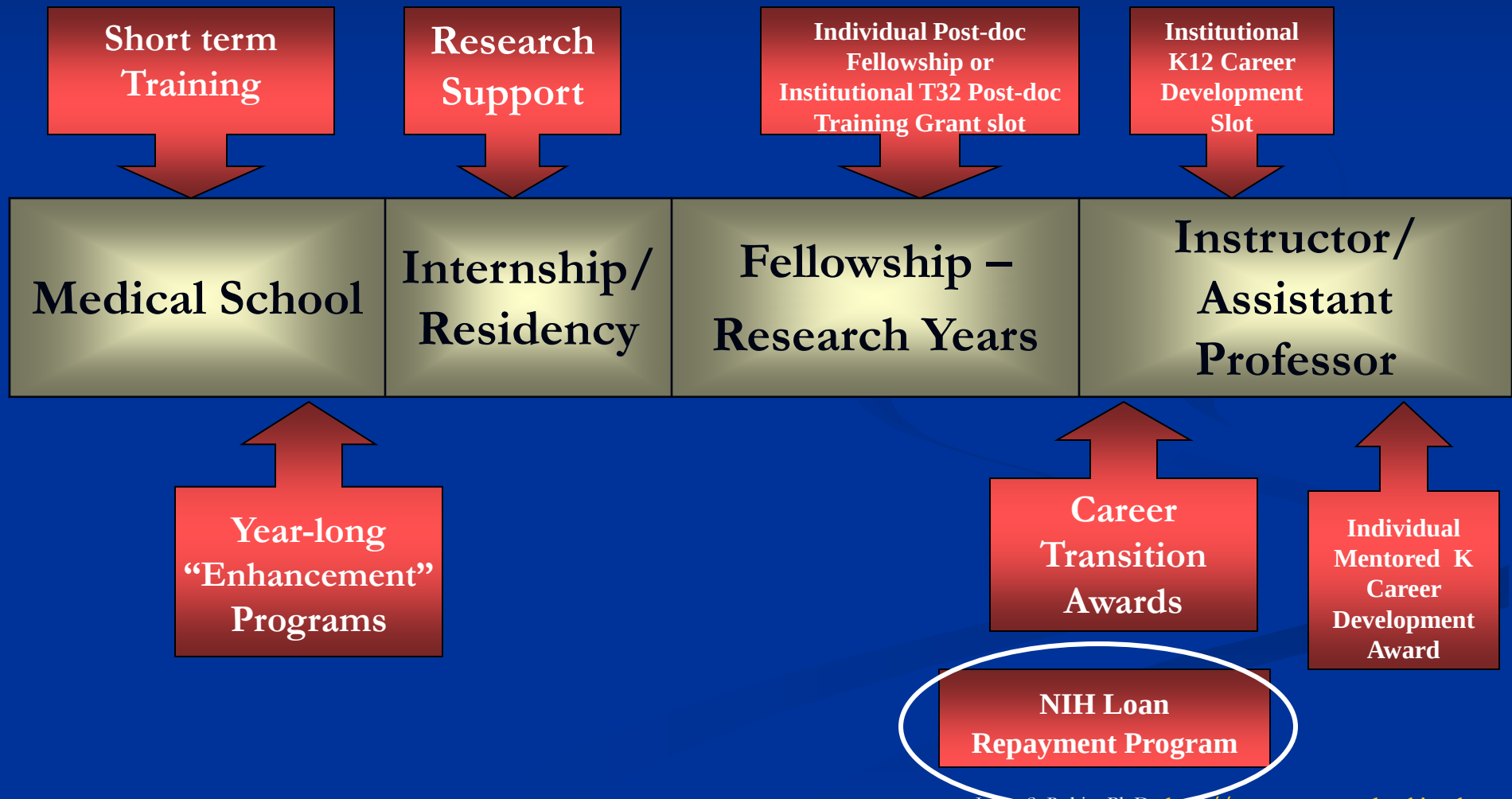
CU Irving Institute/CTSA Training Programs

- **Reach for the First R01 Course:** Participants receive five free hours of biostatistical consulting, access to CTSA resources, two expert pre-reviews on an early draft of their R01 application, and bi-monthly, closely-monitored meetings to ensure structure and timeliness in completing the tasks required to successfully submit a first R01 application.

CUMC Research Training/ Didactic Programs

- **Columbia Summer Research Institute (CSRI):** 5-week (10 credit) training program in research design and statistical analysis for patient oriented research.
- **Epidemiology and Population Health Summer Institute (EPIC):** Dept. of Epidemiology's series of week-long, non-credit courses - provides foundational knowledge and applied skills for advancing population health research
- **Patient-Oriented Research (POR) Master's of Science Program:** Two-year, 30-credit M-SPH degree program of comprehensive didactic training for conducting clinical and translational research.

Timeline of NIH Funding for Junior Investigators



NIH's Extramural Loan Repayment Program

http://www.lrp.nih.gov/

- Up to $35,000/year towards educational loan debt
- Conduct qualified research activities for at least 50% of professional effort (or 20 hours per week) for 2 years
- Qualifying educational loan debt equals or exceeds 20% of the applicant's institutional base salary

NIH's Extramural Loan Repayment Program

- May competitively apply for one-year renewal
- Repayments represent taxable income and are paid in addition to loan

Eligibility:

- U.S. citizen/Permanent residence
- Recipient of M.D., Ph.D., D.D.S. D.M.D., or other specified equivalent doctoral degree

NIH's Extramural Loan Repayment Program

Extramural Programs

- Clinical Research
- Health Disparities Research
- Clinical Researchers from Disadvantaged Backgrounds
- Pediatric Research
- Contraception and Infertility Research

National Institutes of Health
Division of Loan Repayment

Fiscal Year: 2015

LRP	New + Renewal			New			Renewal		
	Applications N	Awards n	Success Rate %	Applications N	Awards n	Success Rate %	Applications N	Awards n	Success Rate %
Clinical Research	1,529	866	57	874	400	46	655	466	71
Pediatric Research	630	312	50	404	157	39	226	155	69
Health Disparities Research	486	125	26	303	55	18	183	70	38
Clinical Research for Individuals from Disadvantaged Backgrounds	50	25	50	32	11	34	18	14	78
Contraception and Infertility Research	41	23	56	28	12	43	13	11	85
Total	2,736	1,351	49	1,641	635	39	1,095	716	65

https://www.lrp.nih.gov/data-reports

National Institutes of Health
Division of Loan Repayment

Fiscal Year: 2015

LRP	Awards	Funding	Mean Award
Clinical Research	866	$43,757,421	$50,528
Pediatric Research	312	$16,891,639	$54,140
Health Disparities Research	125	$6,224,388	$49,795
Clinical Research for Individuals from Disadvantaged Backgrounds	25	$1,517,710	$60,708
Contraception and Infertility Research	23	$977,528	$42,501
Total	1,351	$69,368,686	$51,346

https://www.lrp.nih.gov/data-reports

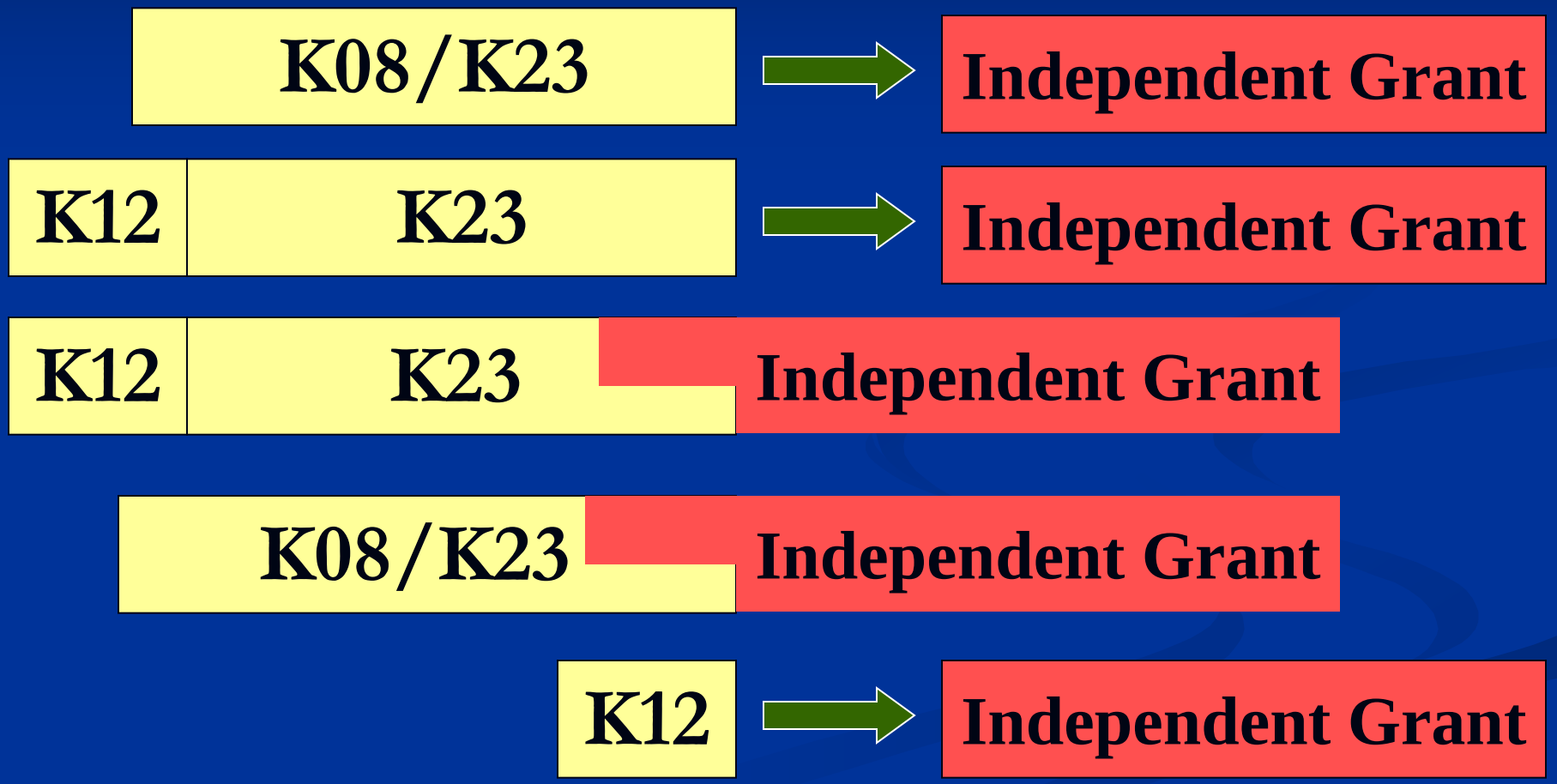
National Institutes of Health
Office of Extramural Research

ADVISORY COMMITTEE TO THE DIRECTOR

Physician-Scientist Workforce

6. **NIH should expand Loan Repayment Programs and the amount of loans forgiven should be increased to more realistically reflect the debt burden of current trainees.** This program should also be made available to all students pursuing biomedical physician-scientist researcher careers, regardless of particular research area or clinical specialty.

