U.S. Department of Health & Human Services National Institutes of Health



National Center for Complementary and Integrative Health

National Advisory Council for Complementary and Integrative Health (NACCIH)

Working Group Report on

Clinician-Scientist Workforce Development



Executive Summary

The National Center for Complementary and Integrative Health (NCCIH) supports a variety of research training and career development programs aimed at increasing the number, quality, and diversity of well-prepared, skilled investigators with knowledge and expertise both in complementary and integrative health and state-of-the-art research methodology. As it develops its next strategic plan, NCCIH has been considering future needs in the research workforce.

In October 2015, Josephine P. Briggs, M.D., NCCIH Director, requested that NCCIH's advisory council, the National Advisory Council for Complementary and Integrative Health (NACCIH), convene a working group on workforce development. In particular, this working group should focus on clinician-scientists who are trained in both science and clinical practice, serve as an essential bridge between both domains, and offer a unique perspective. The working group would identify needs and gaps, develop concepts for how to meet them, and formulate recommendations to be conceptual in nature. A series of five questions, listed on page 6 of the full report, also informed discussions. Members, listed in the Appendix, were selected for their diverse perspectives and technical expertise. They held six teleconferences from November 2015 to January 2016 and presented their report to the full NACCIH in February 2016.

Training the biomedical research workforce, including clinician-scientists, is being discussed and studied across the National Institutes of Health (NIH), other Federal agencies, and the greater biomedical community. One recent report is the *Physician-Scientist Workforce Working Group Report* (June 2014), by the Advisory Committee to the NIH Director (ACD). An array of needs and challenges exist for building the clinician-science workforce and are shaped by an environment of constrained resources. Some challenges are particular to NCCIH—e.g., the Center's mission is not disease- or organ-focused; NCCIH covers not only conventional academic, medical, and research-intensive institutions, but academic institutions training health care practitioners in the use of complementary approaches; and the interventions, modalities, and credentialing in this field are very diverse. In addition to the general challenges described (e.g., in the 2014 ACD report), additional challenges in developing this workforce exist within the context of complementary and integrative health.

General themes that emerged in the Working Group's report included that the primary driving factor in decisions on this topic should be research needs in the field in 5 to 10 years. Clinician-scientists are valuable to the research enterprise, and have varied career paths. Team science is becoming increasingly vital; its benefits should be institutionalized and the concept embraced, including by individuals at junior levels. Ways should be found to attract stellar candidates to the profession of clinician-scientist, and to do so early on. As part of intensifying efforts to enhance diversity in the clinician-scientist workforce, NCCIH could consider offering opportunities for professionals from complementary and integrative health fields to obtain training and career support. Research infrastructure and mentorship should be improved within both research-intensive and complementary and integrative health institutions—e.g., through committed support at all levels for the integration of clinical services and the pursuit of research on complementary and integrative health.

The formal recommendations that emerged from the Working Group to NCCIH were as follows:

- 1. Make improvements in existing programs if a need is identified, and find new ways to leverage and optimize these programs.
- 2. Continue to support a variety of career paths to the goal of clinician-scientist, addressing specific roadblocks in each type of path. As part of this effort, develop innovative approaches to support research training for clinicians with complementary and integrative health degrees.
- 3. Develop programs to support the host environments at all types of institutions involved in research training in complementary and integrative health. This effort should include incentivizing institutions to reward teams of scientists and clinicians.
- 4. Raise the visibility of complementary and integrative health in the research and clinical community at large by enhancing the profile of both complementary and integrative health-trained clinician-scientists and conventionally trained researchers who conduct research in this field.
- 5. Tie NCCIH's training and career development initiatives to the Center's priority areas for research funding, while remaining open to potential support of new areas as appropriate.
- 6. Consider ways to address challenges related to the peer review process.

In conclusion, the Working Group was optimistic about the potential for substantial growth and strengthening of the complementary and integrative medicine clinician-scientist workforce in the next 5 to 10 years, given the success of previous NCCIH targeted programs and the general trend in the improvement of research quality in complementary and integrative health. Some of the most important and challenging areas identified in which NCCIH could have an impact were:

- Facilitating the pairing of individual clinicians with the strongest and most successful scientific mentors
- Incentivizing the creation and sustainability of strong and diverse research teams
- Supporting the infrastructure of both complementary and integrative health and conventional institutions to optimize the environment for team-based research.

