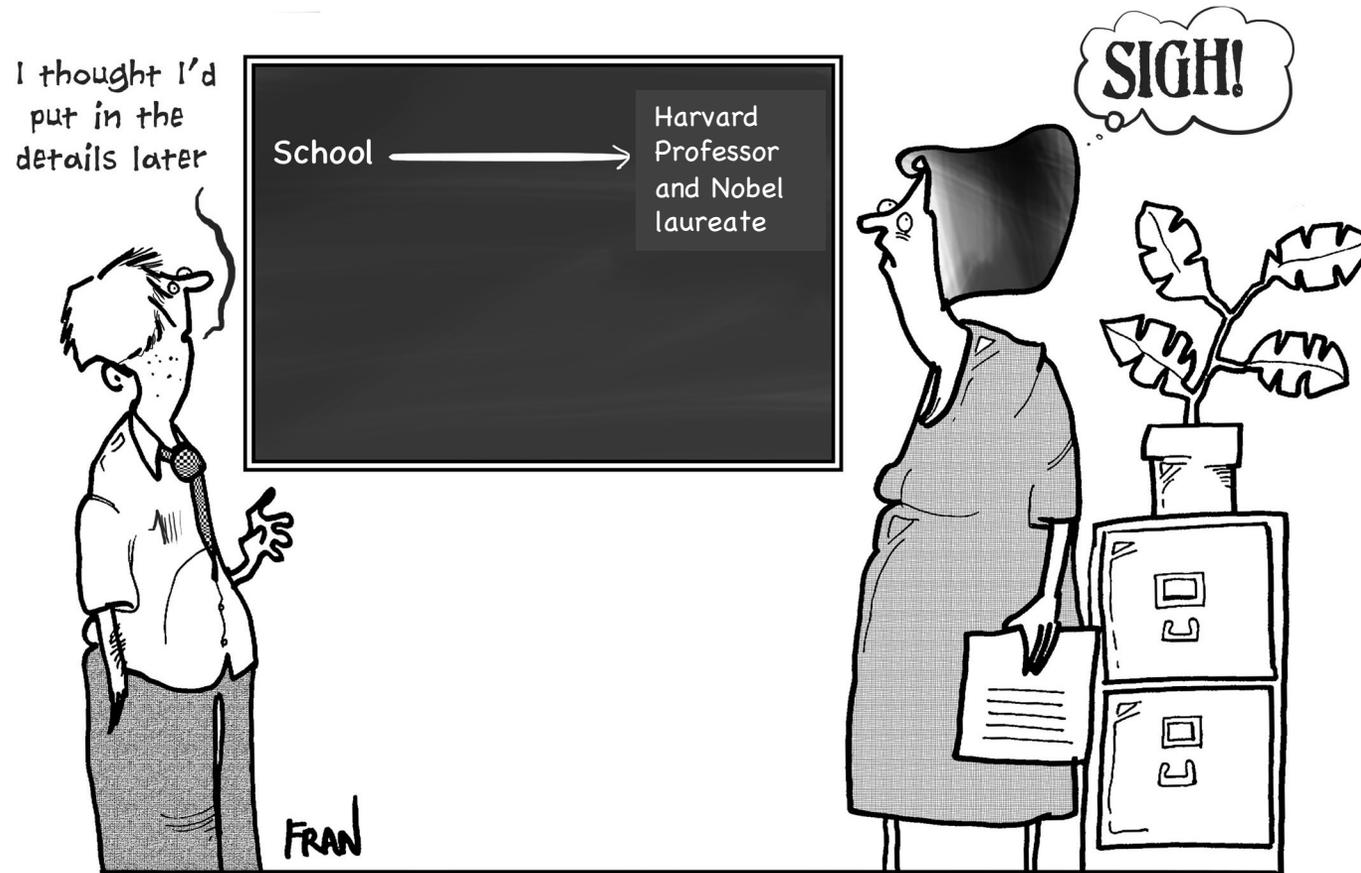


Pathfinding, careers, and lessons learned

Karen Lyons, Dept of Orthopaedic Surgery, Dept of Molec.,
Cell, and Devel. Biol. , UCLA



My path to Professorship

1976– Matriculate at UC Berkeley as a pre-med student. Get scared.

1980—Graduate. Delay applications to anywhere due to uncertainty about qualifications.

1980-82-Work at a chemical manufacturing company and get bored. Apply to graduate programs.

1982-88—Graduate school at U Wisconsin Madison –(Oliver Smithies).

1988—Follow former boyfriend to Vanderbilt and begin postdoctoral studies in lab of Brigid Hogan (a lucky find)

1988-1992—Spend next four years working around the clock on exciting but exhausting projects related to functions of BMPs in various aspects of development

My winding path to Professorship (cont.)

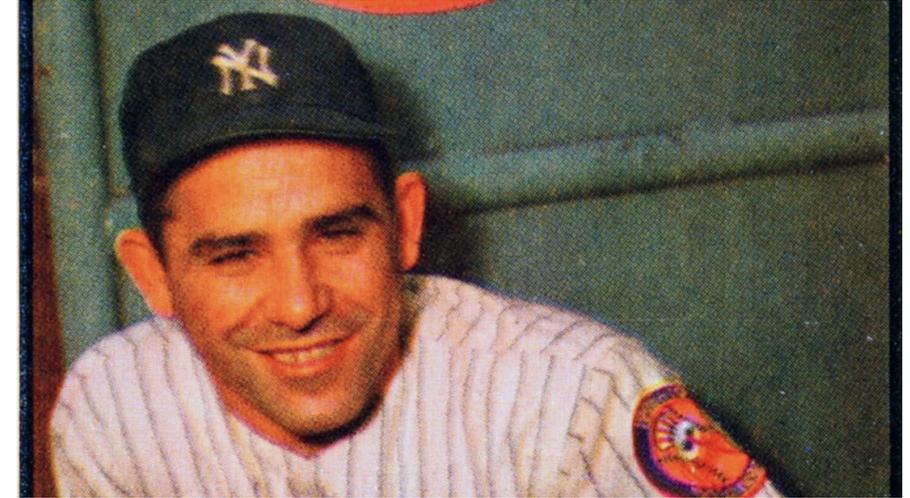
1992--Apply for several academic positions and get some interviews (but no offers). **Realized** I needed a clearer vision of my personal long-term and short-term goals

1993-1994—Brief 2nd postdoc. Realized I wasn't benefitting from additional training.

1994-1995—Work with Vicki Rosen at Genetics Institute.

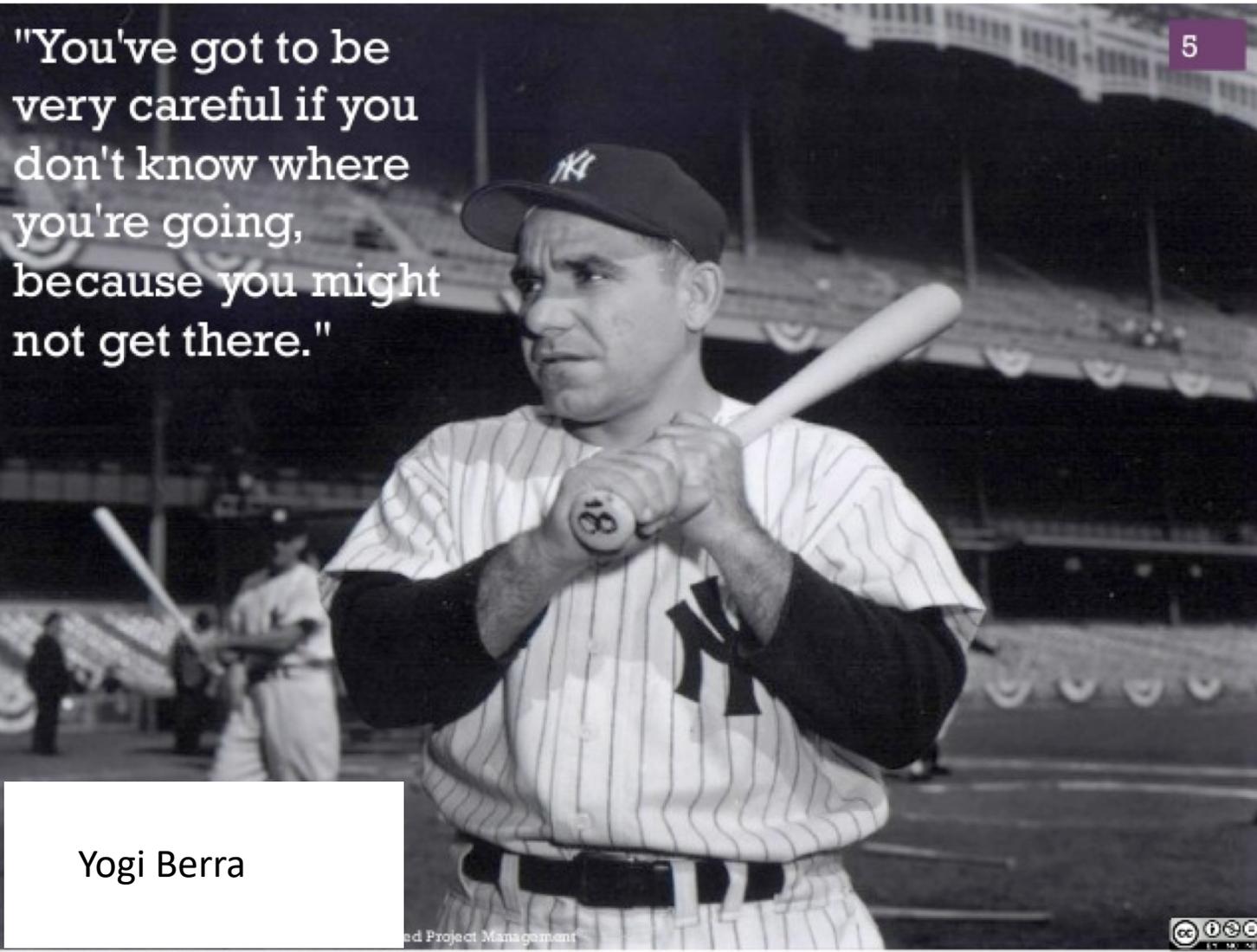
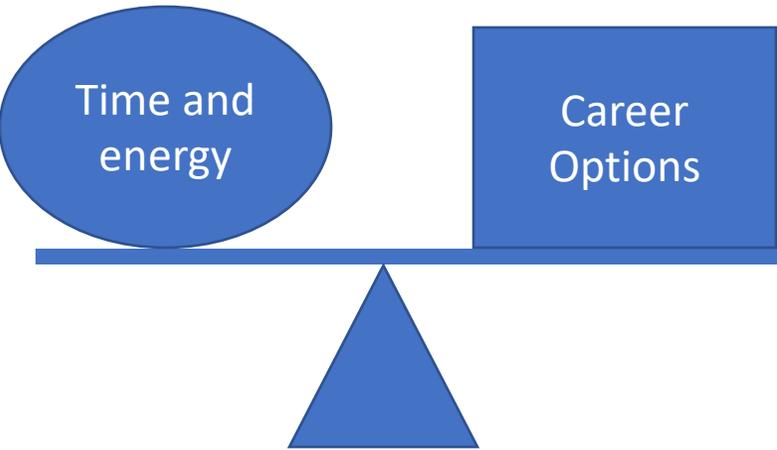
1. Invaluable experience working in biotech
2. Finally understood that I wanted to at least try for an academic position

