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The 1999 ASCI Presidential Address: *Executive Summary of the Nerflex Commission Report*

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ASCI Presidential Address

SUMMARY OF THE 1999 PRESIDENTIAL ADDRESS

Delivered by Dr. Ajit Varki on April 24, 1999 Fairmont Hotel, Chicago, IL

The ASCI presidential address has traditionally been a scholarly effort on a topic of academic interest such as peer review, biomedical ethics or science education. Two years ago, Mike Welsh made a radical departure from this tradition. Recognizing that the Society faced many serious problems, he presented instead a practical analysis of these issues. Last year, Tim Ley continued this new format for the Presidential Address. This year, I decided to take a middle road. Having discussed most matters of importance to the Society in the spring newsletter, I could focus in my address on one critical issue, namely the declining numbers of physician-scientists.

Much has been written on this matter in the past, including scholarly expositions by many distinguished society members. I decided to take a different approach, *a retrospective* historical analysis of this problem, made from an unusual vantage point – the year 2049. Imagining myself to be a time traveller, I presented the executive summary of the Nerflex Commission Report dated April 25th, 2049. This blue ribbon panel chaired by Sarah Nerflex was commissioned by U.S. President Heather Ling Garcia. Its charge: "To evaluate and explicate the decline in pre-eminence of U.S. medical schools and the resulting flight of the best students and scientists to medical schools in Southeast Asia and elsewhere."

See following pages for the Executive Summary of this report, published in the JCI

The report describes the disappearance of the "physician-scientist", the consequent flight of basic researchers to non-medical institutions and to other countries, the elimination of the MD/PhD programs, the JCI declaring its independence from the ASCI, and the eventual dissolution of the ASCI in 2031. I deliberately presented a dark and dismal prognosis, and the worst possible scenario for the future. If I have disturbed some members in doing so, I have achieved my purpose. I ask you to recognize that these scenarios are not implausible, and that we all need to work hard to ensure that such negative outcomes cannot and will not occur. It is no longer sufficient for the rank and file of our membership to stand and watch while a few leaders represent the situation and suggest possible solutions to other biomedical organizations and to governmental funding agencies. In addition to such policy and fiscal recommendations, it is necessary for each society member to take an active role. What can individual ASCI members do?

- Work with your ASCI Institutional Representative to form a local committee of ASCI members who can act as career development advisors for medical trainees considering careers in biomedical research, and for junior faculty who have embarked on such careers.
- Increase the visibility of the ASCI on your campus and support the research training of medical students, residents, and fellows.
- Award an ASCI prize for the best research performed by a medical student at your school. National winners could be supported for travel to our annual meeting to present their work.
- Actively educate your PhD colleagues about the importance of having physician-scientists and continuing to train them for the future,
- Maintain good intellectual contacts with your full-time clinician colleagues, so that they can appreciate the role that you are playing.
- If you are in a position of leadership as a Dean or Department Chair, use your position to support and enhance the training and career development of physician-scientists.

The ASCI Council also stands ready to support such local activities with logistic and fiscal support. In closing, I thank you all for the privilege and honor of having served as your President. I call on each of you to rally around and work with Jeff Leiden and the current leadership of the Society to ensure the perpetuation and success of the physician-scientist career track.

Ajit Varki
La Jolla, California

VISIT THE ASCI WEB SITE

The website features a frequently updated membership database that is extremely accurate with a search engine that is very fast. The activities of the Society and of the Council are also posted. We encourage you to bookmark the site, to use the database when you need to contact a colleague, and to browse it frequently for updates and new information about our initiatives.

Our web site address is http://www.asci-jci.org/asci/

EXECUTIVE SUMMARY

of the

NERFLEX COMMISSION REPORT

April 25, 2049

Chaired by

SARAH ANNA NERFLEX, MD
Chief Scientific Officer
Pacific Rim Pharmaceuticals Inc.