These challenging areas will all require changes in institutional culture—namely, acceptance of complementary and integrative health research topics as worthy of mainstream science, and appreciation of the value of teams in academic recognition.

National Advisory Council For Complementary and Integrative Health (NACCIH) Working Group Report on Clinician-Scientist Workforce Development

Full Report Submitted to the NACCIH on February 5, 2016

Legislation authorizing what is now the National Center for Complementary and Integrative Health (NCCIH), Public Law 113-215, stipulates research training as one part of the Center's purpose. Accordingly, since its founding, NCCIH, formerly the National Center for Complementary and Alternative Medicine, has supported a variety of high-quality research training and career development programs. These opportunities have been aimed at increasing the number, quality, and diversity of well-prepared, skilled investigators with knowledge and expertise both in complementary and integrative health and in state-of-the-art research methodology.

As it develops its next strategic plan, NCCIH has been considering what the research workforce needs for complementary and integrative health will be in the next 5 to 10 years and beyond. In October 2015, Josephine P. Briggs, M.D., NCCIH Director, requested that the National Advisory Council for Complementary and Integrative Health, NCCIH's advisory council, convene a working group on workforce development with a specialized focus on clinician-scientists.

The definition of "clinician-scientist" varies, including among institutions, committees, countries, and other entities. For the purpose of this report, the Working Group defined clinician-scientists in complementary and integrative health as licensed, certified clinicians—e.g., physicians, acupuncturists, chiropractors, naturopathic medicine practitioners, nurses, and massage therapists—who provide professional health care and also have research training and an advanced degree (a master's and/or doctoral degree) in a scientific discipline (e.g., epidemiology, neuroscience). The latter especially applies to those clinicians actively engaged in the conduct of biomedical or behavioral research. Clinician-scientists typically engage in both clinical care and basic or clinical research, although not always together at the same time in their career.

In December 2014, Congress, in an omnibus budget measure signed by President Obama, changed the Center's name from the National Center for Complementary and Alternative Medicine to the National Center for Complementary and Integrative Health. This change reflects more accurately the Center's research commitment to studying promising health approaches already in use by the American public; aligns with its strategic plan; and recognizes that most people who use non-mainstream approaches use them along with conventional treatments, not as an alternative.

"Complementary health approaches," as used by NCCIH, refers to practices and products of non-mainstream origin, and "integrative health" refers to incorporation of complementary

approaches into mainstream health care. This report consistently uses the term "complementary and integrative health," which combines both terms and for which NCCIH does not use an acronym.

Charge

The group's formal charge was as follows:

While NCCIH will continue to provide research training and career development opportunities for the breadth of investigators involved in research in complementary and integrative health, the purpose of this Working Group is to focus on research training and career development for clinician-scientists—individuals trained in both science and clinical practice. They offer a unique perspective and serve an essential bridge between research and clinical practice.

Dr. Briggs asked the Working Group to focus primarily on identifying needs and gaps in this arena and developing concepts for how to meet them. The group's ensuing report would be discussed by the full Council, and final recommendations would inform the forthcoming strategic plan for the Center. Group members were encouraged to take a "big picture" view and make recommendations that were conceptual. However, potential ideas and examples that may be relevant to implementation were also invited. Translating the strategic plan to actual implementation, including in this topic area, is the responsibility of NCCIH staff.

Background

Training the biomedical research workforce, including clinician-scientists, is a topic being discussed and studied across NIH and other Federal agencies as well as in the greater biomedical community—e.g., by the Institute of Medicine and the Royal College of Physicians and Surgeons of Canada. Public data include two recent representative reports (1) *The Physician-Scientist Workforce Working Group Report*, a 2014 report to the Advisory Committee to the NIH Director that cites much of the scientific literature related to clinician-scientists, and (2) *Developing a 21st Century Neuroscience Workforce: Workshop Summary*, a 2015 report from the Institute of Medicine.

An array of needs and challenges exists with respect to building the clinician-science workforce in general. They are detailed in the above reports, exist at all NIH Institutes and Centers (ICs), and are shaped by an environment of constrained resources at NCCIH, NIH, and more broadly. Additionally, some challenges are particular to NCCIH, including the following:

- The Center's mission is not disease- or organ-focused, while those of many other NIH ICs are.
- The Center's umbrella covers not only conventional academic, medical, and researchintensive institutions, but academic institutions that train health care practitioners in the use of complementary approaches such as acupuncture, chiropractic, and naturopathy.