1995--**connection** with Vicki led to a faculty position in Dept of Orthopaedic Surgery at UCLA

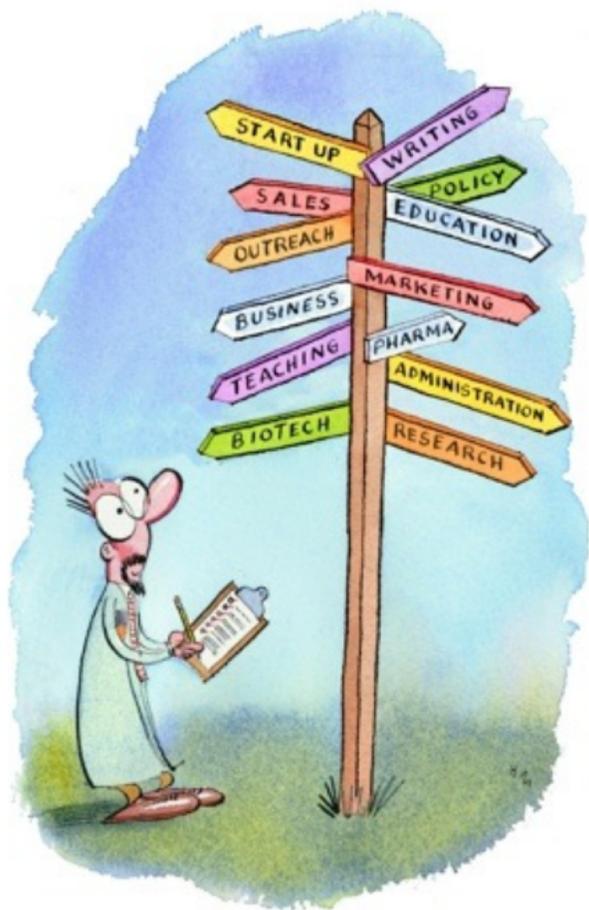


If the world was perfect, it wouldn't be."
Yogi Berra

We can't always predict the path our experiments or our careers will take



Find your path



<https://myidp.sciencecareers.org/>

Career coaching for scientists:

<https://www.nature.com/articles/nbt.3259>

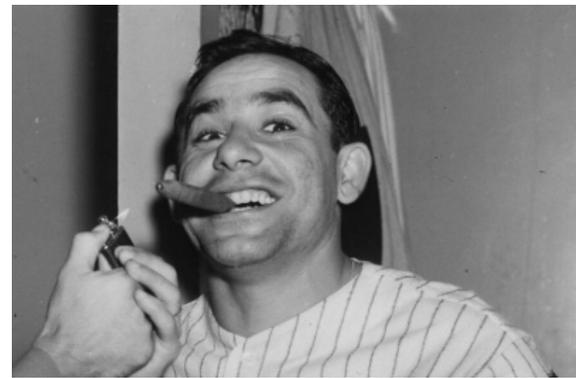
myIDP provides:

- Exercises to help you examine your skills, interests, and values

- A list of 20 scientific career paths with a prediction of which ones best fit your skills and interests

- A tool for setting strategic goals for the coming year, with optional reminders to keep you on track

- Articles and resources to guide you through the process



“Make a game plan and stick to it. Unless its not working.”
Yogi Berra

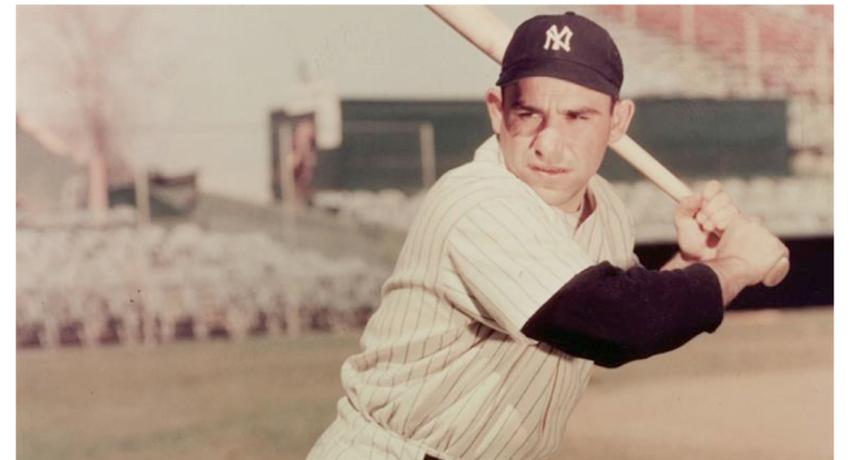
A screenshot of the myIDP Science Careers website. The page is titled "Individual Development Plan Overview". On the left is a navigation menu with sections: Overview (Overview Summary, Personal Information), Assessment (Skills Assessment, Interests Assessment, Values Assessment), Career Exploration (Consider Career Fit, Read About Careers, Attend Events, Talk to People, Choose a Career Path), Set Goals (Career Advancement Goals, Skill Goals, Project Goals), and Implement Plan (Mentoring Team, myIDP Summary, Completion Certificate). The main content area includes a definition of an IDP, a list of three bullet points, and a four-step process diagram. The diagram shows a cycle: 1. Self-assessment (Consider your skills, values, and interests.) -> Submit -> 2. Career exploration (Learn about career options for PhD-level scientists, and compare your skills, interests, and values to each option.) -> Submit -> 3. Set goals (Make a concrete plan for how you will improve your skills, build your network, and get the experience you need to prepare for your future career.) -> Submit -> 4. Implement plan (Recruit mentors to help with various parts of your plan.) -> Submit -> back to 1. In the center of the cycle is a stack of papers labeled "Your own IDP". The top of the page has navigation links: LOG OFF | CONTACT US | MY ACCOUNT | ABOUT myIDP | SCIENCE CAREERS and the AAAS logo. A "Next Step" button is in the top right corner.

It's not always about bench science

“When you come to a fork in the road, take it”

Yogi Berra

- Science Policy
- Science Teaching
- Regulatory Affairs (NIH, CDC, FDA, private sector)
- Science Editing
- Field Application Scientists for Biotech, Imaging, etc
- (Core Facilities)
- Life Science Consulting (management or finance)
- Patent Law
- Medical Writing



BONE BIOLOGY-SPECIFIC CAREER WEBSITES (Jobs, Early Investigator Grants, Mentors, Workshops, etc)

- AAOS (American Academy of Orthopaedic Surgeons)
- ASBMR (American Society for Bone and Mineral Research)
- ASMB (American Society for Matrix Biology)
- Bone Research Society
- OARSI (Osteoarthritis Society International)
- ORS (Orthopaedic Research Society)
- OREF (Orthopaedic Research and Education Foundation)
- MTF (Musculoskeletal Transplant Foundation)
- Disease Foundations (e.g., OIF, IFOPA)



FINDING YOUR BEST MENTORS

“A mentor is someone who allows you to see the hope inside yourself.” Oprah Winfrey.