NIH Career Development Support to Independent Research Funding



R01
Research Award

Independent Investigator

Funds research project

- Salaries of PI and other research personnel
- Supplies, reagents, etc
- Animal costs
- Patient care costs
- Core facilities
- Page charges for publications

Multi-Year (4yrs – 5yrs)

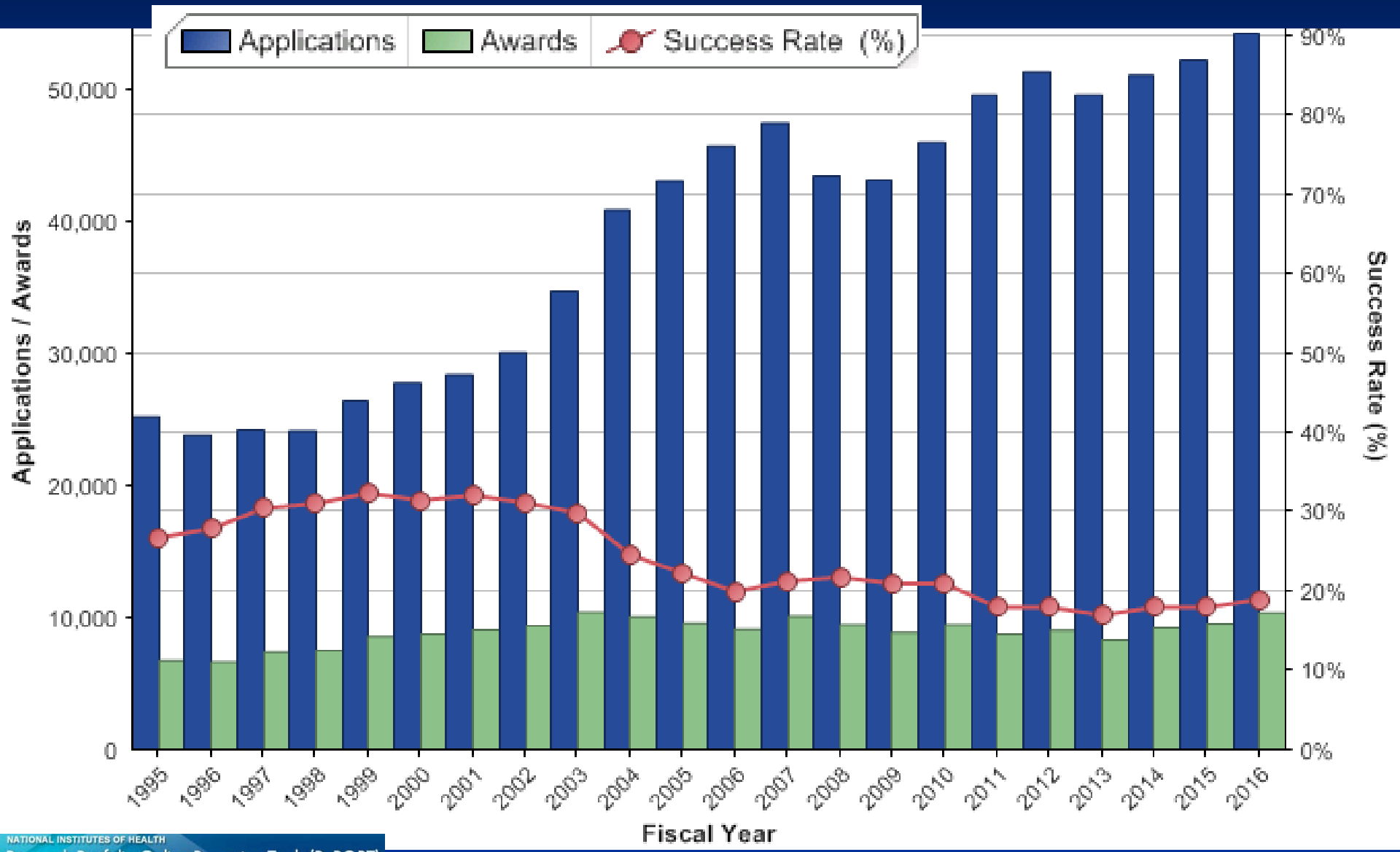
Renewable (e.g. original grant + 2 renewals = 15yrs)

nature

R01 Research Grant

- Supports a discrete, specified project
  - "Specific Aims"
- "Comprehensive" funding
  - Salary of PI and research staff, supplies, animal costs, patient care costs, travel, publication costs
- Modular budgets up to $250,000/year
- Multi-year (4yrs – 5 yrs)
- Renewable
  - e.g., original grant + 2 renewals = 15 years
- Flexibility
- Most NIH-supported investigator-initiated research is through this funding mechanism

Research Project Grants: Applications, Awards, and Success Rates



Small Research Grants (R03)

- Supports, e.g.:
  - Pilot or feasibility studies;
  - Collection of preliminary data
  - Secondary analysis of existing data
  - Small, self-contained research projects
  - Development of new research technology
- 2 years of funding
- Budget: Direct costs up to $50,000/yr
- Not renewable
- Some Institutes only accepts applications in response to their specific funding opportunity announcements

Exploratory/ Developmental Grants (R21)

- Encourages new, exploratory and developmental research projects by providing support for the early stages of project development. Sometimes used for pilot and feasibility studies.
- 2 years of funding
- Budget: $275,000 (D.C.) over two years
- Investigator-initiated R21 studies not funded by all Institutes

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Pathology-Specific Funding Agencies

- Academy of Clinical Laboratory Physicians and Scientists
  - Paul E. Strandjord Young Investigator Award Program
- American Association of Neuropathologists
  - Trainee Travel Awards
- American Society for Clinical Pathology
  - Resident Subspecialty Grants
- American Society of Cytopathology/Foundation
  - Young Investigator Grant
  - Travel Scholarship
  - Patient Advocacy Grant

Pathology-Specific Funding Agencies

- **Association for Molecular Pathology**
  - Travel Awards
- **Rodger C. Haggitt Gastrointestinal Pathology Society**
  - Travel Awards
- **National Blood Foundation**
  - Early-Career Scientific Research Grants Program
  - Strategic Research and Education Grants Program
- **United States and Canadian Academy of Pathology**
  - Pathologists-In-Training Travel Scholarships

Pathology-Specific Funding Agencies

- American Society of Hematology
  - ASH Bridge Grant
  - Abstract Achievement Awards and Outstanding Abstract Achievement Awards
  - Clinical Research Training Institute
  - Research Training Award for Fellows
  - Translational Research Training in Hematology
  - Physician-Scientist Career Development Award
  - HONORS (Hematology Opportunities for the Next Generation of Research Scientists)
  - Minority Medical Student Award Program
  - The Minority Medical Student Award Program
  - ASH Minority Resident Hematology Award Program

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NIH Career Development (K) Application

- Model for other career development/ scholar grant programs supported by voluntary health organizations, private foundations, and professional societies

Overall Impact *Write a paragraph summarizing the factors that informed your Overall Impact score.*

1. Candidate

Strengths

-

Weaknesses

-

2. Career Development Plan/Career Goals & Objectives/Plan to Provide Mentoring

Strengths

-

Weaknesses

-

3. Research Plan

Strengths

-

Weaknesses

-

4. Mentor(s), Co-Mentor(s), Consultant(s), Collaborator(s)
Strengths • **Weaknesses** •

5. Environment and Institutional Commitment to the Candidate
Strengths • **Weaknesses** •

1 + 12 Pages Combined

- **Candidate Information**
  - Section 2
- **Research Plan**
  - 3. Specific Aims (1 page)
  - 4. Research Strategy

2. Candidate Information

- Candidate's Background
- Career Goals and Objectives: Scientific Biography
- Career Development/ Training Activities During Award Period

Candidate's Background

- Personal background for this career path
- Other training experiences
- Other research experiences
- Reasons for basic, clinical, translational, behavioral, multidisciplinary research, relevant publications

Career Goals and Objectives

- Unique expertise/Scientific history
  - Previous work
    - Consistent themes, or
    - Why research interests have changed direction
  - e.g. Joint appointments, Multidisciplinary
- Skills that are lacking
  - Identification of specific modules to address areas for growth, provides justification of award
  - Role of specific Mentor(s) and Advisory Committee member(s)

- Justify award
  - Fits into past and future research career
- Short-term Career Goals
  - Timeline for funded period

Year 1: Preliminary data

Year 2: Submit publications (possible journals),
Presentations at national meetings (examples),
Formulation of project to submit for R01 application

Year 3-5: By the end of the funded period, applicant will be an independent investigator near to R01 funding

- Long-term Career Goals
  - Scientific goals
    - Basic science, translational, clinical, epidemiologic, behavioral
  - Mentoring goals
    - How mentoring has been important to you
    - Previous/current mentoring responsibilities
  - Networking goals
    - Multidisciplinary activities, grants, etc

Career Development/Training Activities During Award Period

- Review of didactic courses, training, and research experiences to date
- New research skills/ knowledge required
- Identification of training modules required to fill gaps in knowledge in order to reach long term goals
  - Rational for each of the modules

- **New Section on each Module**
  - Reason for module
  - Specific Description of each "Mode of Learning"
    - Role of Mentors and Advisors
    - Specific courses, workshops, and other didactics
    - Details on research meetings
  - Module: Career skills
    - Grantsmanship
    - Becoming a mentor
    - Laboratory management
- **Table: Career Development/ Training Activities During Award Period**

Module	Mentor(s)	Mode of learning
Scientific Area (1-3)	Specific names	Coursework (completed and new) 1-on-1 meetings (schedule? e.g. weekly) Guided readings Research meetings (schedule? e.g. weekly) Applied training Clinical experience
Career skills **Dissemination of Research Results** **Research management** **Mentorship**	All mentors	 Improving communication skills Grant writing course Professional workshops/seminars Collaborations Abstracts and manuscripts Small grant application submission Supervising technical support personnel, organizing lab meetings, journal clubs e.g. training new lab members, undergraduate, summer students

- **Mentors/Advisory Committee**
  - Scientific area per mentor/committee member
  - Schedule of meetings

Career Development and Research Training Mentors and Advisors		
Faculty Member	**Role**	**Area of Expertise**
Name (Title)	Mentor	
Name (Title)	Co-Mentor	
Name (Title)	Advisory Board Member	
Name (Title)	Advisory Board Member	
Name (Title)	Advisory Board Member	
Name (Title)	Collaborator	
Name (Title)	Consultant	

- **Summary of coursework**
  - List previous relevant coursework
  - Proposed coursework
    - Course number and description
    - Include courses on grant writing and responsible conduct of research
  - Additional didactic activities
    - e.g. Those offered by professional societies, workshops, symposiums

- Clinical and/or Teaching activities
  - Be specific, mention hrs. per week, restate % of time dedicated to research
- Percentage of time for each activity
- Timetable

