

Labor and skills gap analysis of the biomedical research workforce

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ABSTRACT

The United States has experienced an unsustainable increase of the biomedical research workforce over the past 3 decades. This expansion has led to a myriad of consequences, including an imbalance in the number of researchers and available tenure-track faculty positions, extended postdoctoral training periods, increasing age of investigators at first U.S. National Institutes of Health R01 grant, and exodus of talented individuals seeking careers beyond traditional academe. Without accurate data on the biomedical research labor market, challenges will remain in resolving these problems and in advising trainees of viable career options and the skills necessary to be productive in their careers. We analyzed workforce trends, integrating both traditional labor market information and real-time job data. We generated a profile of the current biomedical research workforce, performed labor gap analyses of occupations in the workforce at regional and national levels, and assessed skill transferability between core and complementary occupations. We conclude that although supply into the workforce and the number of job postings for occupations within that workforce have grown over the past decade, supply continues to outstrip demand. Moreover, we identify practical skill sets from real-time job postings to optimally equip trainees for an array of careers to effectively meet future workforce demand.—Mason, J. L., Johnston, E., Berndt, S., Segal, K., Lei, M., Wiest, J. S. Labor and skills gap analysis of the biomedical research workforce. FASEB J. 30, 2673-2683 (2016). www.fasebj.org

REFERENCES



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3 National Institutes of Health. (2012) *Biomedical Research Workforce Working Group Report*. Working Group of the Advisory Committee to the Director, NIH, Bethesda, MD, USA. Available at: http://acd.od.nih.gov/Biomedical_research_wgreport.pdf

[Google Scholar](#) 

4 National Science Foundation. (2013) Survey of Doctorate Recipients. Table 77. Available at: <http://ncesdata.nsf.gov/doctoratework/2013/> (Doctoral scientists and engineers employed as postdoctoral appointees, by selected demographic characteristics and broad field of doctorates)

[Google Scholar](#) 

5 National Institutes of Health. (2014) *New and Early Stage Investigator Policies*. Office of Extramural Research, NIH, Washington DC. Accessed January 4, 2016, at: http://grants.nih.gov/grants/new_investigators/new_investigator_data_1980_to_2011.ppt/

[Google Scholar](#) 

6 Alberts, B., Kirschner, M. W., Tilghman, S., and Varmus, H. (2014) Rescuing US biomedical research from its systemic flaws. *Proc. Natl. Acad. Sci. USA* 111, 5773–5777

[CAS](#)  | [PubMed](#)  | [Web of Science®](#)  | [Google Scholar](#) 

7 Kimble, J., Bement, W. M., Chang, Q., Cox, B. L., Drinkwater, N. R., Gourse, R. L., Hoskins, A. A., Huttenlocher, A., Kreeger, P. K., Lambert, P. F., Mailick, M. R., Miyamoto, S., Moss, R. L., O'Connor-Giles, K. M., Roopra, A., Saha, K., and Seidel, H. S. (2015) Strategies from UW-Madison for rescuing biomedical research in the US. *eLife* 4, e09305

[Google Scholar](#) 

8 Daniels, R. J. (2015) A generation at risk: young investigators and the future of the biomedical workforce. *Proc. Natl. Acad. Sci. USA* 112, 313–318

[CAS](#)  | [PubMed](#)  | [Web of Science®](#)  | [Google Scholar](#) 

9 McDowell, G. S., Gunsalus, K. T., MacKellar, D. C., Mazzilli, S. A., Pai, V. P., Goodwin, P. R., Walsh, E. M.,

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11 Gould, J. (2015) Career paths: tracking Ph.D.s. In Nature Jobs Blog. Accessed January 4, 2016, at: <http://blog.s.nature.com/naturejobs/2015/04/22/career-paths-tracking-phds/>

[Google Scholar](#) 

12 Callier, V., and Vanderford, N. L. (2015) Wanted: information. *Nature* 519, 121–122

[Google Scholar](#) 

13 Meyers, F. J., Mathur, A., Fuhrmann, C. N., O'Brien, T. C., Wefes, I., Labosky, P. A., Duncan, D. S., August, A., Feig, A., Gould, K. L., Friedlander, M. J., Schaffer, C. B., Van Wart, A., and Chalkley, R. (2016) The origin and implementation of the Broadening Experiences in Scientific Training programs: an NIH common fund initiative. *FASEB J.* 30, 507–514

[CAS](#)  | [PubMed](#)  | [Web of Science®](#)  | [Google Scholar](#) 

14 State of California, Employment Development Department. (2013) *Biotechnology in California*. CAEDD, Sacramento, CA, USA. Available at: http://www.labormarketinfo.edd.ca.gov/Biotechnology_in_California.htm