- Frequent and early communication with your research mentor as you develop your independent research plan
- Go to seminars, journal clubs at your institution and establish relationships with faculty you admire/relate to.
 - consider successful grant writers
 - people who run efficient labs (get a lot done with the resources they have)
 - people who manage to successful careers with young families
 - great speakers
 - great teachers
 - people who manage to balance clinical duties with protected research time
- Mentoring programs through cartilage and bone societies
- Yourself!! Perform an honest and critical self-assessment of your interests, priorities, accomplishments (myIDP can help with this)

NETWORKING TIPS

- INITIATE CONVERSATIONS WITH YOUR MENTORS
- Talk to other scientists with whom your group is collaborating.
- If applying for a position involving teaching, sit in on a class and talk to the instructors about designing courses. Consider offering to deliver a lecture.
- GO TO MEETINGS (Regional, national, international), PRESENT and HAVE CONVERSATIONS with faculty.

“You should always go to other people’s funerals, otherwise, they won’t come to yours.” Yogi Berra



Rudy Giuliani, Henry Kissinger, Carmen Berra, Yogi Berra at Joe DiMaggio’s funeral

Mentoring your mentors, chairs, directors, etc.

- If you find solutions that solve problems for others (help with grant writing, protected research time, access to technical support, etc), suggest them.
- Make it a win-win situation
- It is YOUR responsibility to communicate challenges with your chair/director. (S)he may not know a problem exists.
- If your relationship with your mentor isn't working for you, it is YOUR responsibility to communicate that in a respectful way and to SUGGEST A CHANGE or GET A NEW MENTOR.
- **Institutions want you to succeed.**



"I never said most of the things I said"

Yogi Berra

Take control of your future

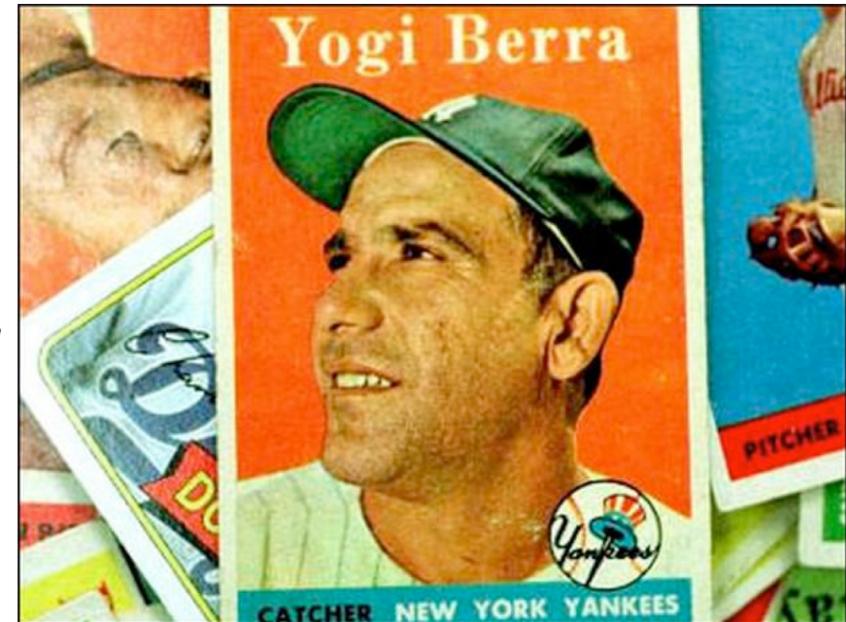
- **Identify your intrinsic values** (things that motivate you and make you feel fulfilled), extrinsic values (salary, power), and lifestyle values (myIDP and other self-assessment tools)
- **Identify your core strengths and interests** (seminars, career coaching, myIDP, etc)
- **Develop your 10-minute TED talk about why you are passionate about science and the specific research you are doing**



Bolster your productivity and your skills

- Grant writing programs and **practice**
- Courses in statistics, computational approaches
- Give seminars and participate actively in seminars
- Seek opportunities to interact with senior faculty

“Little things are big”



Apply early and apply often

research

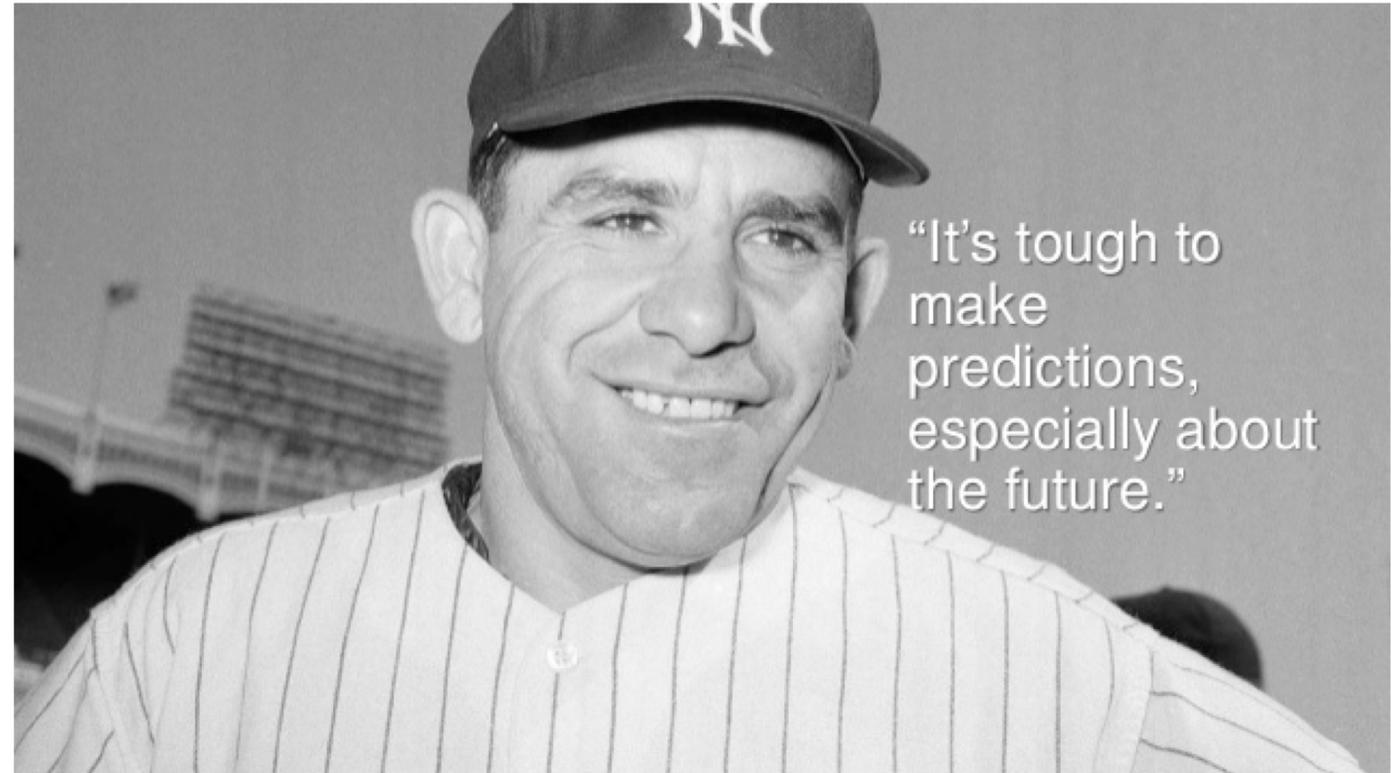
teaching

clinical departments (Dentistry,

Medicine, Endocrinology,

basic science departments

112 applications---17 interviews—11 campus visits---2 offers



“No one goes there nowadays, it’s too crowded.”

MAKE YOUR JOB APPLICATION STAND OUT

Prioritize Publications-

solid, strong productivity can trump one paper in Cell

Letters—these are crucial and are usually as influential as the publication record (occasionally more so)

Research Statements—You should **ALWAYS** have one of these and update it frequently

Diversity and teaching statements—these are very important for positions in basic science departments involving teaching

Effective Research Statements

Read this: “Writing a Research Plan by Jim Austin (2002) Editor, Science Careers, Science Magazine