Commissioned by

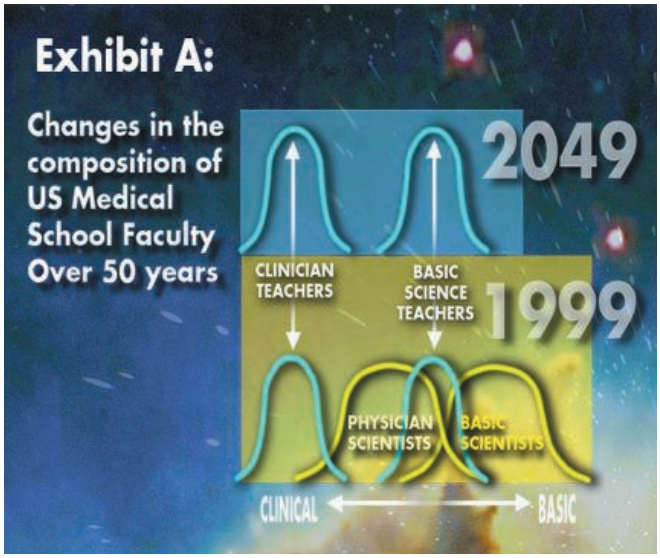
HEATHER LING GARCIA
President, United States of America

Charge to the Commission

> *"To evaluate and explicate the decline in preeminence of American medical schools over the last several decades, and the resulting flight of the best students and scientists to medical schools in Southeast Asia and elsewhere."*

Preamble

American medical schools in the year 2049 primarily consist of 2 types of faculty (Exhibit A, top). The first category includes full-time, practicing clinician-teachers who deliver excellent medical care, teach medical students to do the same, and conduct contracted clinical research for pharmaceutical companies. The second category is composed of basic scientist-teachers, whose primary function is to deliver preclinical teaching to medical students and who commit a limited amount of time to perform bench research. In contrast, the American medical schools of 50 years ago had 2 other kinds of faculty (Exhibit A, bottom). First, there were PhD scientists whose primary activity was basic research, who had a somewhat limited teaching role other than supervision of thesis projects by graduate and medical students. Second was the now-defunct category of biomedical researchers once called the "physician-scientist," who conducted varying combinations of patient- and disease-oriented research, or basic research, while also participating to some extent in teaching. After reviewing all available data, this commission concludes that the single major factor responsible for the decline of American medical schools is the disappearance of the physician-scientist, with the flight of basic researchers to nonmedical institutions and to other countries being a secondary consequence.



This summary is thus, essentially, an analysis of the disappearance of the physician-scientist from American medical schools during this century.

Historical background: relevant events of the 20th century

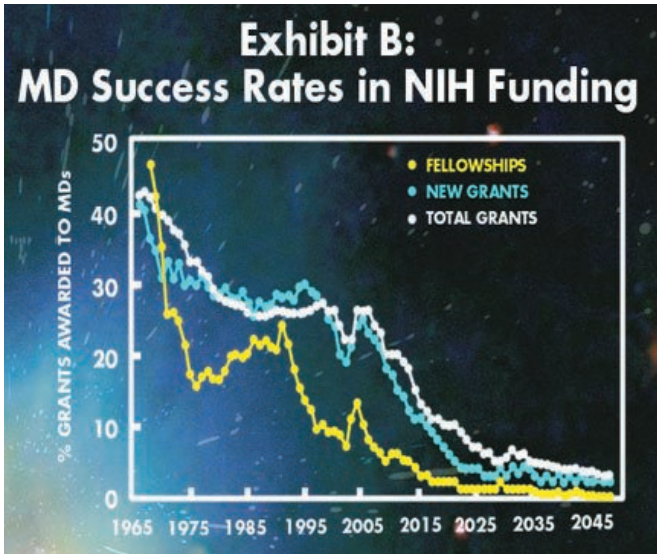
The Flexner Commission of 1910 is credited with modernizing American medical education at the turn of the last century, partly by catalyzing the introduction of scientific thinking into American medical schools. With the resulting establishment of research capabilities in medical institutions, and the subsequent expansion of funding by the National Institutes of Health (NIH), biomedical science in the United States reached its zenith at the end of the 20th century. Although the subsequent decline addressed in this report became obvious less than 20 years ago, its roots can be traced back much further. The first alarm was sounded in 1979 by James Wyngaarden, who subsequently became the NIH Director. Wyngaarden (1) noted a decline in the number of physicians applying for, and succeeding in obtaining, NIH research grants at all levels, from early trainees to established investigators. The continuation of these downward trends in the present century is evident from the data in Exhibit B, with the decline in training grants leading the way. Through the last 2 decades of the 20th century, there were additional warning signs, and articles by many prominent scientists appeared (2, 3), discussing the increasing difficulty in attracting physicians into training and subsequent careers in research. By the mid 1990s, it was clear that the classic model of the physician-scientist "triple threat" (simultaneously conducting research, teaching, and patient care) was no longer viable. Thus, physicians with research training gravitated in 1 of 2 distinct directions: either toward hands-on, patient-oriented clinical research, or toward the other extreme — very basic,

laboratory-based investigation. Meanwhile, the downward trends identified by Wyngaarden accelerated, and fewer and fewer physicians voluntarily sought any research training.