- NCCIH's mission encompasses a large array of interventions and modalities that are also very diverse, including in their maturity with respect to integration with other health approaches, existing evidence, grant support, and number of potential research grant applicants.
- Credentialing is also diverse; for example, many complementary and integrative disciplines do not require doctoral-level training. Yet, commonly used NIH training mechanisms such as K, F, and T awards require doctoral degrees or matriculation in doctoral degree programs.

In general, the current challenges and roadblocks to training the clinician-scientist workforce, as noted in the literature and in Working Group discussion, include the following:

- Marked prolongation of the training process
- The necessity to give up one's current job in order to pursue training
- Debt burden from training, including for those already carrying educational debit
- Income pressures to see patients
- Time consuming, demanding requirements to maintain clinical credentials
- Finding mentors to support and guide career development
- Lower profile for research endeavors compared with clinical practice
- Burdens of travel, e.g., among geographically separated institutions and departments
- Historical difficulties transitioning once a training grant ends
- Work/life balance.

For people who have a degree in complementary and integrative health and wish to be a clinician-scientist in that field, these challenges apply along with additional ones noted under Recommendation 2 below.

The Working Group considered its charge against a research landscape that has evolved and continues to do so in multiple ways—including in the importance of partnerships and teams across an array of fields, professions, and disciplines. Modern clinical research, for example, has been described as a "team sport" that increasingly requires the expertise of multidisciplinary collaborative groups. No single individual possesses all the needed skills. Thus, the Working Group discussed the role of clinician-scientists on research teams in complementary and integrative health, how promising candidates might be attracted to and trained for the job, the optimal functionality of teams, and how that might be incentivized and strengthened.

Working Group Members and Process

Members of the Working Group were chosen for their diverse perspectives and technical expertise, including as clinician-scientists, relevant to the assigned topic. The group was chaired by Helene Langevin, M.D., and the other members were David Borsook, M.D., Ph.D., Christine Goertz, D.C., Ph.D., Mary Jane Guiltinan, N.D., and Aviad Haramati, Ph.D. Partap Khalsa, D.C., Ph.D., cochaired the group and led the organizational effort at NCCIH. Titles and affiliations of all Working Group members and lead NCCIH staff appear in the Appendix.

The Working Group accepted Dr. Briggs's charge and, in November 2015, began to define and discuss the issues, consider relevant data, and formulate its recommendations. The group held six teleconferences, which concluded in January 2016. The various data and resources to which it had access included:

- Reports pertaining to the topic from the Institutes of Medicine and the Advisory Committee to the NIH Director
- Journal articles
- Responses to a Request for Information issued by NCCIH in April 2015 as part of its strategic planning process, many of which cited the importance of workforce development and especially a need to train clinician-scientists
- Center data presented by staff on (1) NCCIH-funded trainees (i.e., holders of T32, F31, K08, K23, and K24 grants completed from Fiscal Years 2005 to 2014) compared with all NIH-funded trainees relative to time to receipt of a subsequent NIH research project grant, and (2) training trajectories for NCCIH-trained clinician-scientists.

Discussion Questions

To spur and shape discussion, the Working Group was asked to consider a series of questions developed by NCCIH program staff and Dr. Briggs, based on inquiries that they commonly receive:

- 1. For a successful, sustainable career in biomedical and behavioral research, what breadth and depth of training, skills, and career development is needed for clinician-scientists in complementary and integrative health?
- 2. Given the breadth of this field, are there applicable general guidelines, or is tailoring needed to specific domains (e.g., basic versus clinical) and/or specific interventions (e.g., acupuncture, meditation, or natural products)?
- 3. What are the roles that clinicians, not just clinician-scientists, can play in the clinical research process? What types of scientific research training are needed for clinicians of all types (e.g., doctors of acupuncture and Oriental medicine, chiropractic, naturopathy, and osteopathy) to contribute to the research enterprise?
- 4. There are a number of clinical disciplines within complementary and integrative health that do not currently train clinicians at doctoral levels, such as yoga therapists, massage therapists, and some acupuncturists. What scientific training is needed relevant to those disciplines?
- 5. Are there existing resources that could be used to maximize training and career development for early-career clinician-scientists?