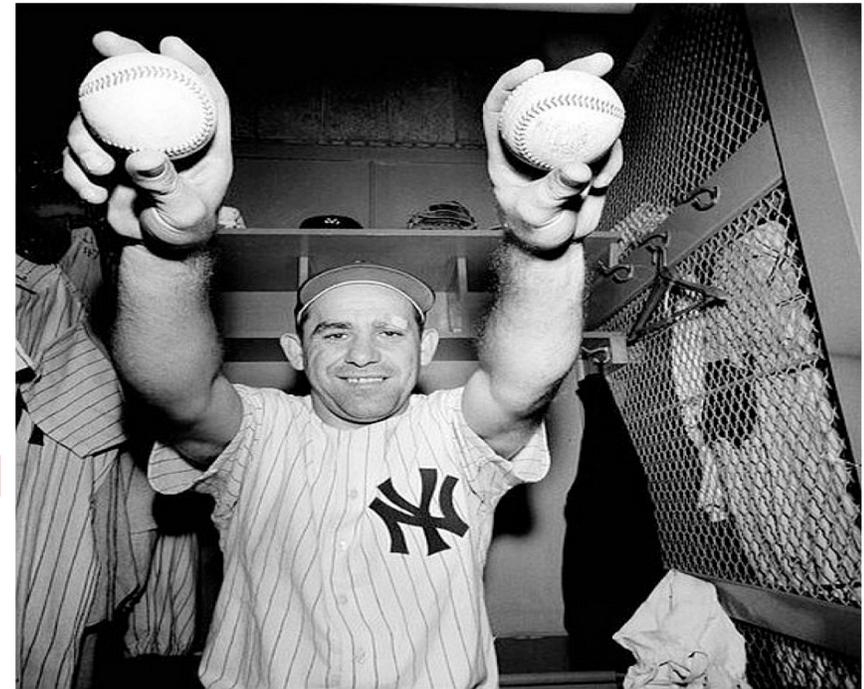
<https://www.sciencemag.org/careers/2002/07/writing-research-plan>

- Benefits

- clarifies your future aspirations so you can most effectively plan your present operations
- demonstrate your intellectual vision and aspirations
- demonstrate the creative and independent thinking required of a successful scientist
- prompts you to begin planning for when you have your own laboratory

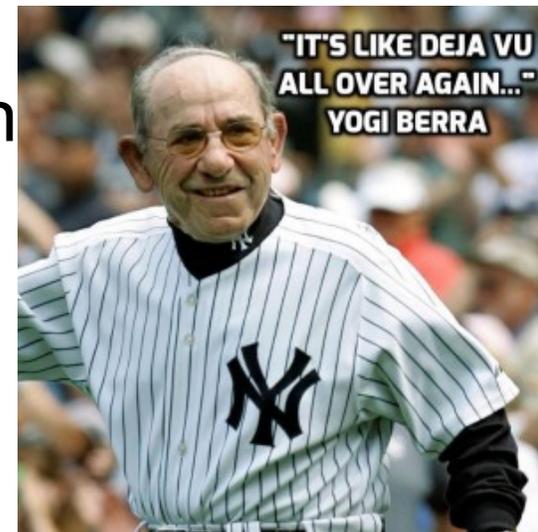
“Baseball is ninety percent mental and the other half is physical”

Yogi Berra



Some essential attributes of an effective Research Statement

- **Choose an important subject.** Make sure you can convince your readers that it is important. Faculty in basic science departments often know very little about skeletal biology.
- **Be specific:** Eliminating osteoarthritis or curing cancer are not suitable goals for a new investigator. New approaches to treatments or insights into disease processes are.
- **Keep it concise** so you don't lose your reader's attention
- **Get feedback from your mentors**

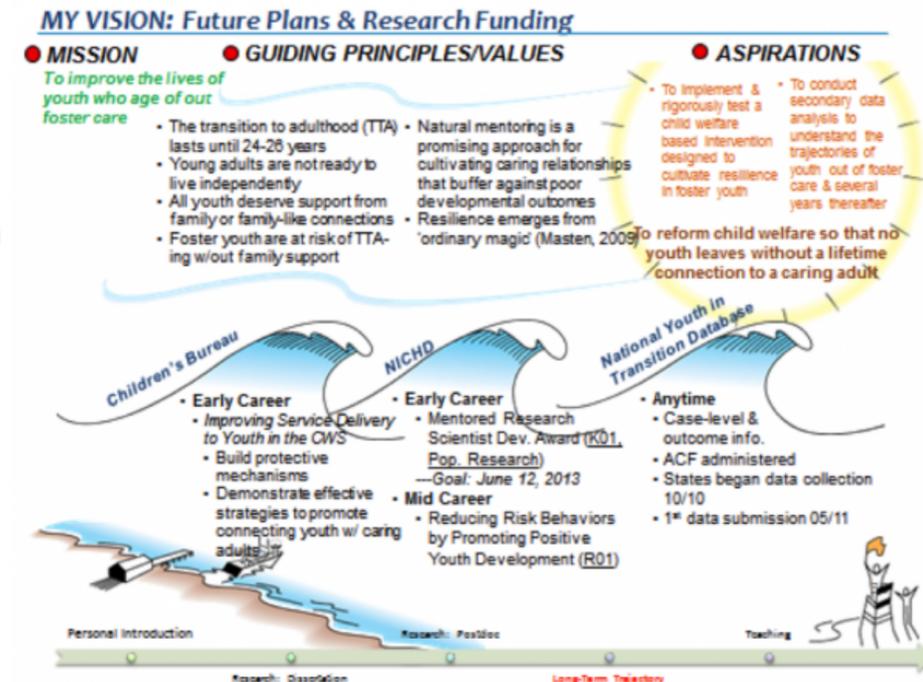


Essential Components of an effective Research Statement

- **An ambitious but attainable plan**
- **Include preliminary data**—demonstrates feasibility, productivity, vision, and commitment.
- **Include multiple approaches**—demonstrates rigor, resourcefulness, adaptability, and maximizes potential collaborations at hiring institution.
- **Demonstrate independence**—build on your postdoctoral work, but don't propose experiments that appear to be a direct extension of your mentor's life work.
- **Coordinate with your mentor** to ensure intellectual independence

Be the right “FIT” for the position

- TAILOR YOUR STATEMENT TO THE DEPARTMENT/INSTITUTION
 - DON'T CHANGE YOUR OVERALL GOALS, BUT STRIVE TO MAKE THEM ALIGN WITH THE DEPARTMENT
- TRY TO CONSTRUCT A ONE SLIDE/ONE FIGURE VISION PLAN:
 - FUTURE PLANS AND RESEARCH FUNDING—try to tailor this as much as possible to the institution/department.
 - Is it a clinical department? If so,
 - Address the clinical relevance of your basic research
 - Address how you can incorporate residents into your research
 - How can you collaborate with your clinical colleagues?



You have your position...now all you need is your first (NIH/NSF) grant

Apply for grants from foundations and societies. (AF, OREF, MTF, OARSI, ASBMR, MTF, AAOS)—Study Section members like to see this kind of initiative from new investigators

Resources

- NIH Center for Scientific Review Video: “Inside the NIH Grant Review Process”

(<https://public.csr.nih.gov/NewsAndPolicy/PeerReviewVideos>)

- NSF web sites
- Science Careers web page: www.sciencemag.org/careers

The screenshot shows the NIH Center for Scientific Review website. At the top, there is a navigation bar with links for "U.S. Department of Health & Human Services", "NIH Staff", "Staff Directory", and "Contact CSR". Below this is a search bar with the text "What are you searching for?". A secondary navigation bar includes links for "For Applicants", "For Reviewers", "News & Policy", "Study Sections", "Review Panels & Dates", and "About CSR". The main content area is titled "CSR Peer Review Videos" and contains a paragraph: "CSR has produced a series of videos to give you an inside look at how scientists from across the country review NIH grant applications for scientific and technical merit. New and established applicants will find insights and understanding that can empower them to improve the applications and increase their chances for receiving a more positive review." Below the text is a grid of video thumbnails with the following titles and descriptions:

- What Happens to Your NIH Grant Application is one of our most popular outreach presentations**
- Top 10 NIH Peer Review Q&As for Applicants give you the answers you need**
- NIH Peer Review Revealed provides a front-row seat to a review peer review meeting**
- Jumpstart Your Research Career with CSR's Early Career Reviewer Program tells how it works**
- Webinars provide helpful guidance to R01, R15, Fellowship and SBIR/STTR Applicants**
- NIH Tips for Applicants gives applicants practical advice and insights**
- NAVIGATING NIH PEER REVIEW**
- NIH TIPS FOR APPLICANTS**

NIH Program Official

- ✓ *An Important Resource for Applicants & Investigators*
- ✓ *Principal liaison between Investigators and the NIH*
- ✓ The most important contact for Scientists