Toward the end of the 20th century, it was not too late to reverse these trends. Unfortunately, the now-defunct for-profit "managed care" approach to medicine expanded in the 1990s and seriously damaged the financial stability of medical institutions, and thus distracted the attention of medical school leaders from the problem of the disappearing physician-scientist. Indeed, the precarious financial situation of medical schools at the turn of the century caused these institutions to press their research-intensive medical faculty to return to more lucrative clinical care activity. The existing physician-scientists apparently voted with their feet, either by returning to full-time practice with some activities in patient-oriented research, or by giving up clinical activities altogether. Several articles discussing the crisis appeared in 1998–1999 (4–7), and various organizations took up the challenge. At first, these efforts were aimed primarily at restoring research funding and credibility to clinical research, which was defined as the direct involvement of a physician with a live patient (4–6). However, an article by Leon Rosenberg in 1999 (7) emphasized that "The term 'physician-scientist' is . . . meant to be an inclusive designation, covering basic, disease-oriented, patient-oriented, population-oriented, and prevention-oriented investigations . . . the entire species of physician-scientist is at risk — not only those doing patient-oriented research."

Historical background (2000–2030)

Up to this point, few major biomedical research societies had paid attention to this broader view of the physician-scientist problem. Some of the first



actions were taken by the American Society for Clinical Investigation (ASCI), an honor society of younger physician-scientists which had previously been focused only on its scholarly activities. The ASCI joined the Federation of American Societies for Experimental Biology (FASEB), the well-known and respected coalition of biomedical research scientists, and worked to develop a consensus conference on this issue. Meanwhile, the Institute of Medicine and the Committee on Science, Engineering, and Public Policy of the National Academy of Sciences also investigated the matter. These efforts produced reports (8, 9) that confirmed the seriousness of the problem and made several concrete suggestions as to how the negative trends might be reversed. Many of these recommendations were then put into practice by the NIH in the early part of this century. These included a doubling in size of the MD/PhD (MSTP) training programs (in 2002); establishment of the Medical Student Research Fellowships and Junior Medical Faculty Career Awards with opportunities for medical tuition debt relief (instituted in 2003); supplements to RO1 grant holders (MD or PhD) to support the 3-year participation of a medical student, house officer, or medical fellow (instituted in 2004); clinician-teacher matching salary grants for physicians with highly rated RO1 grants (instituted in 2004); and PhD to MD training programs (instituted in 2007).

All these interventions seemed appropriate and were made feasible by the expanding budget of the NIH. However, inadequate attention was given to the underlying problem of the diminished entry of students and young faculty with medical degrees into the physician-scientist pipeline, and to their poor subsequent success rate. Thus, as the first decade of this century drew to a close, it became evident that there was an inadequate talent pool to take advantage of the huge resources that had been set aside for these special programs.

