The NPA Core Competencies

University of Virginia
Charlottesville, VA
Lunchtime Postdoc Seminar
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Presented by:
Cathee Johnson Phillips
Executive Director, National Postdoctoral Association

With special thanks to Joan Chesney, M. D.,
St. Jude Children’s Research Hospital,
for her work and for the use of some of her slides
"Consider the postage stamp: its usefulness consists in the ability to stick to one thing until it gets there."

– Josh Billings (1818-1885)
Are postdocs still “invisible”?

What's with those people standing there?

They're right there!

I don't see anybody.

Actually, we're postdocs.

National Postdoctoral Association

www.nationalpostdoc.org
The mission of the National Postdoctoral Association is to advance the U.S. research enterprise by maximizing the effectiveness of the research community and enhancing the quality of the postdoctoral experience for all participants.

The NPA is a non-profit 501(c)3 organization headquartered in Washington, DC.
The National Situation: A Context for Competency
Postdoctoral Scholars Today

- 89,000 in U.S.* (estimate)
- 60% international* (estimate)
- $38,000 median annual income**
- 51 hours, average work week**
- Early 30s and in a relationship; 1/3 have children**
- 42% women; 58% men**

Sources:
**Sigma Xi 2004-2005 Postdoc Survey
How many postdocs who earn their degree in the United States are women?

**NSF Survey**

- 1996: 29%
- 2006: 33%

**SOURCE:** National Science Foundation, Division of Science Resources Statistics, Survey of Graduate Students and Postdoctorates in Science and Engineering, 1996 and 2006.

**Sigma Xi (2004-05)**

- 42%

(Citizens/residents 51%

- Visa holders 35%)

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<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>75%</td>
</tr>
<tr>
<td>Asian</td>
<td>17%</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>4%</td>
</tr>
<tr>
<td>Black/African-American</td>
<td>4%</td>
</tr>
<tr>
<td>Citizens/Residents</td>
<td>46%</td>
</tr>
<tr>
<td>International</td>
<td>54%</td>
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</table>
Where do they go after the postdoc?

- Business/Industry: 41%
- Government: 9%
- Education: 49%

A larger percentage (56%) of former postdocs desired tenure-track academic positions than actually obtained such positions (30%). Similarly, only 16% of former postdocs initially expected to seek nontenure-track research scientist positions, compared with the 25% who ended up in such positions. The “other” types of positions that were cited included nonbench careers such as consulting, technology transfer, and administration.
### Comparison of attribute rankings from principal investigators (PIs) and postdocs

The table compares certain attributes of a successful postdoc, as rated by PIs in this year’s survey, and postdocs in the 2008 survey. Of note are the clearly divergent views on Communication, Networking, and Training.

<table>
<thead>
<tr>
<th>PI Rankings 2009</th>
<th>Postdoc. Rankings 2008</th>
<th>Attribute</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7</td>
<td>Communication</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>Direction and Vision</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>Mentoring</td>
</tr>
<tr>
<td>4</td>
<td>9</td>
<td>Training</td>
</tr>
<tr>
<td>5</td>
<td>N/A</td>
<td>Work Culture/Environment</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>Networking</td>
</tr>
<tr>
<td>7</td>
<td>5</td>
<td>Employer/Situation</td>
</tr>
<tr>
<td>8</td>
<td>N/A</td>
<td>Quality of Life</td>
</tr>
<tr>
<td>9</td>
<td>6</td>
<td>Advancement/Career Options</td>
</tr>
<tr>
<td>10</td>
<td>8</td>
<td>Compensation and Benefits</td>
</tr>
<tr>
<td>11</td>
<td>10</td>
<td>Considering Spouses/Partners</td>
</tr>
</tbody>
</table>
Recent National Trends

Science & Engineering Ph.D. holders reporting that they had a postdoc:

- Before 1972: 31%
- 2002-2005: 46%

*(Highest in life sciences)*


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Recent National Trends

Recent doctorate holders hired into full-time faculty positions

1973  74%
2006  38%


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“Recent S&E doctorate holders who entered academic employment at research universities were more likely to be in postdoc than in faculty positions.”

Recent National Trends

Of recent Ph.D.s (1997-2001, all STEM fields) who completed a postdoc, 30.6% had a tenure-track position; was previously ~20%.


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Recent National Trends

“U.S. enrollment in science and engineering (S&E) graduate programs in 2007 increased by 3.3% over comparable data for 2006. This is the highest annual growth rate since 2002 and is nearly double the 1.7% growth rate seen in 2006.”