Major Discussion Themes and Related Recommendations

A number of overarching themes emerged in the course of the Working Group's discussions and deliberations. The summary below opens with some general themes, followed by the group's six recommendations with related themes and points. First, the Working Group determined that research needs in the field of complementary and integrative health in 5 to 10 years should be the primary factor to consider—both needs that can be anticipated to the degree possible now and new ones that occur. All will guide development of the research-workforce pipeline, including for clinician-scientists.

The group confirmed the value of clinician-scientists to the complementary and integrative health research enterprise, including through their:

- Skills enabling rigorous studies
- Perspective that informs the design of research studies, making them relevant to the clinic while elevating the quality of the science
- Ability to bridge multiple divides—e.g., between different domains and languages
- Knowledge of complementary and integrative modalities
- Real-world, practical experience with those modalities
- Understanding of the systems and beliefs associated with them, where applicable.

The Working Group offered that the current environment calls for examining what constitutes a "clinician-scientist" (and, secondarily, other clinician roles in the research process) and paths to that position. Traditional paths as well as potential new ones are captured in Box 1.

Box 1: Examples of Career Paths to Clinician-Scientist in Complementary and Integrative Health Research

- Candidates with a complementary and integrative health background who desire to attain a Ph.D., M.P.H., or other research credential
- Candidates with an M.D. degree outside complementary and integrative health who desire to move into research in the latter
- Candidates with a Ph.D. and/or M.P.H. who wish to move into researching complementary and integrative health
- Candidates who do not have a research degree (e.g., an M.P.H. or a Ph.D.) but wish to move into complementary and integrative health research.

Team science is an emerging concept that will likely be vital a decade from now, the group noted, and how to make it an element of training will be an important consideration. A similar trend was noted, toward increasingly collaborative models of health care. It is not completely clear yet whether individual achievements in team science will be important, and if so, how important they will be in the context of job decisions, tenure, promotion, credit, etc. However, the Working Group considered it important to support the team science concept, discussed further with respect to clinician-scientists under Recommendation 2.

Another general theme was to find ways to attract stellar candidates to this field of research, and to do so as early as possible in the school or career trajectory. People who are considering their careers need to see that "clinician-scientist in complementary and integrative health" is a valid and important career path with longevity. NCCIH could have more of an impact in this area than it does at present—e.g., by facilitating transitions from training awards to academic/research appointments, and working to raise the historically low success rate and

compress the many years it has typically taken for NCCIH-trained clinician-scientists to obtain their first NIH research project grant.

Intensifying efforts to enhance diversity in the clinician-scientist workforce was another general theme. Specifically, it was suggested that NCCIH consider offering opportunities for clinicianscientists from complementary and integrative health fields to obtain training and career support. It was noted that how to diversify the scientific workforce is a challenging issue for all of NIH, which is interested in strategies to increase the representation of diverse individuals underrepresented nationally in biomedical research and reduce related disparities in research awards.

Improving research infrastructure was another general theme, within both complementary and integrative health and conventional academic institutions. Receptivity of the prospective host environment(s) to programs and/or candidates should be assessed and ensured. There needs to be strong, committed support for both the integration of clinical services and the pursuit of research in complementary and integrative health at multiple levels, including at the highest level such as the department chair or dean of research. Mentorship should be available from more than one discipline, department, and/or institution, where applicable—for example, mentors both from the trainee's home complementary and integrative institution and from a research-intensive institution. Members described many benefits from this kind of multiple- or co-mentoring as in developing technical expertise and building relationships that continue to be important when seeking to take the next step post-training.

Recommendations

The Working Group's six recommendations to NCCIH, with additional themes and points, are summarized below.

Recommendation 1. Make improvements in existing programs if a need is identified, and find new ways to leverage and optimize these programs.

As part of the background informing the Working Group's discussions, NCCIH staff presented data on training trajectories for clinician-scientists in complementary and integrative health who received the following grants: T grants, which are institutional training grants; F grants, which are individual predoctoral or postdoctoral fellowships; and K grants, which are career development awards. A summary slide appears in Box 2.