[Google Scholar](#) 

15 Georgia Power Community and Economic Development. (2012) *Bioscience Industry in Georgia*. Georgia Power, Atlanta, GA, USA. Available at <https://www.tradeandindustrydev.com/region/georgia/bioscience-industry-report-7596/>

[Google Scholar](#) 

16 National Cancer Institute. (2013) NCI Funded Research Portfolio. Accessed November 4, 2015, at: <http://fundedresearch.cancer.gov/nciportfolio/>

[Google Scholar](#) 

17 National Science Foundation. (2014) 2011 Data Show U.S. Business R&D Highly Concentrated by State and

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19 Jones Lang LaSalle, Inc. (2014) Life Sciences Cluster Report. Accessed November 17, 2015, at: <http://marketing.jll.com/acton/media/3030/jll-global-life-sciences-cluster-report/>

[Google Scholar](#) 

20 National Science Foundation. (2013) NSF-NIH Survey of Graduate Students and Postdoctorates in Science and Engineering. Table 47. Available at: <http://ncesdata.nsf.gov/gradpostdoc/2013/> (Postdoctoral appointees in science, engineering, and health in all institutions, by detailed field, citizenship, and doctoral degree type)

[Google Scholar](#) 

21 Working Group on Diversity in the Biomedical Research Workforce. (2012) *Report of the Advisory Committee to the Director: Working Group on Diversity in the Biomedical Research Workforce*. NIH, Bethesda, MD, USA. Available at: <http://acd.od.nih.gov/Diversity%20in%20the%20Biomedical%20Research%20Workforce%20Report.pdf>

[Google Scholar](#) 

22 Carnevale, A. P., and Jayasundera, T. D. R. (2014) *Understanding Online Job Ads Data*. Georgetown Center on Education and the Workforce, Washington, DC. Available at: https://cew.georgetown.edu/wp-content/uploads/2014/11/OCLM.Tech_Web_.pdf

[Google Scholar](#) 

23 Templin, R., and Hirsch, L. (2013) *Do Online Job Ads Predict Hiring?* New York City Labor Market Information Service, New York. Available at: http://www.gc.cuny.edu/CUNY_GC/media/CUNY-Graduate-Center/PDF/Centers/Center%20for%20Urban%20Research/LMIS/NYCLMIS-RESEARCH-BRIEF-Do-Online-Ads-Predict-Hiring.pdf

[Google Scholar](#) 

24 Zolas, N., Goldschlag, N., Jarmin, R., Stephan, P., Smith, J. O., Rosen, R. F., Allen, B. M., Weinberg, B. A., and Lane, J. I. (2015) Wrapping it up in a person: examining employment and earnings outcomes for Ph.D. recipients. *Science* 350, 1367–1371

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26 Rockey, S. (2012) Postdoctoral researchers: facts, trends, and gaps. In *Rock Talk*, National Institutes of Health, Bethesda, MD, USA. Accessed January 4, 2016, at: <http://nexus.od.nih.gov/all/2012/06/29/postdoctoral-researchers-facts-trends-and-gaps/>

[Google Scholar](#) 

27 U.S. Department of Labor, Bureau of Labor Statistics. (2013) Employment Projections: 2012-2022 Summary (news release). USDL-13-2393. Available at: http://www.bls.gov/news.release/archives/ecopro_12192013.htm

[Google Scholar](#) 

28 Educational Testing Service. (2015) *America's Skills Challenge: Millennials and the Future*. Educational Testing Service, Princeton, NJ, USA. Available at: <http://www.ets.org/s/research/30079/asc-millennials-and-the-future.pdf>

[Google Scholar](#) 

29 National Academies of Sciences, Engineering, and Medicine. (2016) *Developing a National STEM Workforce Strategy: A Workshop Summary*. NASEM, Washington, DC. Available at: <http://www.nap.edu/catalog/21900/developing-a-national-stem-workforce-strategy-a-workshop-summary/>

[Google Scholar](#) 

30 Allum J., and Okahana, H. (2015) *Graduate Enrollment and Degrees: 2004-2014*. Council of Graduate Schools, Washington, DC. Available at: http://www.cgsnet.org/ckfinder/userfiles/files/E_and_D_2014_report_final.pdf

[Google Scholar](#) 

31 Garrison, H. H., Justement, L. B., and Gerbi, S. A. (2016) Biomedical science postdocs: an end to the era of expansion. *FASEB J.* 30, 41–44

[Google Scholar](#) 

32 Educational Testing Service and Council of Graduate Schools. (2012) *Pathways Through Graduate School and into Careers. Commission on Pathways Through Graduate School and Into Careers*. Educational

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