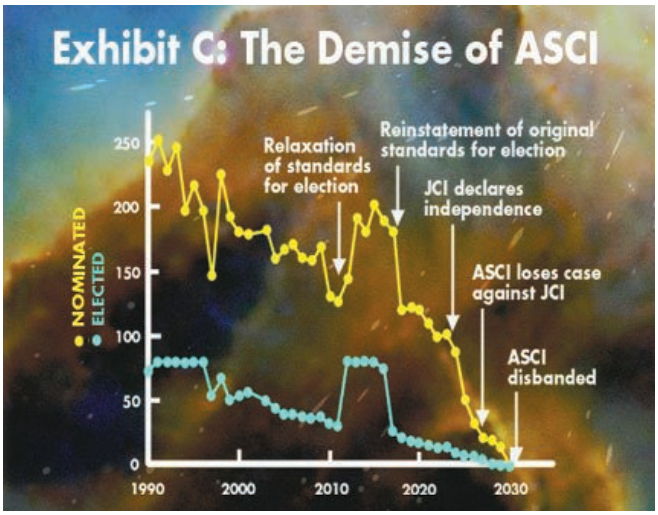
This deficiency evidently allowed a backlash that came from 2 groups that had been skeptical from the outset. First, traditional PhD scientists, who questioned whether having a medical degree was necessary for conducting biomedical investigation; and second, full-time clinicians, who felt that training in basic research was not required to carry out conventional clinical trials and other types of bedside, patient-oriented research. Furthermore, with the continuing fall in the number of physicians on the peer review panels of the NIH, there was less and less sympathy for medically oriented grants originating from physician-scientists. Meanwhile, the Global Internet Stock Exchange collapse of 2014 and the Great International Recession of 2015 brought an abrupt end to the expansion of the biomedical research budget of this country. Draconian cuts in governmental spending were needed to satisfy the Balanced Budget Constitutional Amendment that had been passed in 2010. Eventually, a blue-ribbon commission appointed in 2016 by NIH Director Asha Bose (herself a PhD scientist) concluded that most of the previously instituted physician-scientist support programs should be cut back or terminated. Even the MD/PhD track came into question, though for different reasons. Although many talented students continued to compete for this program, it was apparent that it was merely producing 2 types of individuals: the majority, who never took any further training in medicine and simply went

on to academic careers in basic science departments; and the minority, who went on to full-time clinical practice. It was cogently argued that individuals in the first category were not much different from well-trained PhD researchers with an interest in medically relevant issues, and that those in the latter category represented "failures." Thus, the MSTP program was markedly cut back in 2020 and terminated in 2021. All of these cutbacks occurred despite the fact that the economy was now stable, the NIH budget was once again increasing, and medical schools were now fiscally stable, thanks to the Federal Single Payer Health Act of 2012.

The decline and fall of the ASCI

With the benefit of hindsight, it is easy to see that the real problem was with the lack of role models allowing young biomedical research trainees to envision a successful career involving both medicine and research. The previously mentioned ASCI honor society continued its attempts to reconcile the situation and to fight the changes that were occurring. However, most of this activity originated from a minority of ASCI membership. Most ASCI members seemed to have been content with their well-established academic careers and did not make attempts to provide the role models or training environments that were needed. To be fair, the increasing dominance of medical school leadership by full-time clinicians who did not appreciate these remaining physician-scientists also made any sort of activism difficult. Thus, so many years later, J.H. Pratt's comments in 1934 (10) about research conducted by physicians once again rang true for American medical schools: "Many of the older clinicians seemed to think it was a foolish thing for a young man who expected to become a clinician to engage in physiological or chemical studies in the laboratory, whether the observations were on patients or animals. Dr. Meltzer [a cofounder of the ASCI] thought it very important to encourage and assist young clinicians who were carrying on investigative work, especially in the laboratory, during the early years."

Meanwhile, the ASCI itself was under siege for what were perceived to be elitist membership standards, demanding (for election) a high degree of research achievement by physicians and insisting that the work involve the "methods of natural sciences" (a requirement contained within their original charter). The downward trends in both nominations and elections to the ASCI, first noted in 1997 (see Exhibit C), continued until 2011, when a subgroup of the leadership tried to rescue the situation by lowering the standards for election. They argued that any reasonable and well-conducted biomedical research should be sufficient for membership, regardless of whether or not it involved the natural sciences. This resulted in a temporary upswing in election to the ASCI in the period 2012–2016. However, the leadership was then wrested back by those who believed that the original standards should be maintained, regardless of the consequences to membership levels. Meanwhile, the Journal of Clinical Investigation (JCI), the official journal of the ASCI, which had been edited almost exclusively by physician-scientists, could no longer find enough qualified individuals within North America. The JCI thus chose to expand its editorial board with nonphysicians and the newly emerging cadre of physi-



cian-scientists in Asian medical schools. Eventually, the JCI declared its independence from the ASCI in 2024, and joined the International Federation of Electronic Biomedical Journals. The JCI also took with it a substantial fraction of the fiscal endowment of the ASCI, after successfully arguing in court that the funds had in fact originated from journal activities (see Exhibit C). The legal battle between the ASCI and its former journal proved to be the final straw for the Society. In the end, it was a pyrrhic victory for those who had insisted on maintaining the high standards of the ASCI, when the Society ceased to exist in 2031.