Staff noted that the data on NCCIH training awardees appeared generally consistent with that for NIH as a whole in terms of how long it takes for trainees to obtain their first NIH major research grant (usually an R01)—typically 10 to 15 years. There were diverse trajectories to success, and past trajectories may or may not be appropriate models for training needed in the future. Most grantees have had additional research training after clinical training, whether in conventional health care or complementary and integrative health, while a few grantees were trained first as a scientist and then pursued a clinical degree.

The Working Group and Center staff observed that the outcomes for these grant recipients were quite variable. Some NCCIH training and career development programs were more successful than others. The effects of successes can be seen, for example, at scientific meetings both in mainstream health—e.g., the American Pain Society and the American Academy of Child and Adolescent Psychiatry—and in complementary and integrative health; in publications; and in the rising quality of applications to NCCIH over time. Several members mentioned that R25 grants facilitated change of institutional cultures at complementary and integrative health institutions toward greater acceptability of, and interest in, scientific inquiry, expertise, and related careers.

Some NCCIH training programs have had less success. One example is the F31 program, Ruth L. Kirschstein Predoctoral Individual National Research Service Awards, which at NCCIH are intended to enable promising predoctoral students to obtain individualized, mentored research training from outstanding faculty sponsors while conducting dissertation research; this would facilitate their subsequent transition to becoming independent research scientists in complementary and integrative health. The Working Group emphasized that the F31 program and any others found to be less than optimally successful for the intended purpose should be carefully examined and enhanced, not discarded.

Leveraging and/or optimizing the Center's existing programs, including to best use constrained resources, should be part of this. One approach that has worked well and should continue to be explored, the Working Group concluded, is the funding of partnerships. A number of examples were shared, such as research training partnerships between Bastyr University and the Institute of Translational Health Sciences at the University of Washington, and Palmer College of Chiropractic and the University of Iowa. Members also recommended that NCCIH's programs always include monitoring to determine success and whether improvement is needed.

Recommendation 2. Continue to support a variety of career paths to the goal of clinician-scientist, addressing specific roadblocks in each type of path. As part of this effort, develop innovative approaches to support research training for clinicians with complementary and integrative health degrees.

The Working Group recommended that NCCIH define the clinician-scientist position(s) in complementary and integrative health research that are needed and achievable in the next 5 to 10 years and beyond, outline the choice of career paths by which outstanding candidates can be trained for those positions, and identify and address specific roadblocks on each type of path. As part of this, the Center should explore innovative approaches to encourage cross-pollination—i.e., for people who hold research Ph.D. degrees to obtain clinical training in complementary and integrative health, and vice versa. There are a variety of paths to this goal. Three are described below along with associated challenges and some Working Group ideas to address them.

Scenario 1. A candidate with a background in complementary and integrative health wants to pursue research.

Challenge: Depending on the strength of the person's undergraduate degree, acceptance into a top Ph.D. program may be difficult and into an M.D./Ph.D. program even more so.

Proposal: Once the candidate is in a Ph.D. or an M.D./Ph.D. program, an NCCIH F31 or F30 award would be key to support the student to focus his/her thesis on complementary and integrative health, which may be a departure from the research focus of the candidate's thesis advisor. The challenge for these individuals is to "catch up" in terms of their understanding of the culture of science. Many clinicians in complementary and integrative health are excited about research, but naïve about its rigors and restrictions. Involvement in research societies in this field is a good way for these individuals to become familiar with research and get to know researchers before embarking on a research career. NCCIH could partner with professional societies to encourage this process.

Scenario 2. A candidate with an M.D. degree wants to pursue complementary and integrative health clinical training and research.

Challenge: The main challenge for these individuals is to "become" scientists, when their initial focus was clinical.

Proposal: Postdoctoral training in research is needed, as an F32 or T32 award from NCCIH, a graduate degree as a Ph.D. or M.P.H., or a program like the Global Clinical Scholars Research Training Program at Harvard Medical School that is built around being a scholar in clinical and translational science. Second, strong mentoring in science is key. NCCIH could help these individuals succeed by incentivizing top-quality mentors to support postdoctoral projects related to complementary and integrative health, a topic that may be new to their labs. The unique strength of these individuals is their eventual breadth of training and their understanding of both conventional medicine and complementary and integrative health. Success would depend on the strength of research mentoring.

Scenario 3. A candidate starts with a Ph.D., with or without postdoctoral training, and wants to pursue complementary and integrative health clinical training and research.