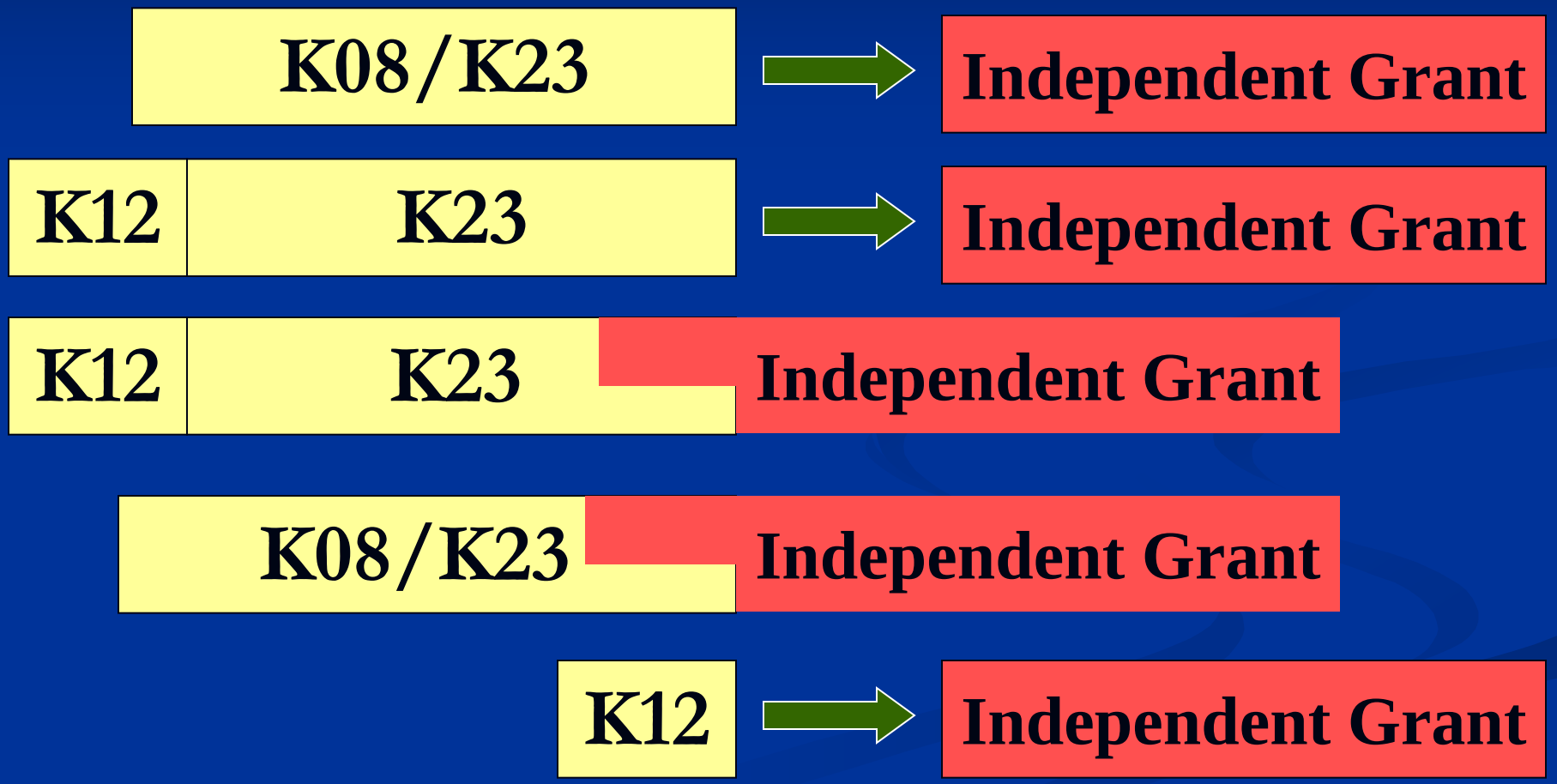
Career Development Activities	Year 1	Year 2	Year 3	Year 4	Year 5
Mentorship					
Mentor (name)– frequency (e.g. weekly) of individual meetings, frequency of lab meetings, frequency and listing of specific journal clubs, seminars, and other recurring relevant programs	X	X	X	X	X
Co-Mentor (name) – frequency (e.g. weekly) of individual meetings, frequency of lab meetings, frequency and listing of journal clubs, seminars, and other recurring relevant programs	X	X	X	X	X
Advisory Group – frequency (e.g. quarterly) of meetings	X	X	X	X	X

Career Development Activities	Year 1	Year 2	Year 3	Year 4	Year 5
Experimental Training					
Mentor (name) – Specific area of research and/or methodology	X	X	X	X	X
Co-Mentor (name) – Specific area of research and/or methodology	X	X	X		
Co-Investigator 1 (name) – Specific area of research and/or methodology		X	X		
Co-Investigator 2 (name) – Specific area of research and/or methodology			X	X	
Collaborator 1 (name) – Specific area of research and/or methodology		X	X	X	
Collaborator 2 (name) – Specific area of research and/or methodology			X	X	X
CU Formal Coursework – P&S, M-SPH, GSAS, etc.					
Course #1: Specific Course # / Formal Title	X				
Course #1: Specific Course # / Formal Title		X			
Course #3: Specific Course # / Formal Title			X		
G4010: Responsible Conduct of Research and Related Policy Issues		X			
M9780: Funding for Research Activities			X		

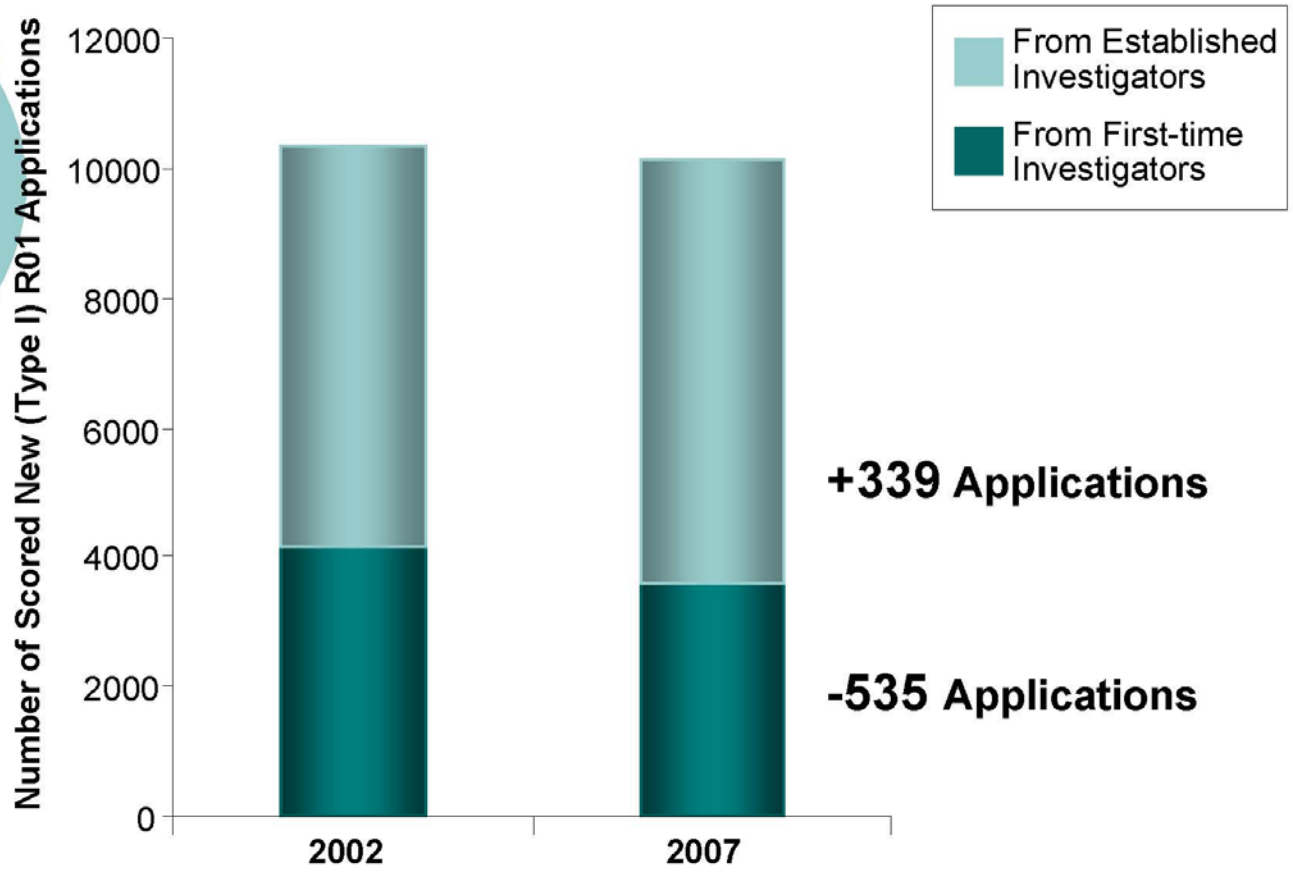
Career Development Activities	Year 1	Year 2	Year 3	Year 4	Year 5
Workshops & Additional Training Programs					
Cold Spring Harbor Course on.....	X				
Woods Hole Workshop on.....	X	X			
American Association for.... Junior Investigators Training on.....			X		
CTSA "K to R" Program				X	
IRB 101 Course		X			
NYAS Science Alliance Sessions on.....	X	X	X	X	X
Scientific Conferences-Communication Skills (Oral / Poster Presentations)					
Symposium of the NY Academy of....(annual)	X	X	X	X	X
Congress of..... (annual)		X	X	X	X
American Association for..... (annual)		X	X	X	X
Society of..... (biannual)	X		X		X

Career Development Activities	Year 1	Year 2	Year 3	Year 4	Year 5
Mentoring Skills (responsibility shared with K mentors)					
Students (summer, undergraduate, medical)		X	X	X	X
Communication Skills (Written)					
Preparation of manuscripts for peer reviewed journals			X	X	X
Grant Writing					
CTSA pilot award for junior investigator (to supplement K award)	X	X			
Center for..... award for new investigators			X	X	
R01 preparation and submission (on research funded by K award)				X	X

NIH Career Development Support to Independent Research Funding



Number of Scored Applications from First-time Investigators are Dropping



21

http://enhancing-peer-review.nih.gov/meetings/Peer%20Review%20Implementation%20FINAL%20DRAFT%20update%20-%20ACD%20mtg%206-8-08.pdf

Challenging Times for All Researchers

	1999	2007
Overall success rate for NIH RO1* Proposals	32%	24%
Success rate on first submission	29%	12%

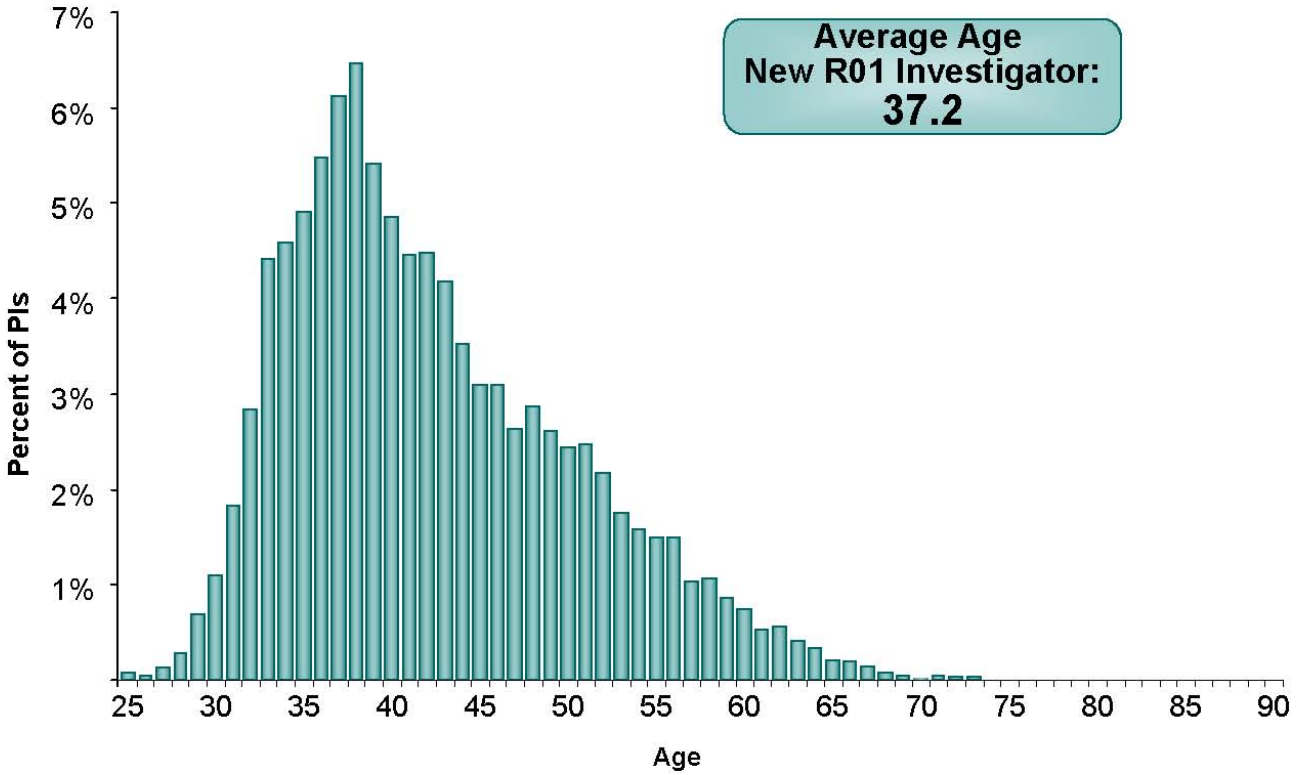
Especially for Young Investigators

	Then 1990	Now 2007
Age at first Ro1* grant	39	43
% of Ro1s* that go to first-time investigators	29%	25%