Lack of action by other biomedical research societies

During this period, most other biomedical research societies took no action because they could not convince their members of any reason to intervene. Moreover, in contrast to the days when physician-scientists comprised a significant part of their membership, and were even involved in their leadership, such representation had became increasingly rare. Indeed, as shown in the example in Exhibit D, the percentage of new members with a medical degree joining the American Society for Cell Biology showed a downward trend that practically reached zero by 2020. In retrospect, this trend was already visible in the late 1990s, when concerns about the physician-scientist issue were strongest. With regard to physician-dominated societies, almost all were focused on the needs specific to the medical profession or on the conduct of clinical research involving hands-on contact with patients. The only exception could have been the Association of American Physicians (AAP), a venerable organization that had shared an annual meeting with the ASCI until the year 2024. The AAP had continued, as before, to elect members representing the scientific and academic leadership of medicine. However, with the increas-

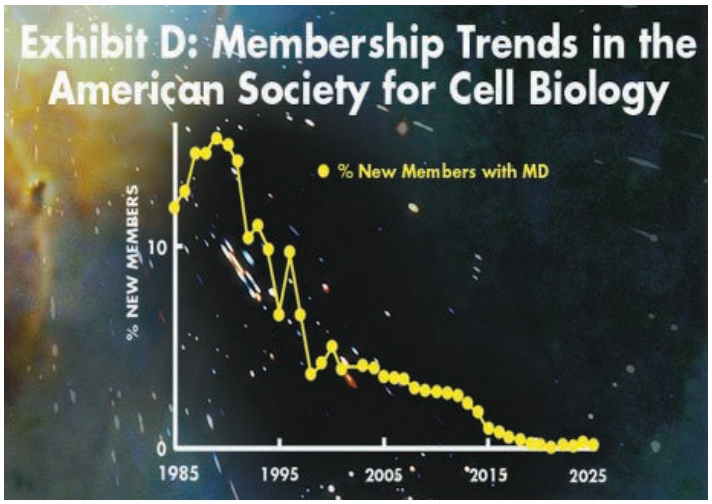
ing emphasis on patient-oriented clinical issues in medical schools, the resulting shift in leadership of the AAP made it no longer a viable champion to support the physician-scientist issue.

The deterioration of American medical schools

The next notable trend was the flight of top-notch basic researchers from American medical schools to general university campus departments. With the elimination of the salary differential between medical school and general campus science faculty, the disappearance of bench-trained physician-scientists from medical school, and the increasingly thorny interactions of PhDs with full-time clinicians, there was little incentive for the successful basic scientist to remain in a medical school. The clinically based leadership of these schools was content to allow this flight, as long as they could retain faculty willing to deliver the required preclinical teaching to medical students. Indeed, the increasing value placed on such teachers eventually resulted in their current dominance of medical school basic science departments. Thus, another great tradition of American medical schools of the past — strong basic research in preclinical departments — was eroded and eventually lost. Ironically, the end result today is similar to the situation that the Flexner Commission deplored in 1910: most American medical schools in 2049 have essentially become modern-day trade schools, bereft of emphasis on serious scientific inquiry.

Ascendancy of Asian medical schools

Although all these events transpired in the United States, the exact opposite occurred in several Asian countries (including the Democratic Republic of China, which emerged after the Great Democratic Revolution of 2020). These



changes have resulted in the current dominance of Asian medical schools. Ironically, the transformation was driven primarily by talented individuals who had originally trained in the physician-scientist system of American academia and then returned to their own countries, determined to change their medical schools to match the ideal they had witnessed in the United States at the end of the 20th century. Meanwhile, as conditions for the remaining physician-scientists in American medical schools deteriorated, such individuals became easy targets for recruitment by the now increasingly successful and research-oriented Asian schools. Given the financial and economic stability of these countries, the equalization of the standard of living, and the reduction of trans-Pacific travel time, there was little that American schools could do to prevent this flight of talent. Any remaining physician-scientists in American medical schools were then recruited by pharmaceutical and biotechnology companies hungry for this increasingly rare talent profile. This left us with the current system described earlier, with 2 types of faculty who do not interact very much and who carry a very limited portfolio of research. Small wonder that our best students and scientists now prefer the stimulating and challenging environments provided by the research-intensive medical schools of Southeast Asia.