Challenge: These individuals are well positioned to succeed in complementary and integrative health research if their prior research training is strong. However, the challenge is to "reenter" the science world after the clinical training hiatus. Also, this career path is unlikely once a researcher has an established lab, making it difficult to take time off to pursue clinical training.

Proposal: An additional postdoctoral step may be needed that could be incentivized by NCCIH.

On all career paths, the benefits of team science should be institutionalized. Individuals need to know to embrace this idea, particularly at junior levels. In terms of logistics, developing training opportunities that are inexpensive, do not require constant travel, and/or do not require trainees to leave their current jobs would help address several of the common roadblocks.

Additional potentially useful concepts were discussed. One was the reissue in January 2016 of Funding Opportunity Announcement RFA-DA-11-005, "Training in Computational Neuroscience: From Biology to Model and Back Again (T90/R90)," an NIH Blueprint for Neuroscience Research initiative sponsored by 17 ICs, including NCCIH. This RFA will support integrated research education and research training programs providing interdisciplinary training in experimental and computational neuroscience at the undergraduate, predoctoral, and/or postdoctoral levels, by capitalizing on the infrastructure of existing multidisciplinary and interdisciplinary research programs. Additional Working Group suggestions of new training vehicles and mechanisms appear in Box 3.

Box 3: Examples of Potential Training Mechanisms/Vehicles

- Institutional training awards (which enable the institution to select fellows)
- Individual awards
- Supplements for research training in complementary and integrative health to NIH grantees in other fields
- Supporting candidates with a complementary and integrative health background within established programs—e.g., medical science training programs and research Ph.D. programs
- Interprofessional education
- New concepts such as:
 - Centers of Excellence—intended to train not only specific workers but an entire community, nation, etc.
 - Training the Trainer—e.g., develop a training-focused expert or include the training of new trainers as part of a grant
 - "Germinating Centers"—built around students using team-based mechanisms.
- Shorter-form trainings—e.g., workshops, practica, and job-shadowing opportunities
- Web-based training such as webinars
- Teleconferences

Recommendation 3. Develop programs to support the host environments at all types of institutions involved in research training in complementary and integrative health. This effort should include incentivizing institutions to reward teams of scientists and clinicians.

A decade from now and beyond, teams of scientists—including teams having clinicianscientists—will continue to be needed to move the field of complementary and integrative health research forward. The resulting question of how to grow and sustain the research base is broad-ranging, applying not only to clinician-scientists but the larger biomedical research workforce and to other bodies—e.g., from the larger scientific community worldwide to governments, from public and private funding agencies to individual institutions. In addition, individuals assess for themselves the potential benefits of career pathways, such as the potential for academic and personal growth. Many of these issues will be beyond the purview of NIH.

The Working Group saw NCCIH's role in this arena as being able to facilitate and speed the process, through its position in the field and as a convener, provider of science-based information, developer of strategized approaches to supporting the training purpose, and a supporter, e.g., through funding opportunities.

A member recommended that to facilitate this effort NCCIH should develop programs to support the host environment at both complementary and integrative health institutions and conventional medicine ones. Related concepts offered by members included:

- Incentivize all research institutions to include complementary and integrative health professionals and disciplines in their research enterprises.
- Incentivize the supporting and rewarding of team science, not just individuals' achievements. This will require a deep change in research and institutional culture that will not happen rapidly, but the Working Group considered it a priority.
- Provide targeted funding opportunities that support training at complementary and integrative health institutions.
- Study the ideal composition of research teams, including where clinician-scientists best fit.

Regarding the last bullet, a member observed there has been a longtime perception in clinician-scientist training that the end goal must be a Ph.D. or M.P.H. and leading one's own R01 trial. There was agreement that this view is not always advantageous to potential trainees, or to research-funding sources such as NIH. Whether a clinician-scientist chooses the role of primary investigator or collaborator, their critical roles should be viewed positively and encouraged. The group recommended that NCCIH be specific in its funding announcements about particular positions it wishes to see included on teams and what it means by the term "clinician-scientist" when used.

Recommendation 4. Raise the visibility of complementary and integrative health in the research and clinical community at large by enhancing the profile of both complementary and integrative health-trained clinician-scientists and conventionally trained researchers who conduct research in this field.