***Call us early ...
Contact us often!***

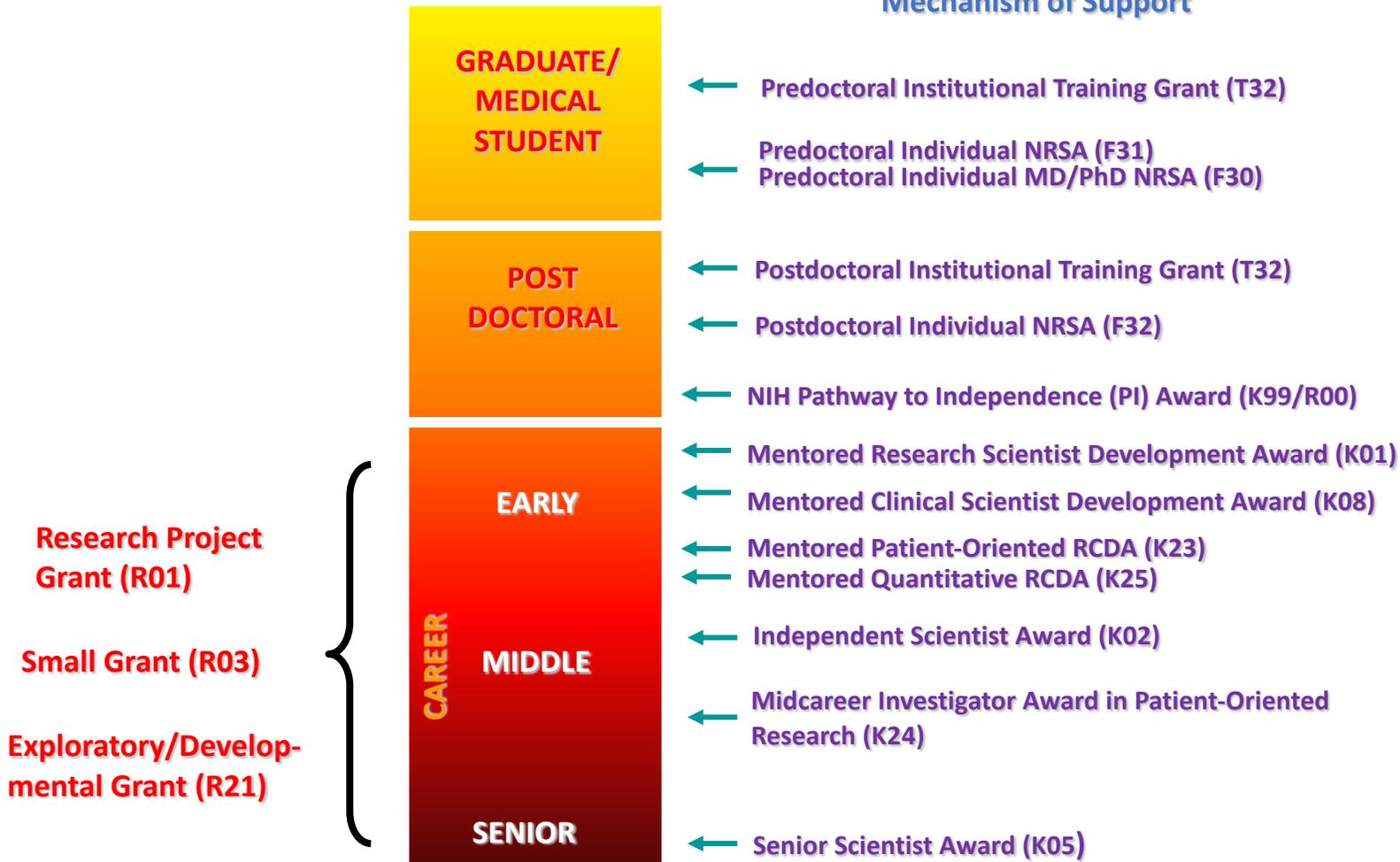


https://grants.nih.gov/.../Primetime_with_Program_Officials-Understanding_RPGs.ppt...

NIH Offers Funding Programs to Support Scientists at Every Stage of Their Careers

Approx. Stage of Research
Training and Development

Mechanism of Support



*Graph represents a small sample of NIH funding mechanisms available.

https://grants.nih.gov/.../Primetime_with_Program_Officials-Understanding_RPGs.ppt...

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About Grants

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- [Get Started](#) +
- [How to Apply](#) +
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- [Media and the Public](#)
- [NIH Staff](#)

Guidelines & Review Criteria

Important note: Critique templates are no longer located on this website. The templates have been moved to the [Critique Templates for Review](#) page on the [NIH Extramural Intranet](#), where they are accessible only by NIH staff.

Note to Reviewers: These documents are provided as general reviewer orientation to NIH peer review. For meeting specific information, please rely on the documents and links provided by your SRO.

Note: Please clear your browser's cache to ensure you pick up the latest version of the documents.

[Expand Menus](#) | [Collapse Menus](#)

R and U Awards (Research Project Grants; R01, R03, R21, SBIR/STTR, etc. and Cooperative Agreements: U01, etc.).

Guidelines for Reviewers

- [R01 GUIDE FOR REVIEWERS](#) (PDF - 74 KB) (03/21/2016)
- [R03 GUIDE FOR REVIEWERS](#) (PDF - 73 KB) (03/21/2016)
- [R15 GUIDE FOR REVIEWERS](#) (PDF - 26 KB) (03/21/2016)
- [R21 GUIDE FOR REVIEWERS](#) (PDF - 74 KB) (03/21/2016)
- [R34 GUIDE FOR REVIEWERS](#) (PDF - 113 KB) (03/21/2016)
- [R25 GUIDE FOR REVIEWERS](#) (PDF - 130 KB) (03/18/2015)
- [U01 BRP GUIDELINES FOR REVIEWERS](#) (PDF - 74 KB) (07/18/2016)
- [R13/U13 GUIDE FOR REVIEWERS](#) (PDF - 74 KB) (03/21/2016)
- [R41, R42, R43, R44 GUIDE FOR REVIEWERS](#) (PDF - 128 KB) (04/05/2016) (Small Business Innovation Research and Small Business Technology Transfer Awards)
- [Guide for Reviewers for 1R44 SBIR Direct Phase II applications](#) (PDF - 191 KB) (04/23/2014)

Review Criteria and Considerations

- [Criteria and Considerations for Research Project Grant \(RPG/R01/R03/R21/R34\) Critiques](#) (03/21/2016)
- [Criteria and Considerations for R15 Critiques](#) (05/19/2016)
- [Criteria and Considerations for R25 Critiques](#) (03/21/2016)
- [Criteria and Considerations for BRP Critiques](#) (03/21/2016)
- [Criteria and Considerations for R13/U13 Critiques](#) (03/21/2016)
- [Criteria and Considerations for SBIR-STTR Critiques](#) (03/21/2016)

K Awards (Career Development)

F Awards (Fellowships)

S10 Awards (Shared Instrumentation)

T Awards (Training)

C06, UC6 & G20 Awards (Construction & Modernization)

Administrative Centers

Related Links

- [NIH Reviewer Orientation](#)
- [NIH Rigor and Transparency](#)
- [IAR for Reviewers Online Help](#)

FAQs

[Consolidated List of Reviewer Documents](#)

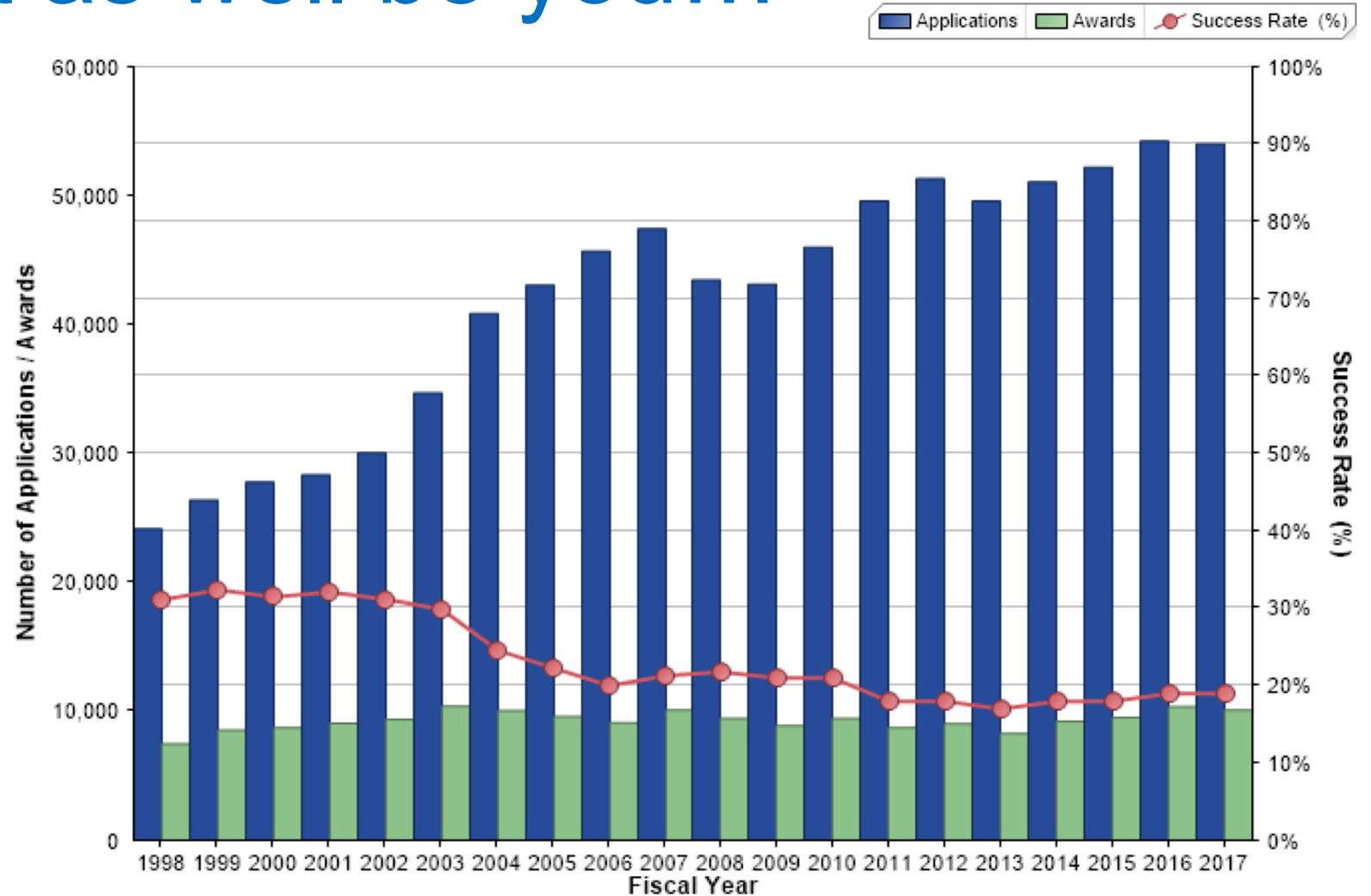
Videos

- [NIH Peer Review Revealed](#)
- [For Reviewers: Navigating IAR](#)

Yes, it takes an effort, but someone is getting funded. It might as well be you...