**RO1 Equivalents: RO1, R29, R37*
Source: National Institutes of Health

http://www.brokenpipeline.org/brokenpipeline.pdf

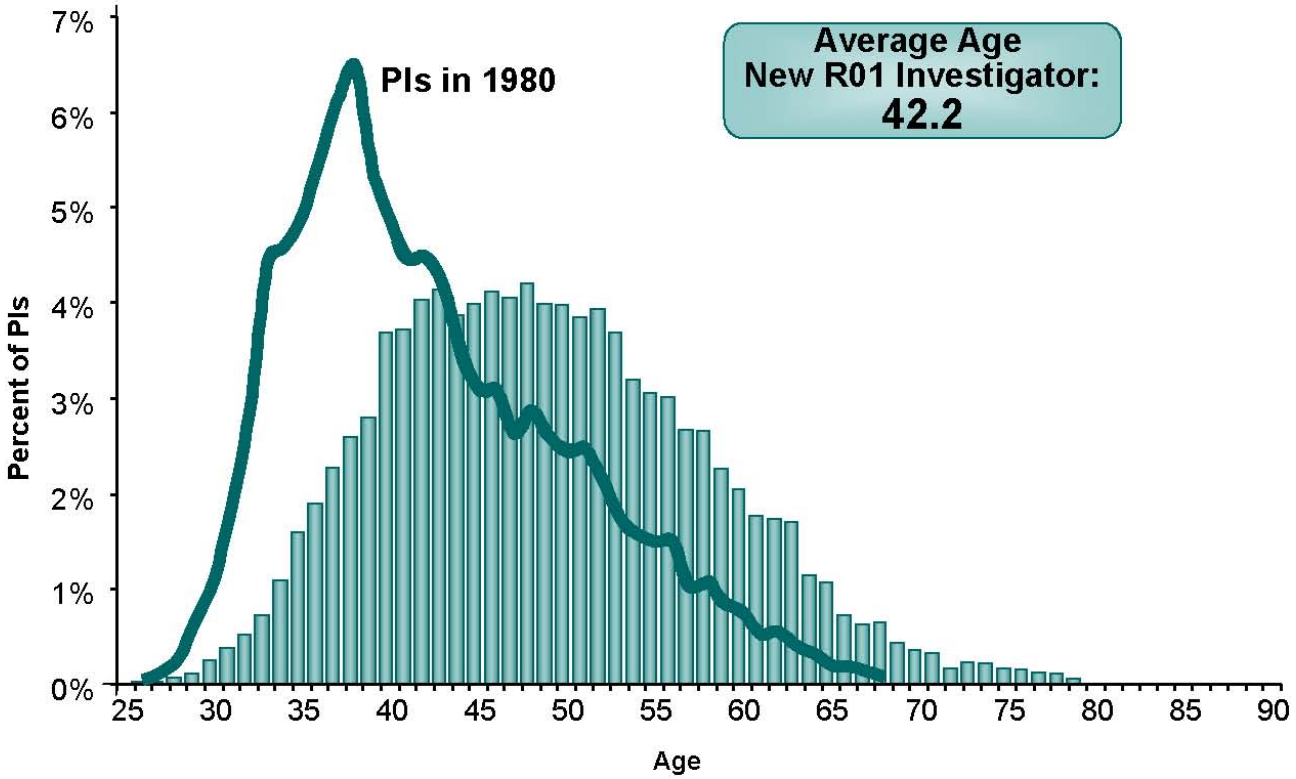
Age Distribution of NIH RPG Investigators: 1980



Sources: IMPAC II Current and History Files

http://enhancing-peer-review.nih.gov/meetings/Peer%20Review%20Implementation%20FINAL%20DRAFT%20update%20-

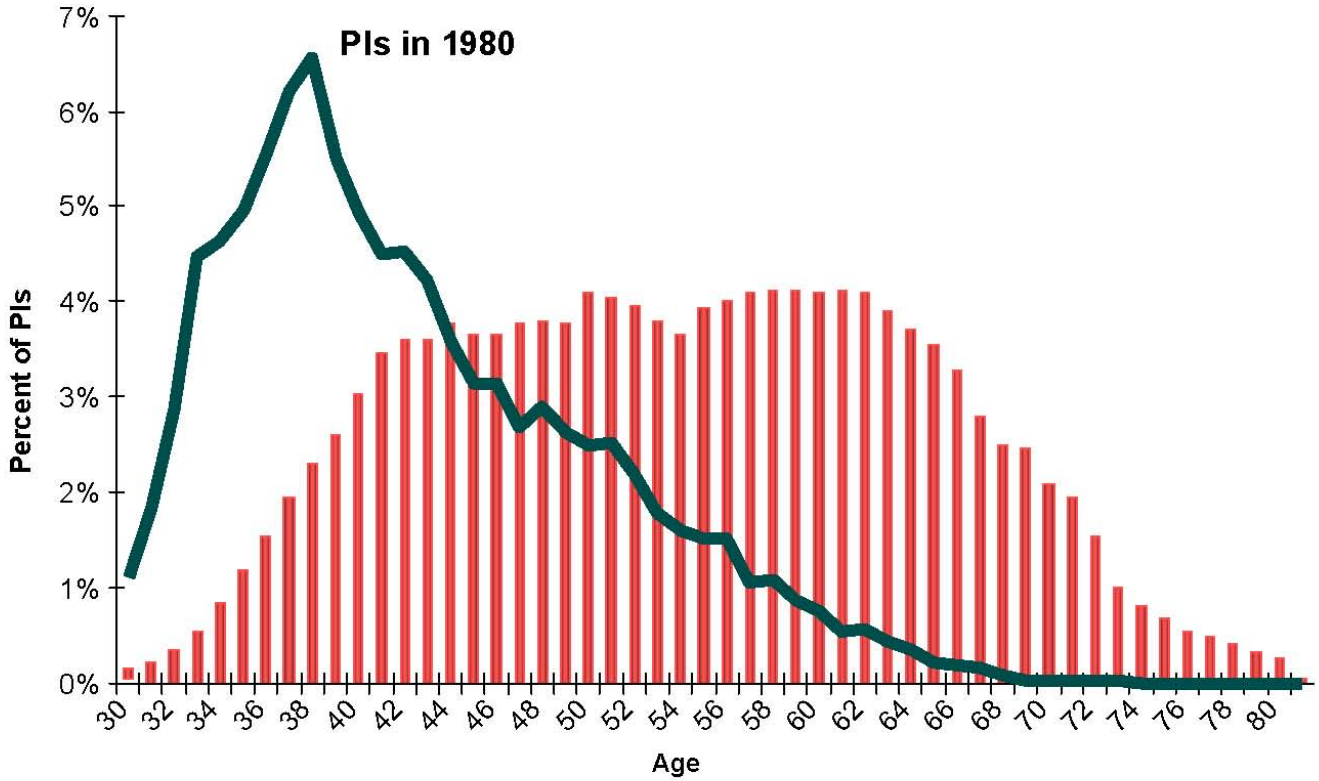
Age Distribution of NIH RPG Investigators: 2006



Sources: IMPAC II Current and History Files

http://enhancing-peer-review.nih.gov/meetings/Peer%20Review%20Implementation%20FINAL%20DRAFT%20update%20-

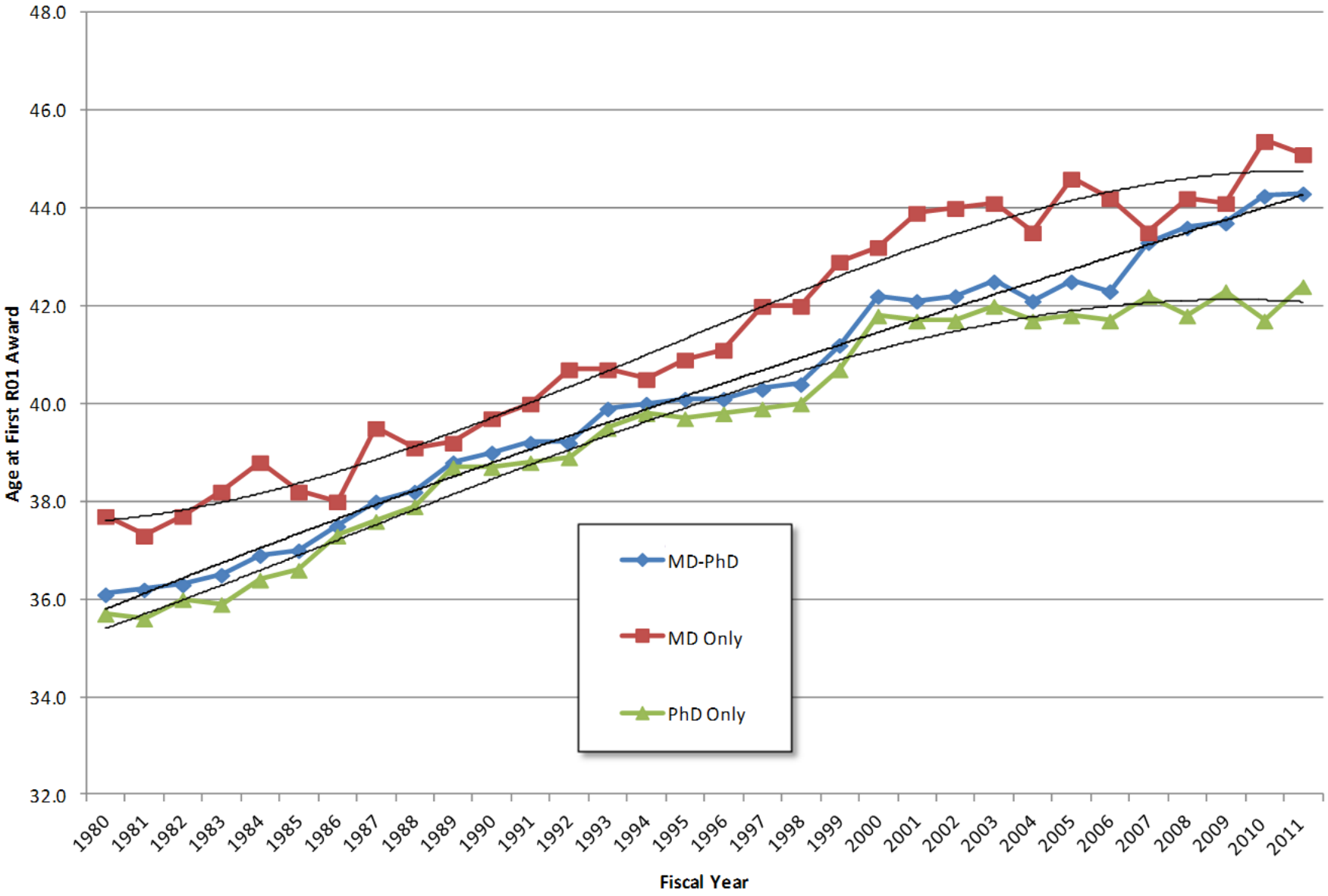
Preliminary Projection of Age Distribution of NIH RPG Investigators: 2020