While research-based news about complementary and integrative health has reached a higher profile over the Center's 17 years of existence—e.g., in scientific and medical journals, mass-market media outlets, and mainstream medical education and training, and on the Internet—the Working Group thought that more progress in this area was needed. More examples of the important and interesting scientific work being done by NCCIH grantees—internal and external to the Center, including trainees—and of impactful findings should be more visible. One piece will consist of continuing to raise the rigor of the research. Another will be training and sustaining people who show promise to become "superstars" in the field. Examples of other suggested ways to pursue this goal appear in Box 4.

Box 4: Approaches for Raising Visibility

- Presentations at grand rounds and/or on the Web by impactful clinician-scientists (and others) in complementary and integrative health drawn from NCCIH and its grantee pool
- At meetings and conferences, having lecturers who have a complementary and integrative health background and/or can speak on a topic in that field
- Timely dissemination of grant results, including to journals, reputable science reporters in the mass media, quality blogs in the topic area, etc.
- Educational presentations to teach the public, health care providers, and others about research in this field, including the kinds of questions that can or cannot be addressed
- Outreach to potential candidates for training, as discussed earlier in this report
- Expertise available on the communications staffs of home and host institutions.

Mainstream medicine may offer natural allies to the effort. For example, many M.D. primary care physicians may not know how complementary and integrative health approaches can contribute to managing challenging clinical problems they face, such as musculoskeletal pain disorders. Enlisting such physicians as potential collaborators on comparative effectiveness studies or in building models for collaborative care would contribute to gradually broadening the awareness of complementary and integrative health within conventional medicine. In addition, such collaborations could inform the design of studies involving whole systems and whole practices in complementary and integrative health. A second example was psychiatry, which has much to contribute to understanding the difficult problems of pain, for example, and often aligns naturally with complementary and integrative modalities—e.g., mind and body approaches.

Recommendation 5. Tie NCCIH's training and career development initiatives to the Center's priority areas for research funding, while remaining open to potential support of new areas as appropriate.

The Working Group envisioned that these NCCIH initiatives and related curricular content should be forward-looking—i.e., pointing toward research needs in the field in 5 to 10 years—and include the methods and conduct of research, clinical content, and new scientific areas becoming standard. Informatics, the brain, and the microbiome are a few current examples. They should also tie to high-priority areas for research funding at NCCIH.

Additional suggested parameters were that they should:

- Be relevant to clinicians and meet their needs and expectations.
- Promise large impact for the investment.
- Be part of an open and flexible approach, with a process to distinguish those of higher priority from lower, and to address suggestions of emerging topics.
- Address difficult problems in the clinical community lacking satisfactory solutions, such as chronic low-back pain, and pain management in general.

- Include the study of mechanisms, as complementary and integrative health has often lacked data and processes that can be communicated and appreciated outside its own community.
- Have application beyond the field of complementary and integrative health—e.g., preventive strategies to develop coping skills and resilience, as in youth, and ways to support health care provider health and well-being.

Recommendation 6. Consider ways to address challenges related to the peer review process.

NCCIH has been aware for years that peer review and study sections can be a barrier and a challenge with respect to review of applications in complementary and integrative health, including those for training and career development. For its own special emphasis panels, the Center recruits reviewers with both scientific and complementary and integrative health expertise. However, the peer review process may still present specific roadblocks with respect to grants for training clinician-scientists in complementary and integrative health. Some special attention may be valuable relative to review of grant applications to build this workforce. The Working Group recommended ensuring that study sections are aware of applicable specialized issues and needs related to building the workforce of clinician-scientists in complementary and integrative health.

Conclusions

The working group overall was optimistic about the potential for substantial growth and strengthening of the complementary and integrative health clinician-scientist workforce in the next 5 to 10 years, given the success of previous NCCIH targeted programs (e.g., F32 and R25 grants) and the general trend in the improvement of research quality in complementary and integrative health. It was felt that some of the most important and challenging areas in which NCCIH could have significant impact are:

- Facilitating the pairing of individual clinicians with the strongest and most successful scientific mentors
- Incentivizing the creation and sustainability of strong and diverse research teams
- Supporting the infrastructure of both complementary and integrative health and conventional institutions to optimize the environment for team-based research in complementary and integrative health.

These challenging areas will all require changes in institutional culture—namely, acceptance of complementary and integrative health research topics as worthy of mainstream science, and appreciation of the value of teams in academic recognition.

Appendix: Working Group Members and NCCIH Staff

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