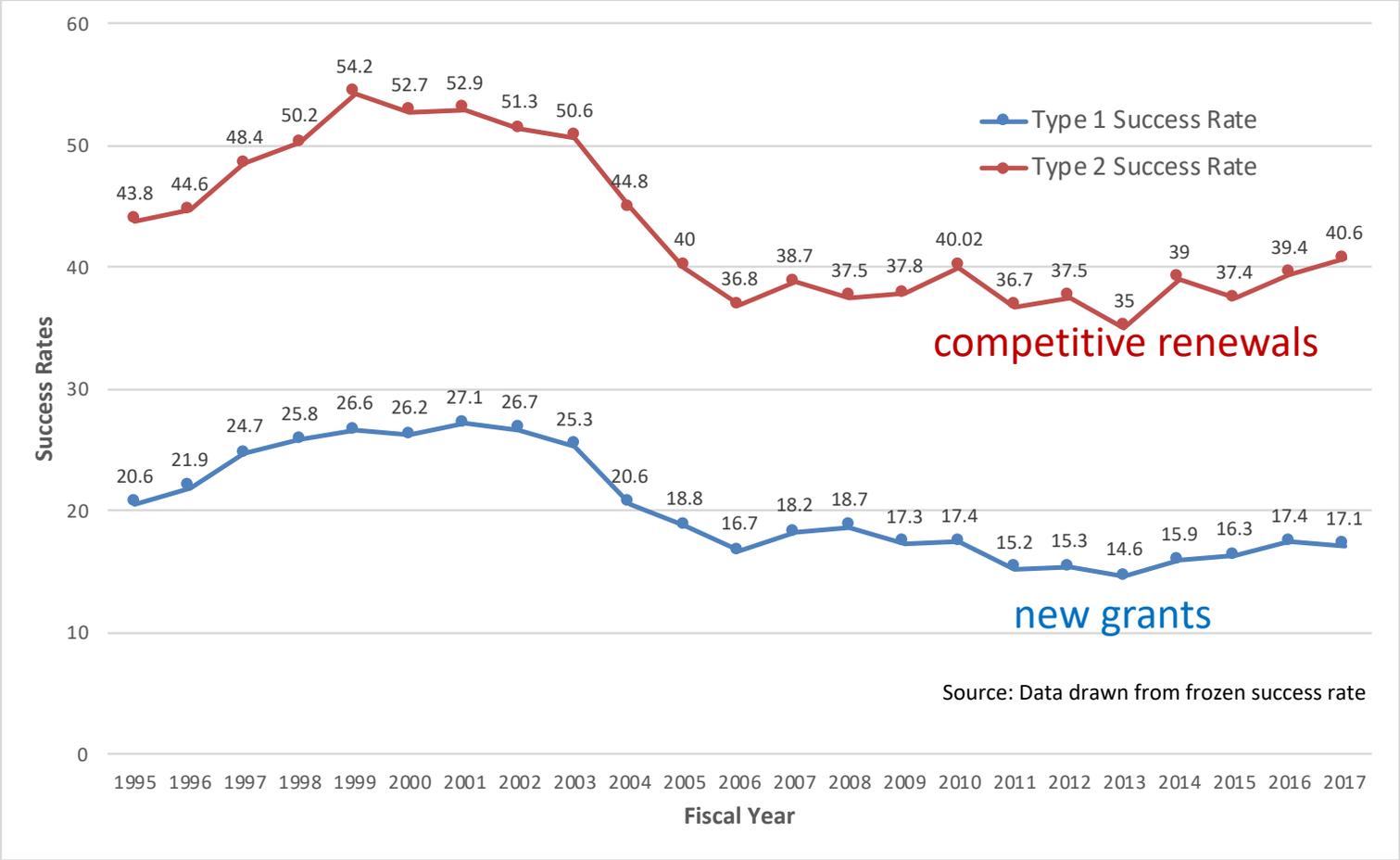
Research Project Grants (RPG) (R01, R21, R03)

Success rates are lower than they were 10 years ago, but they are at least stabilizing, if not improving



<https://report.nih.gov/NIHDatabook/Charts/>

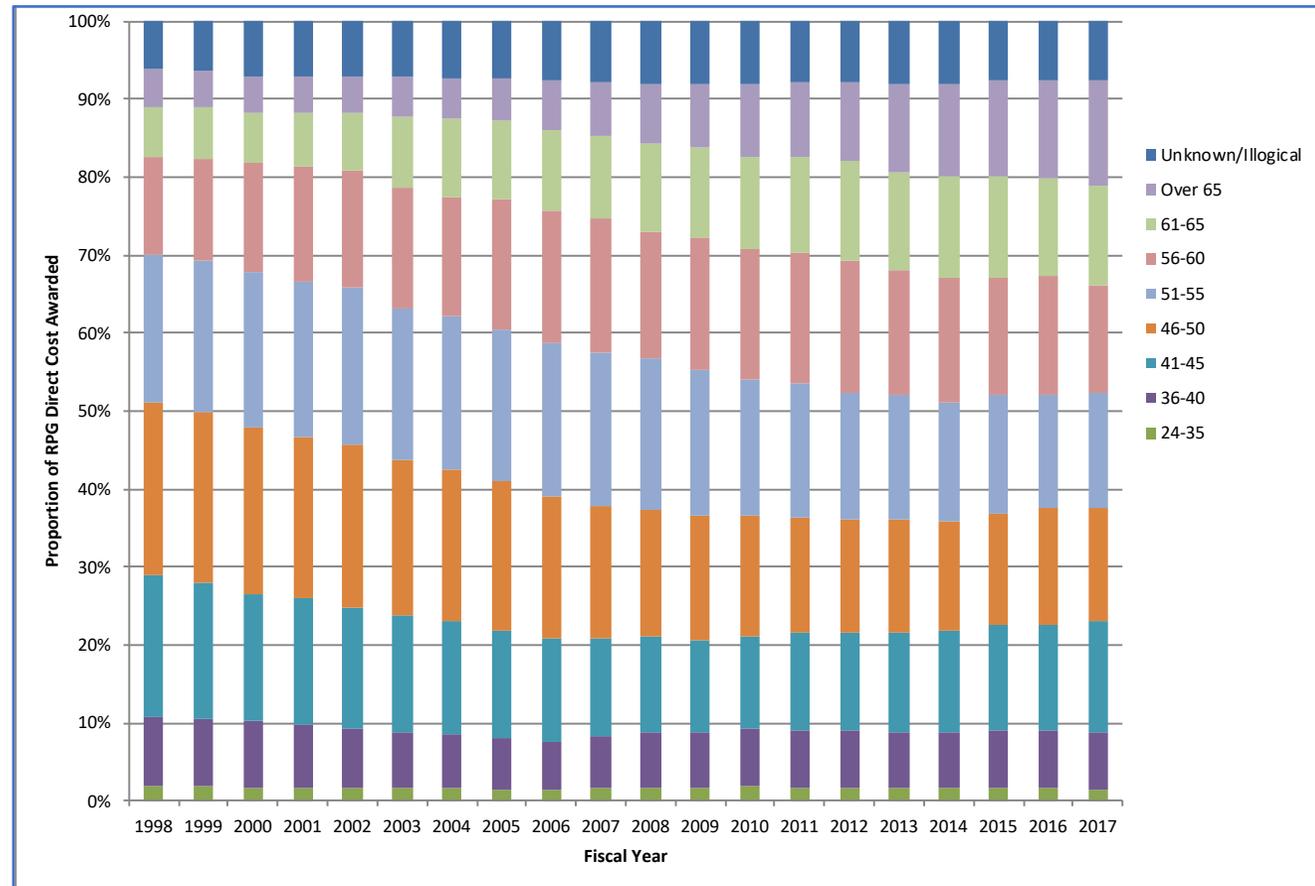
New RPG grant success over time is reasonably stable



Q: Does this mean you should go for a competitive renewal of your grant, or write a new one????

A: It depends.....

Proportion of RPG direct cost dollars awarded by age—a dip in mid-career awardees?? Or a reflection of the bump in hiring during the NIH budget doubling era? Or mid-career investigators have fewer total grants?