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Recent National Trends

Science & Engineering postdocs with temporary visas at U.S. universities

1985  8,900
2005  27,000


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AVERAGE AGE OF FIRST-TIME R01-EQUIVALENT PRINCIPAL INVESTIGATORS BY DEGREE

Source: National Institutes of Health

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Recent National Trends

“The share of all NSF grants awarded to new principal investigators (PIs) remained relatively constant from 2002 to 2006, at roughly 27%-28%, while the number of proposal submissions from both new and prior investigators increased and the funding rate both per PI and per proposal decreased.”

Recent National Trends

- “Underrepresented minorities constituted a smaller share of total employment at research universities than at other academic institutions.”
- Underrepresented minorities represent only 8 to 10% of total academic employment.

Summary: National Trends

Enrollment in STEM PhD programs
Doctorate-holders in postdoc positions
Length of time spent as postdoc
International postdoctoral scholars
Grant submissions
Funding per proposal/PI
Employment of postdocs in full-time faculty positions

71% of postdocs are supported by or receive federal funding
Challenge: increase diversity of faculty

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NPA Priorities

Increase Federal funding and review funding guidelines.

Improve postdoctoral experience.

Emphasize professional development.

Improve efforts to serve international postdocs.

Encourage and facilitate diversity within the postdoctoral community.

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NPA Core Competencies

Began work in early 2007
The Core Competencies Committee

Lida Anestidou, Ph.D., Program Officer, The National Academies Program

Joan Chesney, M. D., Member, Department of Infectious Diseases, St. Jude Children’s Research Hospital

Emil Chuck, Ph.D., Faculty Member, Student Academic Affairs and Advising, Health Professions Advisor & Term Assistant Professor, George Mason University

Phil Clifford, Ph.D., Professor of Anesthesiology and Physiology & Associate Dean for Postdoctoral Education, Medical College of Wisconsin

Lisa Curtis, Ph.D., Instructor of Medicine, Department of Medicine, Division of Nephrology, University of Alabama at Birmingham

Keith Micoli, Ph.D., Postdoctoral Program Manager, NYU School of Medicine, Sackler Institute of Graduate Biomedical Sciences

Lucia Mokres, D.V.M., Program Specialist, Hantel Technologies

Alyson Reed, M.B.A., Former Executive Director, NPA

Nancy Schwartz, Ph.D., Professor, Department of Pediatrics, University of Chicago

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According to the 2005 Sigma Xi postdoc survey of U.S. postdoctoral scholars:

Postdocs who reported the highest levels of oversight and professional development were more satisfied, gave their advisors higher ratings, reported fewer conflicts with their advisors, and were more productive than those reporting the lowest levels.”
Resource: APS List of Professional Skills

- Published by The American Physiological Society (APS) and Association of Chairs of Departments of Physiology (ACDP)
- The APS states: “The primary purpose of this list is to serve as a professional development tool for physiology trainees and their mentors. It is important to note that this document was not designed to serve as a list of standards for graduate or postdoctoral training.”

Source: http://www.the-aps.org/education/skills.htm

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Rationale

• “The variety of professional outcomes for postdoctoral scholars today necessitates broad-based training.”

• “For postdoctoral scholars focused on a research-oriented career, mastering a broad range of skills is essential preparation for becoming independent investigators within a complex research-focused enterprise.”
Overview: Core Competencies

Rationale

- The NSF/NIH Definition of a “Postdoc”

An individual who has received a doctoral degree (or equivalent) and is engaged in a temporary and defined period of mentored advanced training to enhance the professional skills and research independence needed to pursue his or her chosen career path.

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Overview: Core Competencies

Life-long learning

• Competency-based learning assumes stages
• At which stage should postdocs be?
  ▪ Highly individualized
• Not intended to be prescriptive or limiting; should be customized
Purpose

Provide national guidelines for institutional development of curricula to address the needs of postdoctoral scholars for skill acquisition to achieve career success
Overview: Core Competencies

Purpose

Provide guidelines for postdocs and mentors to assess success in completing the steps needed for scientific career fulfillment

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Engage in Self-Assessment

- Review Core Competencies Checklist
- Use with Individual Development Plan (IDP)
- Use customized assessment inventories
  - Scientific Skills Assessment Inventory developed by Phil Clifford and Bill Lindstaedt
- Make a commitment
  - AAMC Compact Between Postdoctoral Appointees and Their Mentors: “I acknowledge that I have the primary responsibility for the development of my own career.”