It is also worth noting the failure of the Japanese biomedical enterprise to achieve the same success as the other Asian nations. The record indicates that the Japanese generally chose to imitate the changes made in the United States in the early part of this century, particularly with regard to completely eliminating the concept of the physician-scientist. That the Japanese biomedical research system is currently in a similar state of dilapidation as the United States' provides an independent confirmation of the conclusions of this report.

Secondary consequences to the American biomedical enterprise

The rest of the secondary consequences now become obvious. With the scarcity of trained physician-scientists in the United States, major multinational pharmaceutical companies that originated in this country have increasingly recruited their physician-scientist leadership from other countries. Coupled with the increasing difficulty of finding PhD scientists in the United States who have had medical school exposure, it is not surprising that several major pharmaceutical and biotechnology companies have chosen to move their research enterprises and headquarters overseas. With this careful review of history, one must acknowledge the foresight of the anonymous physician (11) who wrote a letter to the Editor of the journal *Science* in the year 2005, saying: "Dear Sir: most of your recent letter writers question why we should bother to 'save' the physician-scientist. To them I quote a 20th century folk song: '...you don't know what you've got till it's gone' (Joni Mitchell, *Big Yellow Taxi*, 1971)." In retrospect, it is easy to see that the physician-scientist did indeed play many vital roles in catalyzing research excellence in the biomedical research establishment, particularly in American medical schools.

Recommendations

The commission recommends that the United States rebuild its major medical schools into the formerly successful model, first by restoring the category of physician-scientist shown earlier at the bottom of Exhibit A. This should be

done not just by recruiting back American physician-scientists from elsewhere in the world, but also by reinstituting funding mechanisms to train and support a new generation of physician-scientists in this country. Such individuals can act as the vital link between clinicians and research-oriented basic scientists that will eventually attract the latter back into medical school departments. History also tells us that well-trained physician-scientists are needed in all areas of biomedical research. Even physicians who primarily do basic research can serve as a bridge to more clinically active individuals, while performing a valuable "catalytic" function in educating their PhD colleagues about the realities of biomedical issues. Also, some of the best patient-oriented research is likely to be done by physicians who have spent some time doing basic research, and then turned to a more clinically active career. The experience that such individuals have also allows them to fully understand PhD scientists and to interact freely with them. Thus, support expended in the research training of physicians who later forsake bench science is not necessarily wasted. All of these actions will be of no use unless an effort is made to restore the image of the physician-scientist in the eyes of science-oriented college students. To begin with, this might best be achieved by inviting prominent physician-scientists from Southeast Asia to conduct lecture tours in American science-based colleges and/or undertake prolonged sabbatical leaves in American medical schools. If adequate resources are provided to American medical schools, it might even be possible to convert such temporary sabbaticals into permanent recruitments. This might be criticized by Asian countries as a new round of "brain drain" from these countries, akin to what happened in the last century. However, this time around, such a migration could be considered justifiable. After all, it was the American biomedical research system of yesteryear that gave rise to the Asian biomedical research powerhouse of today.

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(References 8, 9, and 11 are fictitious.)

Acknowledgments

This pessimistic view of the future was part of the 1999 ASCI Presidential Address, delivered in Chicago on April 25, 1999. I deliberately presented a dark and dismal prognosis, and the worst possible scenario as a future outcome. If I have disturbed some readers of this message, I have achieved my purpose. It is important to recognize that this scenario is not implausible, and that we all need to work to ensure that such negative outcomes to the United States biomedical enterprise cannot and will not occur. ASCI is actively working with other societies to ensure the perpetuation and success of the physician-scientist career track.

I thank Hudson Freeze, PhD, Lee Rosenberg, MD, Nissi Varki, MD, and Stephen Hedrick, PhD, for critical comments and helpful suggestions. Exhibit A is based upon a suggestion to the author by Roger Tsien, PhD. Time-line data used in the exhibits (up to 1998, the rest is fictitious) were provided by Belinda Seto, of the NIH (Exhibit B); Susan Nelson, Executive Director of ASCI (Exhibit C); and David Driggers, of the American Society for Cell Biology (Exhibit D).