Success rates for Type 1 RPGs by I/C

Fiscal Year	Application Type	NIH Institutes / Centers	Activity Code	Number of Applications Reviewed	Number of Applications Awarded	Success Rate ²	Total Funding ³
2017	New	NCI	R01	5,183	602	11.6%	\$280,169,464
2017	New	NHLBI	R01	2,862	606	21.2%	\$334,144,930
2017	New	NIDCR	R01	361	61	16.9%	\$26,977,034
2017	New	NIDDK	R01	2,238	319	14.3%	\$146,930,799
2017	New	NINDS	R01	2,058	299	14.5%	\$128,889,713
2017	New	NIAID	R01	2,621	453	17.3%	\$259,872,365
2017	New	NIGMS	R01	2,336	540	23.1%	\$192,875,451
2017	New	NICHHD	R01	1,420	215	15.1%	\$110,582,733
2017	New	NEI	R01	663	150	22.6%	\$63,843,522
2017	New	NIEHS	R01	535	64	12.0%	\$27,727,986
2017	New	NIA	R01	1,547	306	19.8%	\$202,341,223
2017	New	NIAMS	R01	822	123	15.0%	\$50,500,198
2017	New	NIDCD	R01	370	77	20.8%	\$32,920,197
2017	New	NIMH	R01	1,332	261	19.6%	\$148,725,812
2017	New	NIDA	R01	1,021	165	16.2%	\$87,726,262
2017	New	NIAAA	R01	404	69	17.1%	\$27,658,582
2017	New	NINR	R01	270	29	10.7%	\$14,688,837
2017	New	NHGRI	R01	158	30	19.0%	\$19,854,254
2017	New	NIBIB	R01	412	73	17.7%	\$33,770,013
2017	New	NCCIH****	R01	77	13	16.9%	\$6,253,251
2017	New	NIMHD***	R01	224	58	25.9%	\$38,189,490
2017	New	FIC	R01	31	6	19.4%	\$1,346,306
2017	New	NLM	R01	68	14	20.6%	\$5,450,642
2017	New	OD Common Fund	R01	142	10	7.0%	\$7,217,641
2017	New	OD ORIP-SEPA†	R01	14	3	21.4%	\$1,656,323

**Institutes vary in their funding mechanisms
RO3? (small grants)**

Policies and Paylines for New Investigators

RFAs

SOME OBVIOUS TIPS (that even the most experienced grant writers frequently ignore)

Protect your writing time

(Release time from teaching and committee assignments should be in your contract)

Just say “NO” (“but thanks for the invitation”) to committees, teaching, administrative duties, etc.

(Balance this with opportunities that showcase your research at your institution)

Choose the members of your research group carefully— you need to have a team that can get work done without your constant supervision

Be selective when hiring postdoctoral fellows and technicians

Resist the urge to take students who are inexperienced or

uncertain until you have someone who can supervise them daily



“We made too many wrong mistakes”

Yogi Berra

BEST PRACTICES FOR GRANT PREPARATION

Senior colleagues (preferably with Study Section experience) need time to critique your proposal

Ask your mentors for copies of recent successful grants—will save you tons of time in the formatting stages

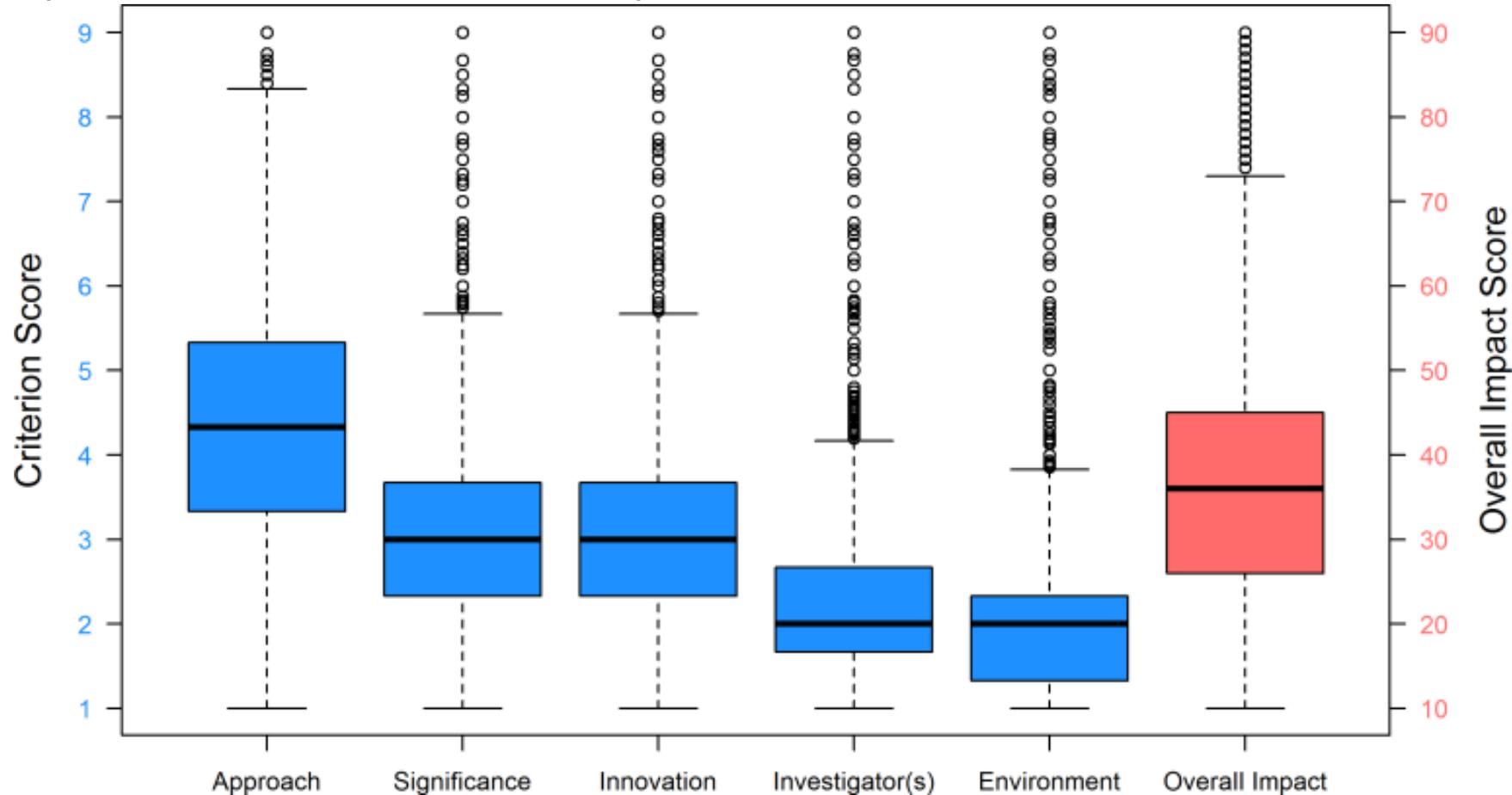
Identify your LOCAL collaborators---they are especially important for new investigators to reassure reviewers that you can do the experiments you are proposing

Start writing several months in advance of the official deadline Your deadline ≠ funding agency's deadline (I budget 6 months—and I am thinking about the aims a year in advance of that)

- You need time to revise (and re-revise)—do not “blow off” mentors’ advice as a lack of understanding, or because it is not feasible for you to address their concerns. **Think of your senior colleagues as dress rehearsal for Study Section.**
- Your administrative support staff will not appreciate having to drop everything else at the last minute because of your deadline

Relative contribution of criterion scores to final overall impact score

analysis of 123,000 scored RPGs from 2010-13



Eben et al. PLOSone. June, 2016

Take Home Message: APPROACH is the major driver of your overall impact score and needs to be the focus of your proposal

Bullet point review format

OVERALL IMPACT

Overall Impact	Please limit text to ¼ page
Strengths	
<ul style="list-style-type: none"> The most appealing experiments are those found in Specific Aim 2 (SAII) to determine if pharmacological amounts of vitamin D, 25D and 1,25D can prevent or rescue the EAE phenotype. 	
Weaknesses	
<ul style="list-style-type: none"> The Preliminary Studies section is virtually devoid of explanatory text for the presented figures; exactly how the reader is supposed to make use of this information as sound rationale for the presented experiments is unclear. The application suffers from a lack of explanation of abbreviations and jargon; examples include: MOGTCR, 2D2 mice, HUT102 cells, ROR, EL-4 cells, CD4+ CD25-T cells, FOXP3, aCD3, and aCD28. Preliminary data also lacks simple descriptive details like “n” and p values; there is not a summation of what the preliminary data purport to mean. The application appears to be “pasted” together; different parts display different fonts. Many of the outcomes in SAI experiments will be observational in nature and out of context with what is occurring within genomic DNA. Inclusion of experiments gauging the effects of dietary vitamin D deficiency on EAE expression would have strengthened the translational component of this work. 	