Sources: IMPAC II Current and History Files and Preliminary Demographic Projection Model

http://enhancing-peer-review.nih.gov/meetings/Peer%20Review%20Implementation%20FINAL%20DRAFT%20update%20-

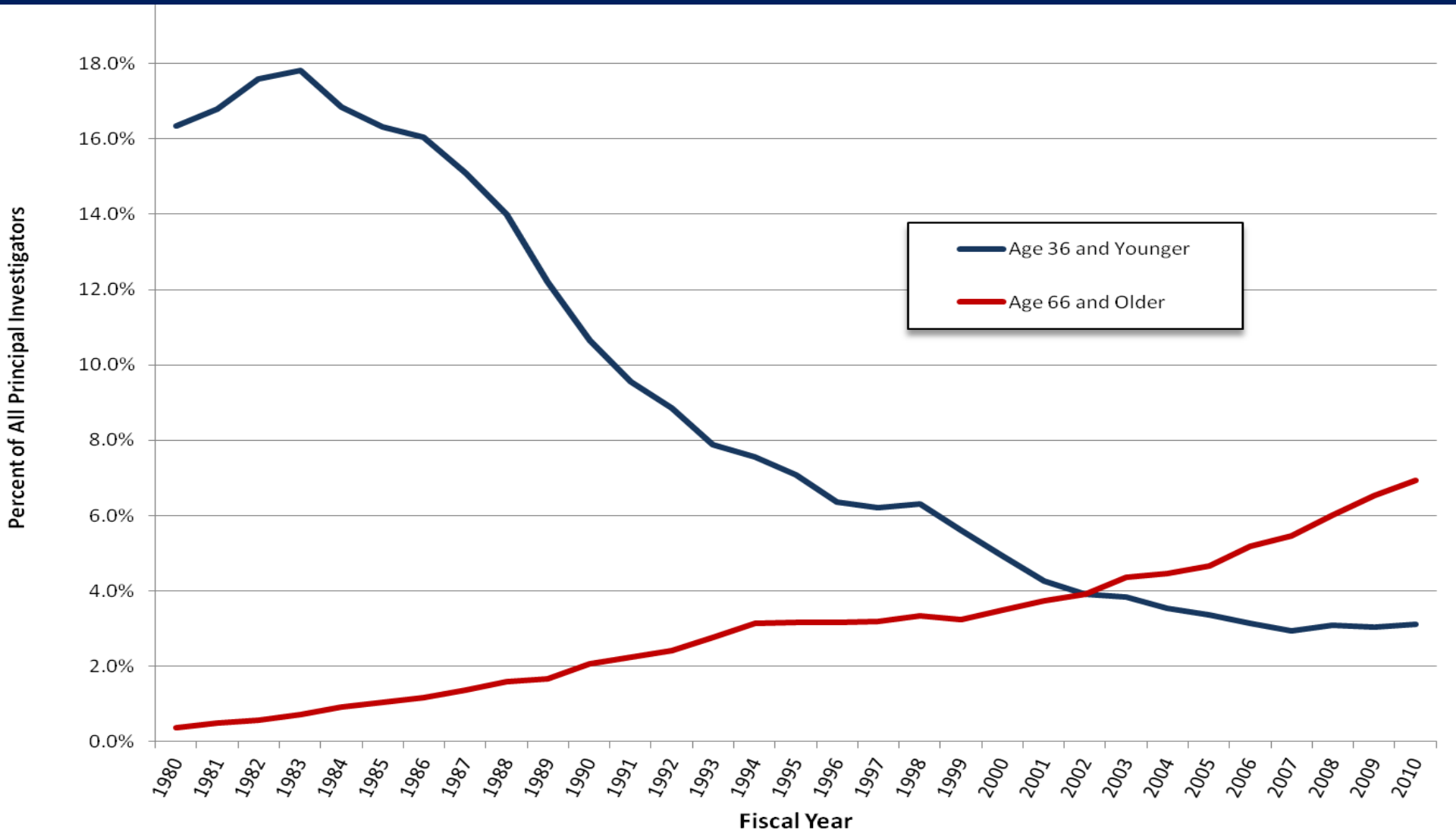
Figure 1. Average Age of Principal Investigators with MD, MD-PhD, or PhD at the time of First R01 Equivalent Award from NIH, Fiscal Years 1980 to 2011



"Over the past three decades, we've seen profound shifts in the average age at which a principal investigator receives their first R01. During the period from 1980 to 2001, the average age increased nearly 0.3 years per year. Since that time, the average age at first R01 award has leveled off near 42 for PhDs. It is higher for researchers with an MD or an MD/PhD." [Dr. Sally Rockey, NIH Deputy Director for Extramural Research (2/3/12)]

http://nexus.od.nih.gov/all/2012/02/03/our-commitment-to-supporting-the-next-generation

NIH R01 Principal Investigators: Age 36 and Younger / Age 66 and Older



The Opinion Pages

OP-ED CONTRIBUTOR

Young, Brilliant and Underfunded

By ANDY HARRIS

We'll never know what medical breakthroughs were missed because young scientists were not provided with resources.

Comments

The New York Times

OCT. 2, 2014

Ping Zhu

http://www.nytimes.com/2014/10/03/opinion/young-brilliant-and-underfunded.html?ref=opinion

A study for the National Bureau of Economic Research from 2005 examined the age at which over 2,000 Nobel Prize winners and other notable scientists in the 20th century came up with the idea that led to their breakthrough. Most were between 35 and 39. Yet the median age of first-time recipients of R01 grants, the most common and sought-after form of N.I.H. funding, is 42, while the median age of all recipients is 52. More people over 65 are funded with research grants than those under age 35.

http://www.nytimes.com/2014/10/03/opinion/young-brilliant-and-underfunded.html?ref=opinion

Young scientists lead the way on fresh ideas

Analysis of millions of papers finds that junior biomedical researchers tend to work on more innovative topics than their senior colleagues do.

Young researchers are much more likely than older scientists to study exciting innovative topics, according to a text analysis of more than 20 million biomedical papers published over the past 70 years. More-senior researchers are more likely to publish in hot areas when they are supervising a younger scientist.

Young scientists go for fresh ideas.
Callaway E.
Nature. 2015 Feb 19;518(7539):283-4. doi: 10.1038/518283a.

Age and the Trying Out of New Ideas

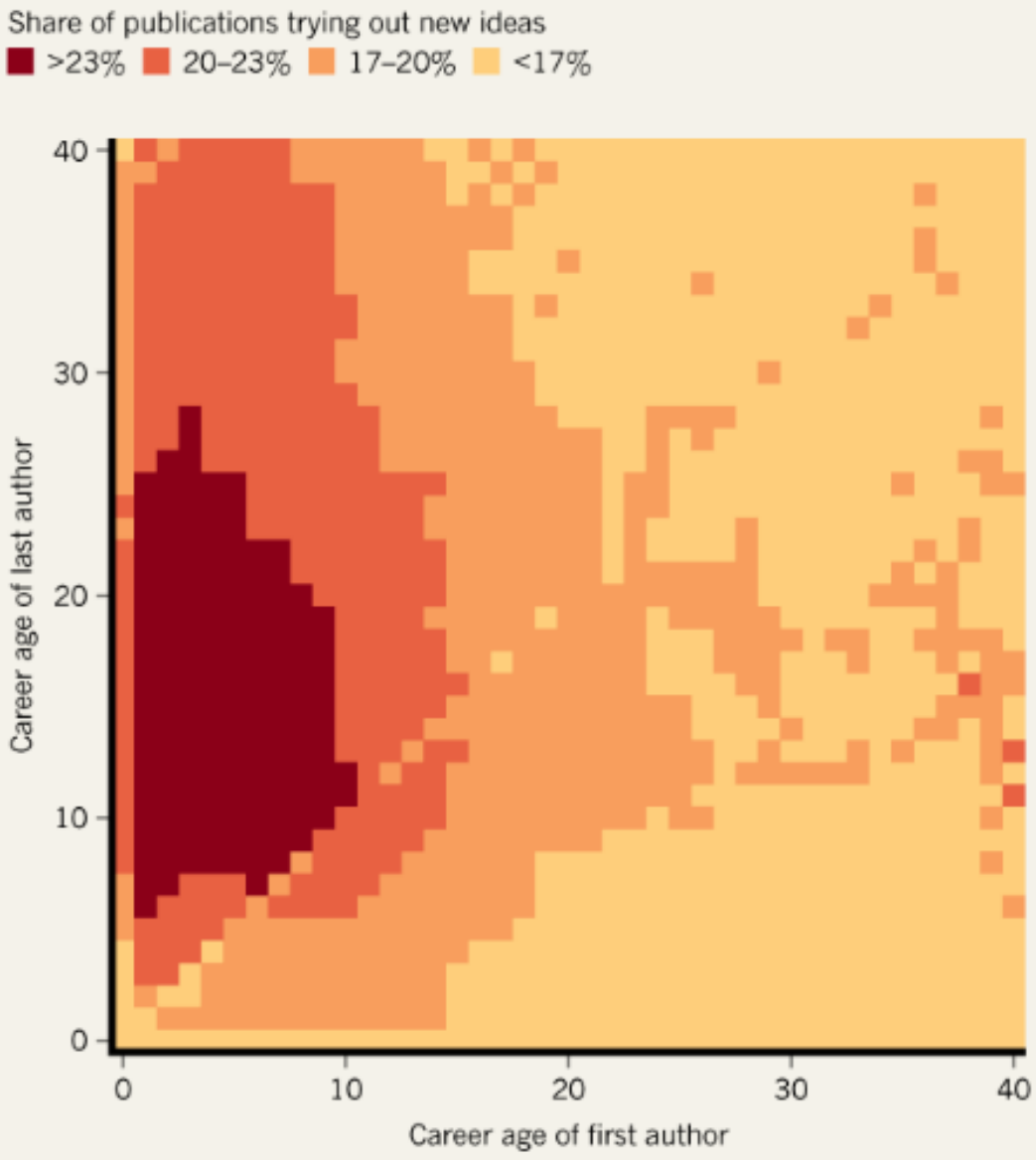
Mikko Packalen, Jay Bhattacharya

NBER Working Paper No. 20920

http://www.nature.com/news/young-scientists-lead-the-way-on-fresh-ideas-1.16934
http://www.nber.org/papers/w20920

HOT SPOT

Pairings of young first authors and mid-career last authors are the most likely to work on the hottest biomedical topics.