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<thead>
<tr>
<th></th>
<th>National Postdoctoral Association (NPA) Core Competencies Self-Assessment Checklist</th>
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<tbody>
<tr>
<td>1</td>
<td>Discipline-Specific Conceptual Knowledge</td>
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<td>Analytical Approach to Defining Scientific Questions</td>
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<td></td>
<td>Design of Scientifically Testable Hypotheses</td>
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<td></td>
<td>Broad-Based Knowledge Acquisition</td>
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<td></td>
<td>Interpretation and Analysis of Data</td>
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<td>2</td>
<td>Professional/Research Skill Development</td>
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<td></td>
<td>Literature Search Strategies and Effective Interpretation</td>
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<td></td>
<td>Experimental Design</td>
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<td></td>
<td>Statistical Analysis</td>
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<td></td>
<td>Data Analysis and Interpretation</td>
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<tr>
<td></td>
<td>Laboratory Techniques and Safety</td>
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<td></td>
<td>Principles of the Peer Review Process</td>
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<tr>
<td>3</td>
<td>Communication Skills</td>
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<td></td>
<td>Writing</td>
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<td>Speaking</td>
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<td>Teaching</td>
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<td>Interpersonal</td>
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<td>Special Situations</td>
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<td>4</td>
<td>Professionalism</td>
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<td></td>
<td>Workplace</td>
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<td></td>
<td>Institutional</td>
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<td></td>
<td>Collegial</td>
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<td></td>
<td>Universal</td>
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<tr>
<td>5</td>
<td>Leadership &amp; Management Skills</td>
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<tr>
<td></td>
<td>Leadership-Strategic Vision</td>
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<td></td>
<td>Leadership-Motivating and Inspiring Others</td>
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<td>Management-Project Management</td>
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<td></td>
<td>Management-Data and Resource Management</td>
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<td>Management-Research Staff Management</td>
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<td>6</td>
<td>Responsible Conduct of Research</td>
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<td>Conflicts of Interest</td>
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<td>Data Ownership and Sharing</td>
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<td>Publication Practices and Responsible Authorship</td>
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<td></td>
<td>Identifying and Mitigating Research Misconduct</td>
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<td></td>
<td>Research with Human Subjects (when applicable)</td>
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<td>Research Involving Animals (when applicable)</td>
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</tbody>
</table>

Rate your current level of development in each of the following, with 1 being "Needs attention" and 9 being "extremely competent."

For more information on these competencies, please visit www.nationalpostdoc.org/competencies.
Six Core Competencies

1. Discipline-Specific Conceptual Knowledge
2. Research Skill Development
3. Communication Skills
4. Professionalism
5. Leadership & Management Skills
6. Responsible Conduct of Research
Competencies Needed for Career Success in the 21st Century

- Scientific Knowledge
- Professionalism
- Responsible Conduct of Research
- Research Skill Development
- Management and Leadership Skills
- Communication Skills

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Core Competency #1

- Analytical Approach to Defining Scientific Questions
- Design of Scientifically Testable Hypotheses
- Interpretation and Analysis of Data
- Broad-Based Knowledge Acquisition
- Discipline-Specific Conceptual Knowledge
Core Competency #2

Research Skill Development

- Laboratory Techniques and Safety
- Data Analysis and Interpretation
- Principles of the Peer Review Process
- Literature Search Strategies and Effective Interpretation
- Statistical Analysis
- Experimental Design

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Core Competency #3

Communication Skills

- Writing
- Speaking
- Teaching
- Interpersonal
- Special Situations

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Core Competency #4

Workplace

Institutional

Collegial

Universal

Professionalism

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Core Competency #5

- Leadership
- Strategic Vision
- Project Management
- Data and Resource Management
- Motivating/Inspiring Others
- Leadership and Management Skills
- Research Staff Management

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Core Competency #5

**Leadership**
- Change/movement
- Establishing direction
- Aligning people
- Motivating/inspiring
- Followers

**Management**
- Order/consistency
- Planning/budgeting
- Organizing/staffing
- Controlling/problem solving
- Subordinates

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Core Competency #6

Responsible Conduct of Research (RCR)

- Data Ownership and Sharing
- Research Involving Animals (when applicable)
- Identifying and Mitigating Research Misconduct
- Conflicts of Interest
- Research with Human Subjects (when applicable)
- Publication Practices and Responsible Authorship

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Ways to Use the Competencies

**Postdoctoral scholars:** Basis for self-evaluation and to determine areas for their own self-improvement.

**Investigators:** Incorporate training in these skills into mentoring activities or group meetings. (NSF mentoring requirement)

**PDOs:** Develop professional development programs around the competency areas.

**Institutions:**
- Play a more substantive role in the training of postdoctoral scholars by adopting an overarching curriculum of development opportunities.
- Use the competencies as a template for preparing graduate students so that they can continue their training in these areas as postdoctoral scholars.

**Disciplinary societies:** Offer programming and services to their postdoctoral scholar constituents to enhance these competencies.

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Thank you!

www.nationalpostdoc.org/competencies