<ul style="list-style-type: none"> The inclusion of Dr. Lawrence Steinman, a world-leading expert in human autoimmunity especially neurologic disease, is a real strength to the application.
Weaknesses
<ul style="list-style-type: none">

3. Innovation	Please limit text to ¼ page
Strengths	
<ul style="list-style-type: none"> The hypotheses that 1,25D directed inhibition of IL-17 is immunosuppressive in MS is innovative. 	
Weaknesses	
<ul style="list-style-type: none"> 	

4. Approach	Please limit text to ¼ page
Strengths	
<ul style="list-style-type: none"> The general approach here is to: 1] identify regulatory elements and their transactors in the proximal 1L-17 promoter that mediate its decreased expression under the influence of 1,25D; and 2] manipulate upward dietary vitamin D and metabolite intake and administration to alter expression of the EAE-like MS syndrome in mice. 	
Weaknesses	
<ul style="list-style-type: none"> The applicant focuses solely in the proximal 1L-17 promoter, ignoring the possible presence and function of important distant 5', 3' and intronic VDREs in and around the 1L-17 gene; relegating identification of such elements to “future studies” disregards the state-of-the-art VDR <i>cis-trans</i> relationship controlling gene expression. The applicant does not really test the effect of vitamin D insufficiency/deficiency on expression of the EAE phenotype. A simple schematic in the Background and Significance or Preliminary Results section summarizing the connection among different cells, cytokines, vitamin D metabolites, and disease activity would have been very helpful to the reader. In the crucial Figure 1, the disease suppressive affect of 1,25D requires doses of the hormone 10-fold greater than that which would be safe in humans; there is no indication as whether mice treated with such high doses developed hypercalciuria, hypercalcemia or died. In SAI the applicant plans to study the effects of chromatin remodeling on expression of a transiently-transfected, truncated promoter-reporter construct in an extra genomic context. Should not an endogenous gene in its naturally “chromatinized” environment be the focus of study? 	

SCORED REVIEW CRITERIA

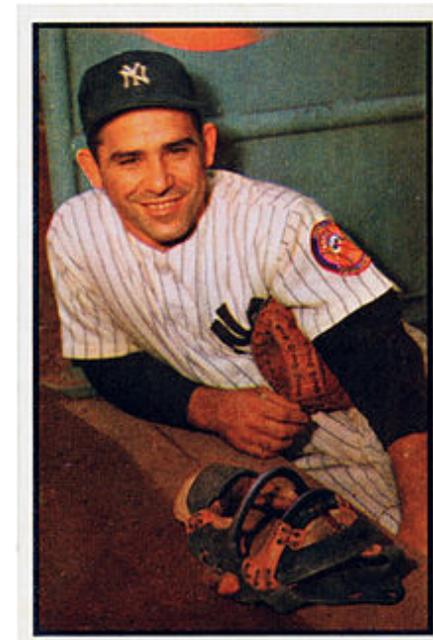
1. Significance	Please limit text to ¼ page
Strengths	
<ul style="list-style-type: none"> The fairly recent discovery of IL-17 and a specialized subset of T cells that make IL-17 and an application to a study of the immunoactions of the vitamin D hormone is of substantial significance. Uncovering a 1,25D-IL-17 regulatory mechanism that might limit progression of mouse models of MS would also be of great significance. 	
Weaknesses	
<ul style="list-style-type: none"> The fact that vitamin D insufficiency actually increases MS risks suggests that 1,25-D must be made locally as low 25D levels will be associated with secondary hyperparathyroidism and increased production of 1,25D made by the kidney. 	

5. Environment	Please limit text to ¼ page
Strengths	
<ul style="list-style-type: none"> SAII and human cell experiments will take place in the Steinman Laboratory; these appear to be the most interesting experiments. 	
Weaknesses	
<ul style="list-style-type: none"> 	

2. Investigator(s)	Please limit text to ¼ page
Strengths	
<ul style="list-style-type: none"> Mouse modeling of observations made “<i>in vitro</i>” is a major strength of Dr. Christakos. 	

Examples on NIH website.

Perhaps your mentors will share theirs



“Take it with a grin of salt.”
Yogi Berra

New review criteria as of 2016

Rigor and Transparency

OVERVIEW: RESEARCH PROJECT GRANT (RPG) APPLICATIONS

Element of Rigor and Transparency	Section of Application	Criterion Score	Additional Review Consideration	Contribute to Overall Impact Score?
Scientific Premise <i>fill knowledge gap</i>	Research Strategy	Significance	NA	Yes
Scientific Rigor <i>exp. design/power/stats</i>	Research Strategy	Approach	NA	Yes
Consideration of Relevant Biological Variables, such as Sex <i>covariates</i>	Research Strategy	Approach	NA	Yes
Authentication of Key Biological and/or Chemical Resources	New Attachment	NA	Yes	No

Your resubmission

Do:

- Follow SF424 instructions precisely.
- Assume *all* of the initial study section comments were correct.
- Respond to *all* criticisms.
- **Include new preliminary data** that addresses concerns
- Assume the same reviewer(s) will be seeing your revised application.
 - at least one of your three original reviewers will critique your resubmission
 - this reviewer will be a regular member of the study section
 - write the resubmission with your reviewers' research/expertise in mind

Your resubmission

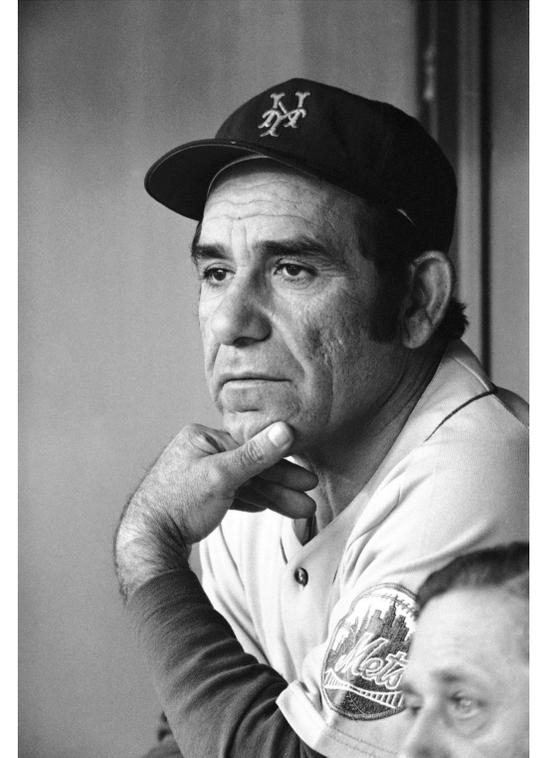
Do Not:

- assume you are smarter than your reviewers
- argue with the reviewers in your response (at least be VERY respectful)
- leave out a consideration of any criticism, regardless of how “minor” it might seem to you
- fail to have your colleague and/or mentor review your revision before resubmission
- fail to consult with your program officer

Your resubmission

Fatal Flaws

- Writing a “non-responsive” Introduction
- Writing an antagonistic (i.e. condescending) Introduction
- Resubmitting before you have the additional preliminary data requested
- *Not making points of revision in your resubmission clear*



“In theory there is no difference between theory and practice. In practice there is.” Yogi Berra

Things I pay attention to as a reviewer

- **Experimental Plan**

- **How far does it advance our understanding?**
- Is it definitive?
- **Is it feasible?**

- **Problems and pitfalls:** Acknowledging problems is important. But don't dwell on them.

- “We don't anticipate technical problems because we have expertise and reagents, but it is conceivable that....In this case, we will use the alternative approaches of.....”

- **Possible interpretations**

- Make sure you address **unexpected** results and make them an asset rather than a liability: “ If we observe Y rather than our expected result, we will consider the possibility that Z may be true and will test this by.....(or in future experiments)”. “**If observed, this would represent an important/paradigm shift/new direction.....a re-evaluation of current literature in the field**”

More things I pay attention to as a reviewer

- **Significance.** Avoid generic statements (“Osteoporosis is bad, therefore anything I learn about bone is important”). Be specific: “These studies will define the mechanisms by which xxx regulates bone formation. **This is an important direction because....XXX is a potential point of therapeutic intervention//...we know nothing about the cellular basis for....**
 - Significance trumps Innovation
- **Innovation.** Address **conceptual** and **technical** innovation. (Making another mutant mouse is not really a technical innovation unless it uses a novel strategy or enables a new line of investigation). Using old technology in a new way is a technical innovation.
 - It is OK and usually good to acknowledge “we use standard but state-of-the-art techniques to investigate..... because this will enable our studies to be interpreted in light of the large body of existing literature on issue X”

Twelve Commandments of Grant Writing

(as delivered to us by Dr.
John S. Adams)

Tablet 1

- I. Thou shall follow SF424 forms
- II. Thou shall have a testable hypothesis in a “hot” area
- III. Thou shall remember that the SRG and I/C are “buyers”
- IV. Thou shall be an expert in the literature of your topic
- V. Thou shall write to answer reviewer criteria
- VI. Thou shall put yourself in the shoes of the reviewer

Tablet 2

- VII. Thou shall not “cut-and paste”
- VII. Thou shall have short and concise specific aims
- IX. Thou shall use pictures to tell your story
- X. Thou shall acknowledge pitfalls and alternative plans
- XI. Thou shall have “zero tolerance” for errors
- XII. Thou shall use your grant writing mentor or advisor(s)



“Keep trying. Stay humble. Trust your instincts.”

“Love is the most
important thing
in the world,
but ~~baseball~~ is
pretty good, too.”

Science

-Yogi Berra



May 12, 1925 - September 22, 2015