Source: M. Packalen & J. Bhattacharya Preprint at http://doi.org/z87 (2015)

Early Stage Investigator (ESI)

- Has not previously been awarded "significant NIH independent research award"
  - Includes R01's, projects on P01
  - Does not include: R03's, R21's, F's, K's, loan repayment
- Within 10 years of terminal research degree/ completion of medical residency
  - Extensions permitted (family care, additional clinical training)

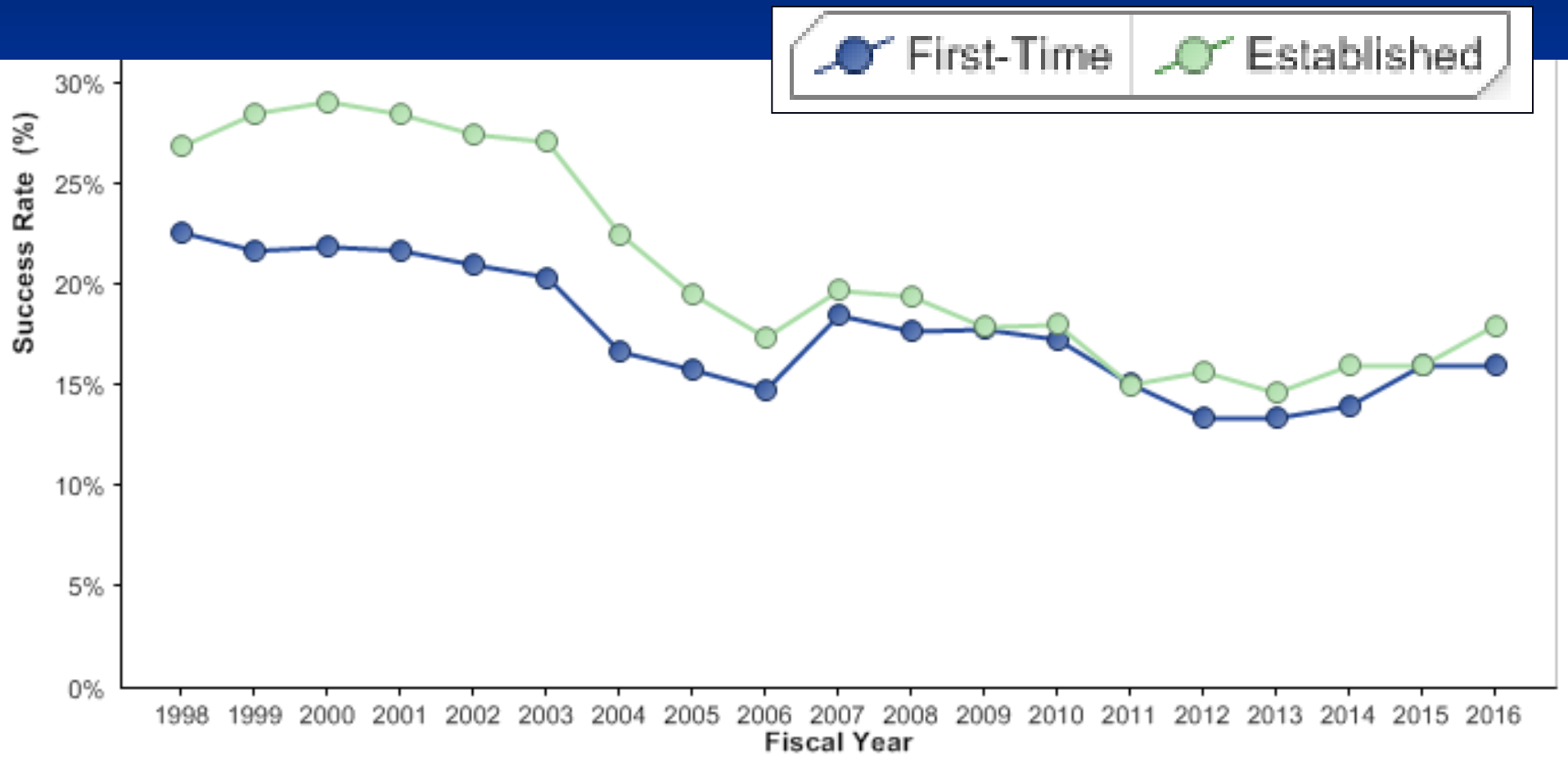
Early Stage Investigators: NHLBI

Payline		
Grant Program	**Grant Program Description**	**Percentile**
R01	Research Project Grant	15
R01 ESI	Early Stage Investigators	25

FY17

http://www.nhlbi.nih.gov/research/funding/general/current-operating-guidelines

R01-Equivalent grants, New (Type 1): Success rates, by career stage of investigator



Topics to be Discussed

- **Types of Awards**
  - Fellowships (F's), Training grants (T's), Career Development awards (K's), Research grants (R's), Loan Repayment Program
- **Funding Agencies**
  - Federal
    - National Institutes of Health
  - Voluntary Health Organizations, Professional Societies, Foundations
- **Approaches for Competitive Applications**
  - Career Development and Research Proposals

Approaches for Competitive Applications

- **Identify Funding**
- Prepare to Write the Grant Application
- Complete the Grant Application

How to Find Funding Opportunities

- Networking
- Speak to colleagues who are in a similar field
- Speak to colleagues who have been on governmental or private agency review panels
- Speak to colleagues who are on (advisory) boards of private agencies
- Acknowledgement section of publications, oral/poster presentations, press releases, etc.

General Resources

- Grants.gov
  - Database and application system for Federal grants
  - http://www.Grants.gov/
- FedBizOpps (Federal Business Opportunities)
  - Single point-of-entry for Federal contracts
  - http://www.FedBizOpps.gov/

General Resources

- Foundation Center
  - http://foundationcenter.org/
  - http://foundationcenter.org/newyork/
- SPIN funding database
  - https://www.infoed.columbia.edu/
  - e-mail alerts matching research area(s) of interest

- National Institutes of Health
  - http://grantscourse.columbia.edu/nih.htm
- Tips for Writing Grant Applications
  - http://grantscourse.columbia.edu/writing.htm

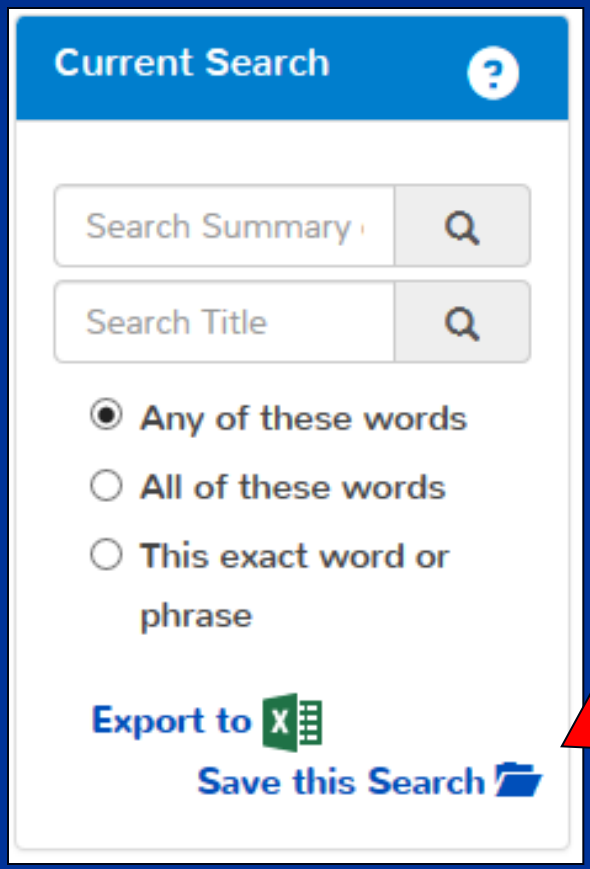
Other Sources of Information

- Sponsor publications/website/social media which describe research/programmatic interests (e.g. newsletters, strategic plans, annual reports)
- Sponsor e-mail alert modules
  - NIH
    - *NIH Guide*: http://grants.nih.gov/searchGuide/search_guide.cfm
      - Able to save queries and have "ongoing" results e-mailed as funding alerts
    - "NIAID-EMAIL ALERTS" Profile: http://www.niaid.nih.gov/researchfunding/newsletter/pages/subscribe.aspx

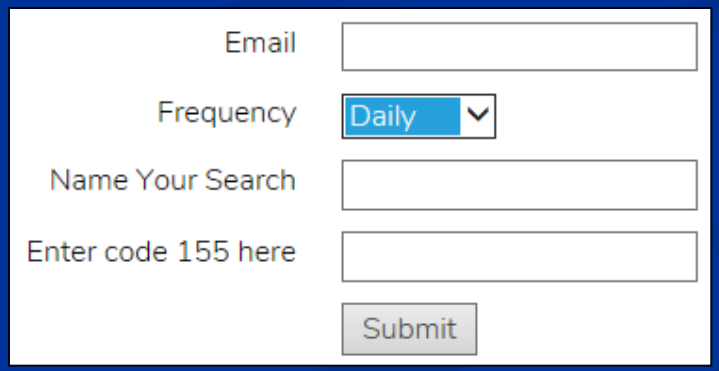
NIH Guide to Grants and Contracts

Current Weekly Table of Contents (TOC)

Weekly Update via E-mail LISTSERV - Subscribe or Unsubscribe.



Save Your Search



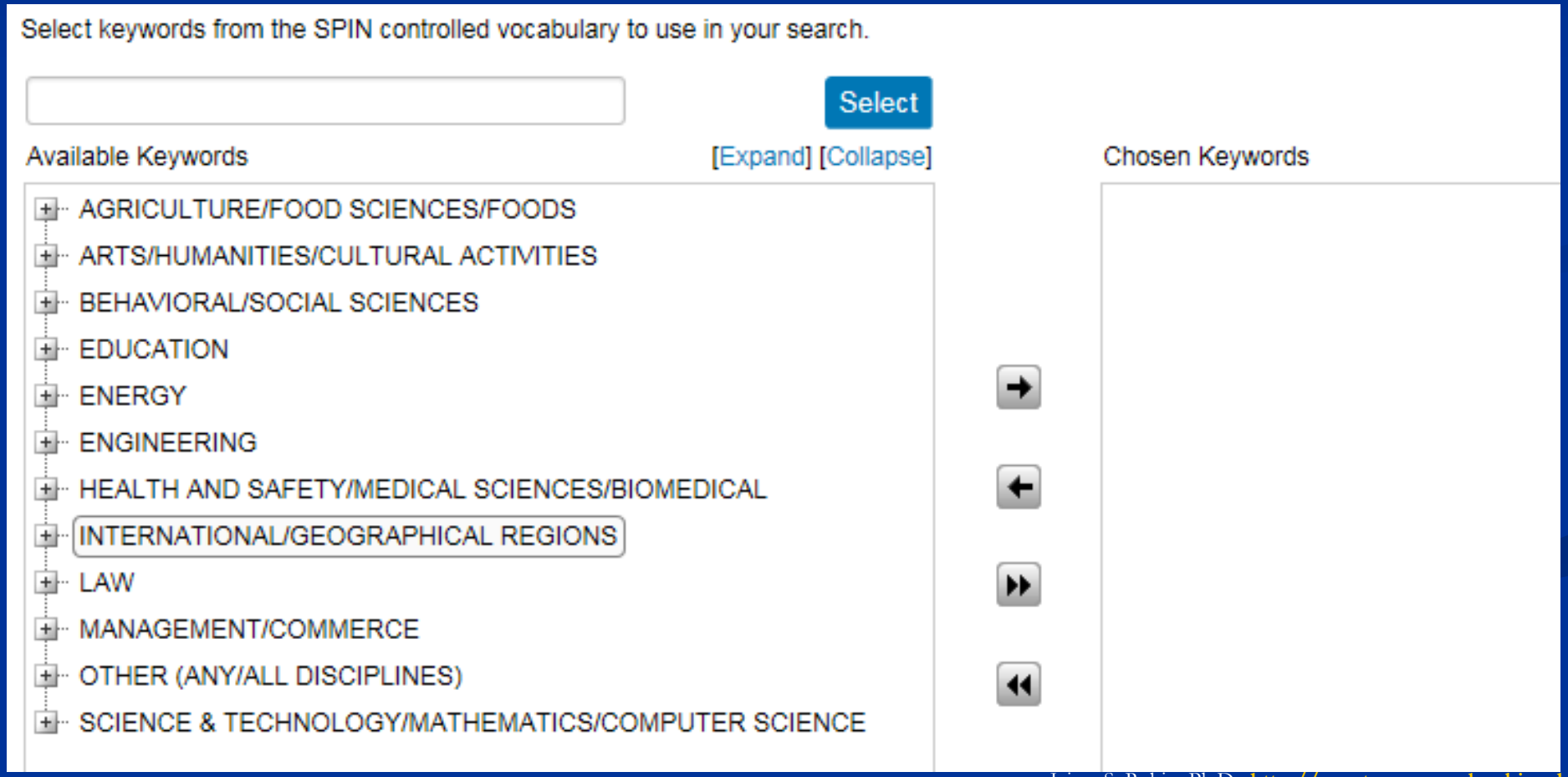
https://grants.nih.gov/funding/searchGuide/nih-guide-to-grants-and-contracts.cfm

SPIN Funding Database

COLUMBIA UNIVERSITY IN THE CITY OF NEW YORK

SPIN — World's Largest Database of Sponsored Funding Opportunities

https://www.infoed.columbia.edu/



SPIN Funding Database

COLUMBIA UNIVERSITY IN THE CITY OF NEW YORK

SPIN — World's Largest Database of Sponsored Funding Opportunities

Chosen Keywords

Pathology

Select Keywords

AND OR

Help

Pathology (337)

Clear | Locate Funding | Save

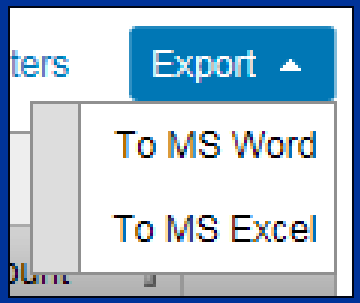
You have additional filters active. Click here to edit them.

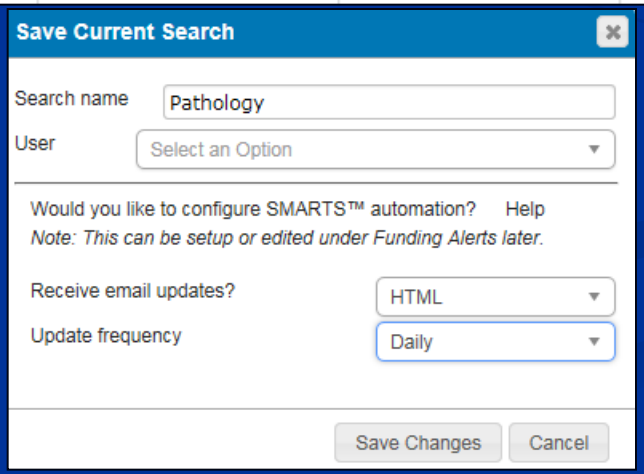
Results Found: 82

Reset Filters | Export

Drag a column header and drop it here to group by that column

SPIN ID	Opportunity Title	Sponsor Name	Sponsor Number	Deadline Date	Funding Amount *



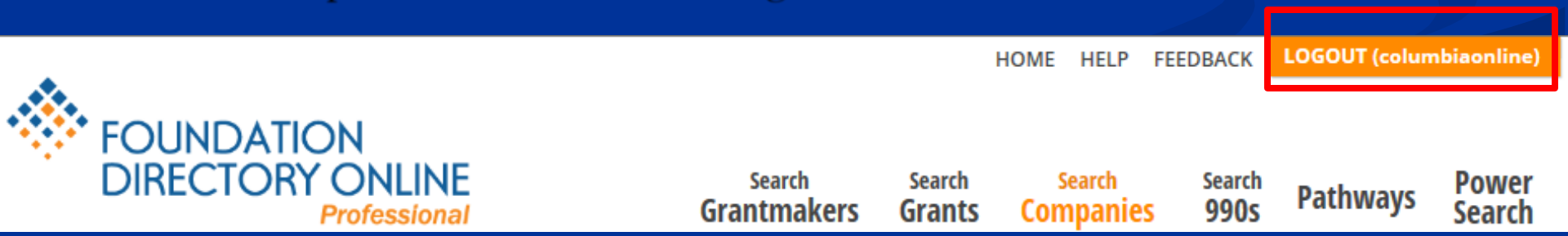


e-mail alerts matching research area(s) of interest

The Foundation Center

New York
32 Old Slip, 24th Floor
New York, NY 10005-3500
tel: 212-620-4230
http://foundationcenter.org/
http://foundationcenter.org/newyork/

- **Training**
  - **Courses:** Proposal Writing Workshop and Bootcamp
  - **Webinars**
  - **Self-Paced eLearning**
- **The Foundation Directory Online**
  - 100,000 Grantmakers
  - 3.4 million grants
  - Tax statements (990's) showing previous awards
  - Access via Columbia University
    - http://www.columbia.edu/cgi-bin/cul/resolve?clio3328966



FOUNDATION DIRECTORY ONLINE Professional

Fields of Interest

Type here to filter the list

A B C D E F G H I J K L M N O P Q R S T U V W Y Z

Pathology (10)

Results: 1-10 of 10

NEW SEARCH | MODIFY SEARCH

Print/Save | Email | Export List

	Grantmaker Name	City, State / Country	Total Assets	Total Giving
☐	Leukemia & Lymphoma Society, Inc., The	White Plains, NY	$242,581,527	$130,249,475
☐	New York Stem Cell Foundation, Inc.	New York City, NY	$40,418,661	$6,133,035

At A Glance

NEW YORK STEM CELL FOUN

1995 Bdwy., Ste. 600
New York City, NY United State
Telephone: (212) 787-4111
Contact: Susan L. Solomon, C.
E-mail: info@nyscf.org
URL: www.nyscf.org

TYPE OF GRANTMAKER
Public charity

ADDITIONAL DESCRIPTOR

FINANCIAL DATA
(yr. ended 2013-06-30)
Assets: $40,418,661
Total giving: $6,133,035

EIN
202905531

BRIDGE NUMBER
2509003516

990
2015 2014 2013 2012 2011 20

PROGRAM AREA(S)

The grantmaker has identified the following area(s)

GRANTS TO INDIVIDUALS PROGRAM

Fellowships and research grants for human embryo
transfer.

GRANTS TO SENIOR SCIENTISTS

The foundation occasionally supports senior scientis
encourages the use of its laboratory by all grantees.
embryonic stem cell work.

INNOVATOR AWARDS PROGRAM FOR EARLY CAR

This award provides $1.5 million over five years to r
institutions from throughout the world for the use o
potential of stem cells. The goal is to foster bold and
the field of stem cell research, and advance the und
of human disease. Applicant must have completed
DPhil, be within five years of starting a faculty (profe
award, demonstrated ability to independently super
containing articles that are innovative and high impa
innovation from translation of basic science to a clin

POSTDOCTORAL FELLOWSHIPS

This fellowship provides an annual stipend of $50,0
for postdoctoral fellows at institutions within New Y
research that will explore the basic biology and ther
and model organisms. The main goal is to foster res
eventual use of stem cells for the treatment of hum

TRAVEL FELLOWSHIPS

The foundation works with the International Society for Stem Cell Research to provide travel fellowships for junior investigators to attend the society's annual meeting, one of the most important annual gatherings of stem cell scientists.

FIELDS OF INTEREST

SUBJECTS

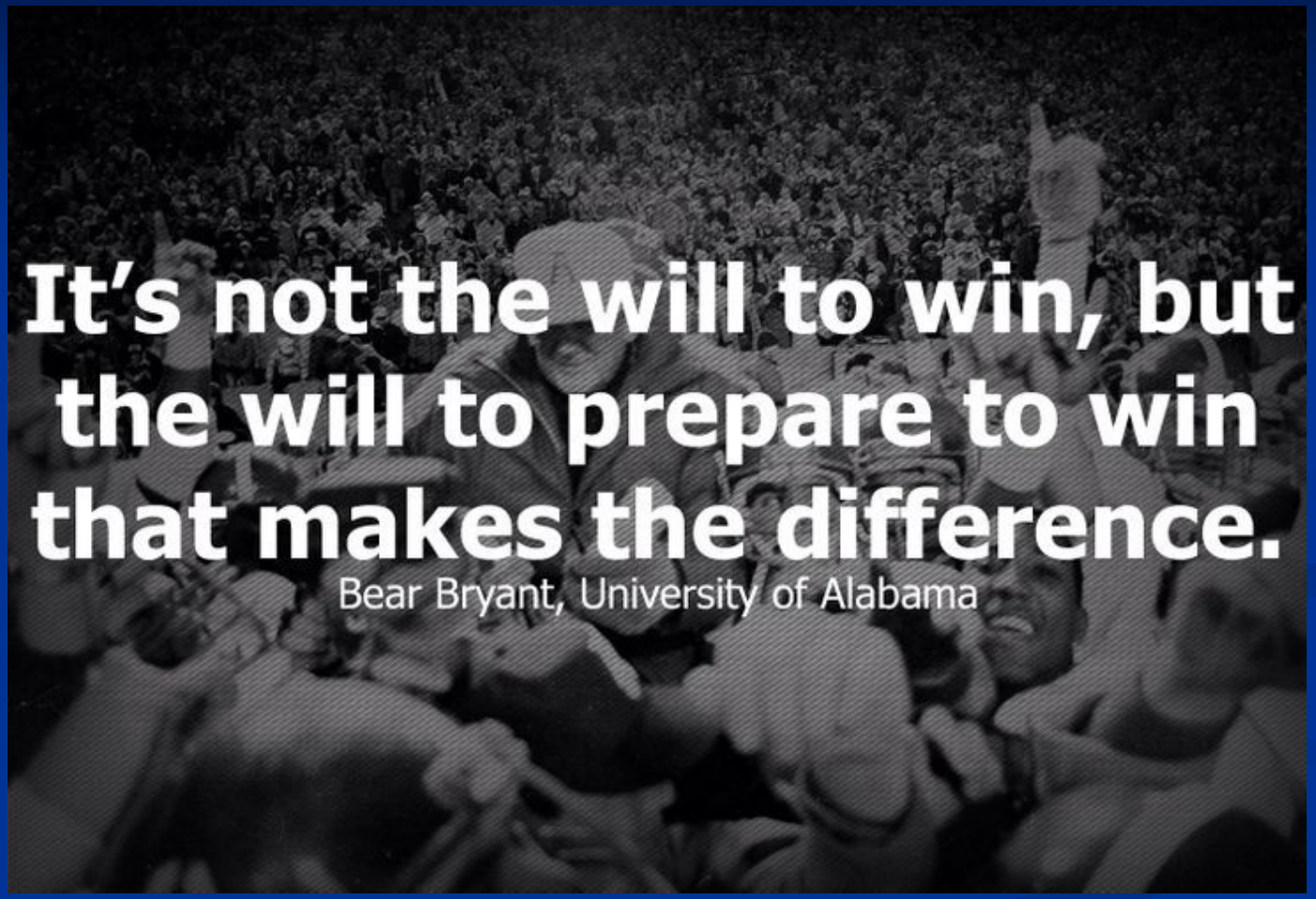
Alzheimer's disease
Autism
Brain and nervous system disorders
Diabetes
Diseases and conditions
Genetic conditions and birth defects
Hematology
Kidney diseases
Leukemia
Liver diseases
Multiple sclerosis
Musculoskeletal diseases
Neurology
Pathology
Philanthropy
Respiratory system diseases
Stem cell therapy

Identify Funding

- Identify appropriate funding agencies
  - Government
  - Non-government
- Identify appropriate funding mechanisms
  - Research
  - Training
- Create a calendar of application deadlines for identified funding programs

Approaches for Competitive Applications

- Identify Funding
- **Prepare to Complete the Grant Application**
- Complete the Grant Application



https://s-media-cache-ak0.pinimg.com/736x/62/93/92/629392429de6a72b8da10f410b569869.jpg

Prepare to Complete the Grant Application

- Speak with Agency Program Officer
- Speak with colleagues who are/were awardees
- Review funded applications if possible
- Review agency's review criteria
- Identify what will make the application more competitive
  - Research and/or career development arrangements
  - Access to core facilities/research resources
- Strengthen "Preliminary Work/ Pilot Data"
- Who will write confidential letters of reference?

Research and Career Development Arrangements

- Multiple Principle Investigators (research awards)
- Multiple Mentors (mentored awards)
- Advisors (mentored awards)
- Co-investigators/Collaborations
- Subcontracts to other institutions
- Multidisciplinary/Interdisciplinary

Prepare to Complete the Grant Application

- Identify and meet with Co-investigators, Collaborators, Consultants, Advisors
  - Identify roles and responsibilities
  - Administrative requirements (e.g. if other countries/institutions are involved)
- Identify necessary core facilities and other research resources
- Meet with research administrators
- Human subjects, lab animals, and any other regulatory issues?

Approaches for Competitive Applications

- Identify Funding
- Prepare to Complete the Grant Application
- **Complete the Grant Application**

Complete the Grant Application

- Review the application instructions
- Identify the different components
- Create a checklist
- Create an outline
  - Content, Length of section (*vis a vis* page limits)
- Identify and delegate responsibilities for the different components
  - Technical/Scientific
  - Administrative – e.g. budget
  - Regulatory
  - Draft letters of collaboration/support

Complete the Grant Application

- Confirm page limits for each component
- Create a schedule for any required meetings
- Determine:
  - Shared computer drive/folders
  - Naming of files (dates?)
  - Track changes?
  - Font, margin, format of literature citation
- Set a firm time-line for each responsibility
  - Writing milestones
  - Absolute deadline date for final compilation

Complete the Grant Application

- Read instructions
- Never assume that reviewers "will know what you mean"
- Refer to literature thoroughly and thoughtfully
- Explicitly state the rationale of the proposed investigation ("the hypothesis of my study is…")
- Discuss limitations and potential "challenges" and how these will be addressed (e.g., "alternate approaches")
- Include well-designed tables and figures
- Present an organized, lucid write-up (use an outline)
- Ask colleagues to review and comment

Complete the Grant Application

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- Ask colleagues to review and comment

Include Well-Designed Tables and Figures

- Include explanatory caption with the figure (not buried in text)
- Not overly complicated
- Informative, even if printed in black and white
- Easy for the reviewers to read
- Tips:
  - Bold label in text (e.g., **Fig. 4**) so it's easier for reviewers to locate relevant text for individual Figure
  - Try to have Figure and relevant text on the same page

Timeline for Specific Aims and Benchmarks/Milestones of Research Progress

Benchmarks/ Milestones	Year 1	Year 2	Year 3
Summary of Specific Aim 1a	→		
Summary of Specific Aim 1b	→	→	
Summary of Specific Aim 2a	→	→	→
Summary of Specific Aim 2b		→	→
Summary of Specific Aim 3			→

Anticipate Questions
and
Answer them before
they are asked

Not everything that can be counted counts.

Not everything that counts can be counted.

Research Plan Section

3. Specific Aims

4. * Research Strategy

Candidate Section

2. Candidate Information and Goals for Career Development

Quote Investigator suggests crediting sociologist William Bruce Cameron
http://quoteinvestigator.com/2010/05/26/everything-counts-einstein/

Investigator

- Competent
- Enthusiastic
- Thorough
- Professional

Personal Statement/ Candidate's Background

When describing a previous research experience:

- What was the hypothesis/scientific question?
- Why was the study important?
- What were the findings and conclusions?
- What were your role and responsibilities?
- What did you learn and accomplish?
  - "Intellectual aspects"
  - Do not focus on technical aspects
- Cite any resulting publications
- Describe any honors/awards and conference/workshop presentations

Possible Problems Specific for Mentored Career Development Awards

Mentor

- Too many other responsibilities (e.g. administrative, clinical)
- Too many other mentees (e.g. students, post-docs)
- Not appropriate scientifically
- Too junior
- Limited experience as a mentor
- Limited funds to support proposed research

Possible Problems Specific for Mentored Career Development Awards

Institution

- Limited scientific/technical resources
- Limited career development opportunities
- Limited opportunities for career advancement

Elements of a Good Proposal

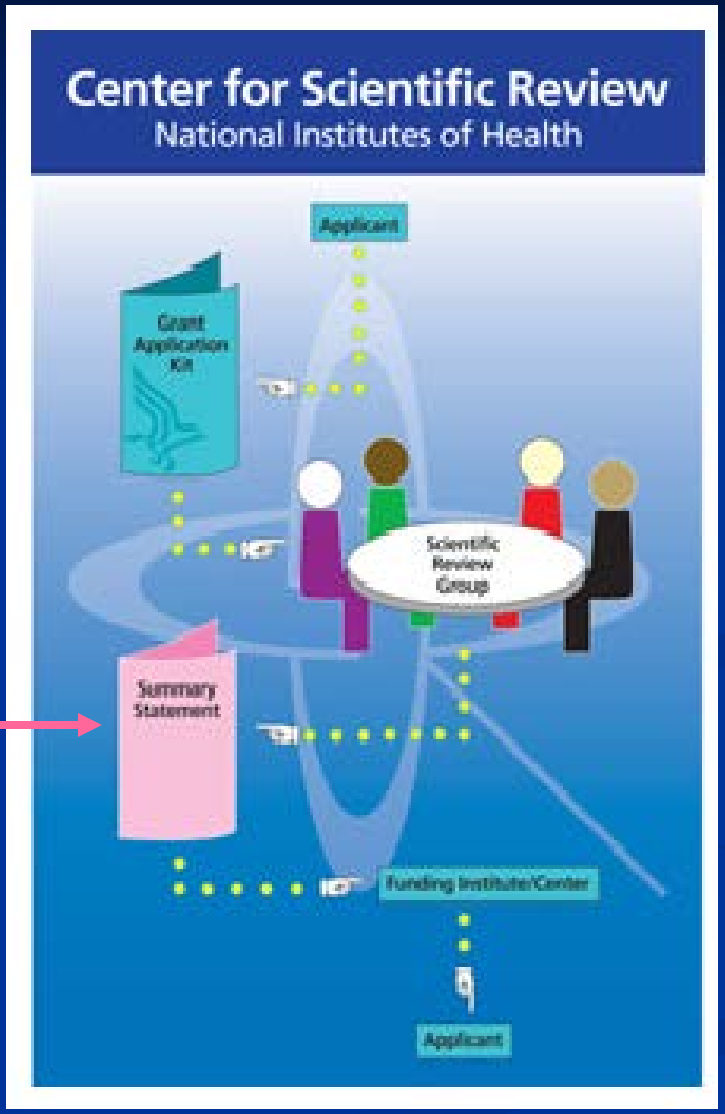
- Feasible
- Relevant
- Unique
- Innovative
- Clear
- Brief
- Consistent

Common Problems with Grant Applications from New Investigators

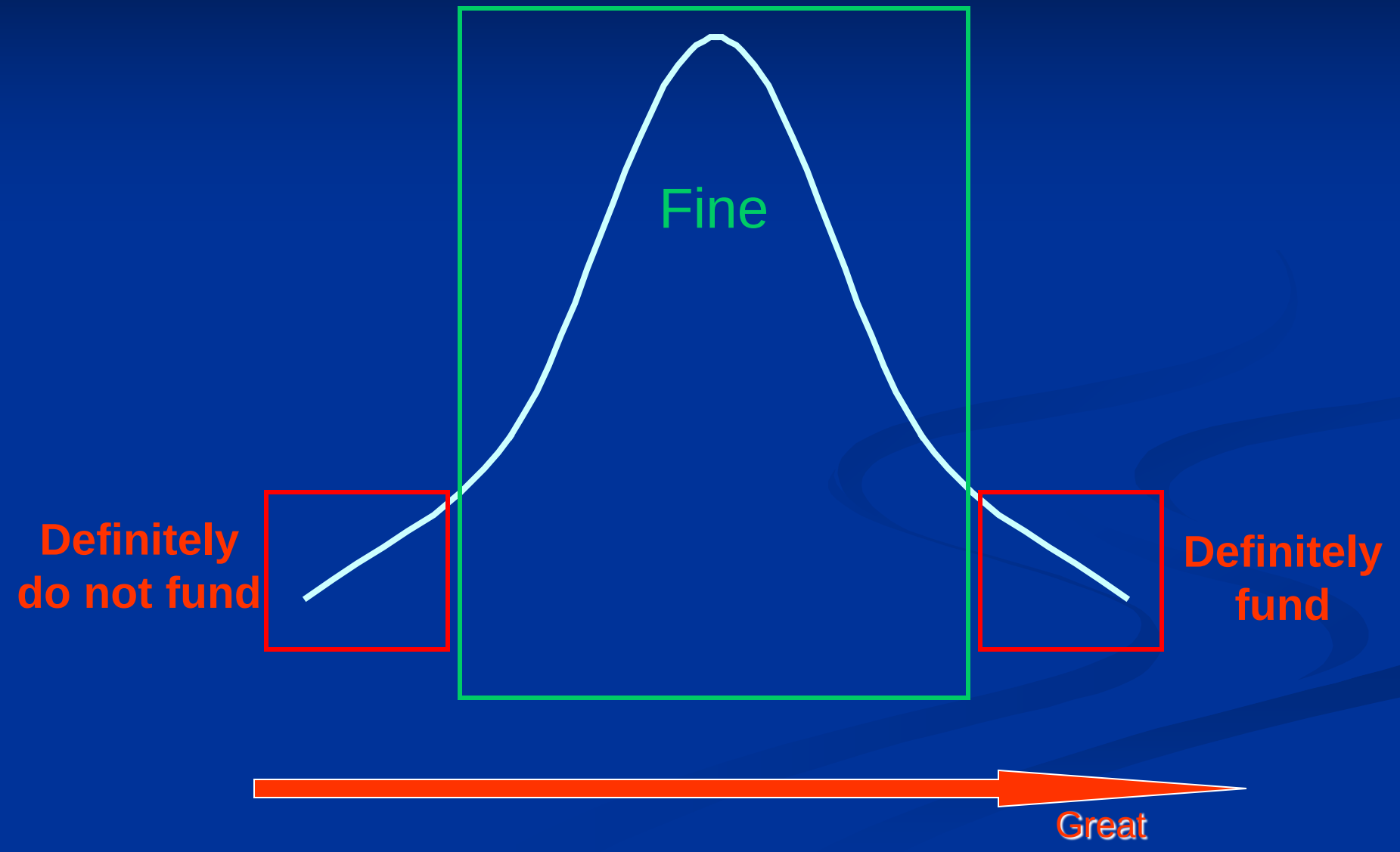
- Does not address/follow funding agency's mission, specific instructions, budget limits, etc.
- Overly ambitious
- Not independent of previous mentor's research
- Fishing expedition
- Not hypothesis driven
- Descriptive, not mechanistic project
- Unfocussed
- No or insufficient preliminary data
- Unrealistic budget
- Methodologies beyond the expertise of investigator or research team

NIH: one round of applications

Pink Sheet: Reviewers' Comments



Bell Curve of Reviewer's Grant Applications

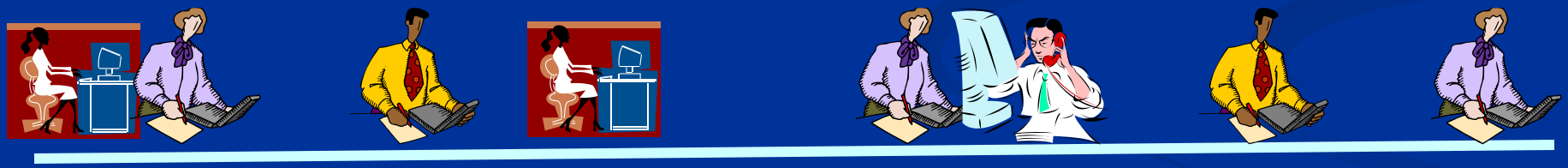


Poor Statistics

Research Resources not Adequately Described

Career Development/ Research Training Plan not Comprehensive

Figure Caption Font too Small



All Components of the Application are as Strong as Possible

Good Luck!