

Making the Future of Personalized Medicine a Reality: A Q&A With the President of the Personalized Medicine Coalition, Edward Abrahams, PhD



EDWARD ABRAHAMS, PHD, is the president of the Personalized Medicine Coalition (PMC), an education and advocacy organization whose mission is to advance personalized medicine. Based in Washington, DC, PMC comprises approximately 250 stakeholders across the spectrum of healthcare.

AJMC®: PMC uses the term personalized medicine, whereas the term precision medicine is used by many others. Why is the term personalized medicine preferred for PMC?

ABRAHAMS: Although we use the terms interchangeably at times, the term *precision medicine* refers just to the interaction between a diagnostic test and use of a drug, whereas *personalized medicine* is broader and also involves the patient, including the patient's values and perspectives.

AJMC®: When you started PMC, there were far fewer personalized treatments than there are today. Can you elaborate on some of the growth that you have seen and how you and PMC have helped to spur that growth?

ABRAHAMS: When we first counted the number of personalized medicines—that is, drugs with reference to biomarkers on their labels—on the market in 2008, there were 5. When we recently completed the same exercise in 2016, we counted 132. In fact, as recently as a few weeks ago, we saw the first cancer drug approved with reference only to biomarkers and not to the tissue of origin (Keytruda). That is a milestone in personalized medicine.

AJMC®: How does personalized medicine have the potential to affect the efficiency of healthcare delivery?

ABRAHAMS: By linking therapy to diagnostics, we can avoid the costs associated with treating patients with therapies that do not work for them. We therefore believe molecular diagnostics and targeted treatments can help reduce overall costs. Importantly, that is not something that is often considered in news reports regarding the “high cost of drugs.” These reports often focus exclusively on the sticker price, overlooking the fact that these drugs will not be prescribed to people for whom they will not work—unlike the current paradigm in which drugs are prescribed in the same way for all patients.

AJMC®: Given that there are so many personalized medicine diagnostic tools, what types of regulations are in place to ensure the quality of these diagnostic tests? What is the role of government in spurring development as well as regulating personalized medicine diagnostics and treatments?

ABRAHAMS: I think you are referring to one of the more contentious issues in personalized medicine: how laboratory-developed tests are regulated. At the moment, there are two pathways to market, one through an FDA approval of a given test, which can be expensive, and the other through a Clinical Laboratory Improvement Act process overseen by the Centers for Medicare and Medicaid Services, which regulates laboratories but not tests. In vitro diagnostics, or “kits,”

are regulated by the FDA, whereas laboratory-developed tests, for the most part, are not. The problem is that we are working with a framework put in place in the late 1970s, long before the advent of personalized medicine. A modernized framework must protect both patients and innovation, which can be challenging. There have been multiple proposals to reform the regulatory system, but none have been put in place yet.

AJMC®: How has the draft guidance on laboratory-developed tests affected personalized medicine, and, if approved, how would this draft guidance influence personalized medicine going forward?

ABRAHAMS: The draft guidance issued in 2014 was not promulgated after the recent election. However, if that guidance had been promulgated and not withdrawn, as it was, it might have brought some clarity to the field without congressional action. After the election, the FDA decided to issue a white paper with its recommendations but no official guidance.

AJMC®: How has the Personalized Medicine Coalition been involved in the Cancer Moonshot initiative?

ABRAHAMS: The Cancer Moonshot initiative incorporates the principles of personalized medicine. It is a broad-based effort to accelerate research in oncology and is something that PMC has supported, especially as this initiative has proposed more widespread sharing of data to better understand how patients respond to different therapies.

AJMC®: What are some challenges of data sharing, and how does the regulation relate to these challenges?

ABRAHAMS: It is a process in development because data sharing—among academic institutions or commercial entities—does not come naturally. Sharing is a challenge, but there are organizations doing it. The Oncology Research Information Exchange Network, for example, is a collection of cancer institutes that are putting together the data they are collecting so that they can get a bigger

and clearer picture of how different patients respond to therapy.

AJMC®: In evaluating large-scale genetic testing in cancer from the perspective of insurers, the decision to cover a large-scale test versus companion diagnostic tests is a challenge. Today, many insurers are limiting patients to companion diagnostic tests. However, in some cases, doing multiple companion diagnostic tests can be more expensive than completing a large-scale panel test. How are some of these changes in cost driving change in insurance markets and practice?

ABRAHAMS: Rightly so, insurers want to see the clinical utility of any test before they reimburse for or cover it. Insurers may be afraid of getting too far in front of these developments. However, a number of companies are working with insurers to define the level of evidence that they will accept to make these very important decisions. Insurers, I hope, will also soon realize that diagnostics can be their friend, because these tests will inform providers and payers which patients should not receive expensive medications. However, I should add that this paradigm is more on the horizon than a reality.

AJMC®: How can government investments and incubators spur development in personalized medicine? What are some best practices to ensure that those investments are efficient?

ABRAHAMS: The role of incubators is very important because it is very difficult to raise sufficient capital to launch new ideas and new products that are very unlikely to make it to market. Investors, especially knowing how difficult this is, will shy away from wanting to fund precompetitive new ideas. Incubators provide launching pads for new ideas and innovations, which is very important. I was involved in developing incubators in the commonwealth of Pennsylvania. Using tobacco money, the state instituted three incubators to stimulate the »

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biotechnology industry. These incubators were located in Philadelphia, Hershey, and Pittsburgh. In this program, the state made investments not unlike what might be expected of a venture capital firm.

AJMC®: What is the role of the 21st Century Cures Act in stimulating investment in personalized medicine?

ABRAHAMS: The 21st Century Cures Act did a number of things to advance personalized medicine. It authorized \$4.8 billion in funding for the National Institutes of Health, for efforts that include the development of a million-person cohort to study in the future. It authorized \$500 million for the FDA to continue its work on stimulating innovation through biomarkers and other initiatives. It also required the FDA to consider the patient experience in developing new therapies. This legislation also established a review pathway for biomarkers and other development tools. We saw that development actualized with the recent approval of Keytruda (pembrolizumab) for treatment of patients with cancer based solely on biomarkers.

We think the 21st Century Cures Act was very important in underpinning the development of personalized medicine. The references to personalized medicine throughout the legislation are evidence that the field now has a solid foundation of support within government, in addition to the solid science supporting personalized medicine.

AJMC®: How is oncology particularly well suited to personalized medicine therapies, and how can personalized medicine expand to areas beyond oncology?

ABRAHAMS: The best example of personalized medicine is actually outside oncology—in cystic fibrosis. However, it is true that in cancer

we have made more progress toward understanding how this disease is genetically based, and we can therefore treat the disease in a way that references the tumor's mutation and the patient's underlying biology.

AJMC®: What are some of the treatment challenges that need to be overcome to establish personalized medicine in clinical practice?

ABRAHAMS: The provider needs to figure out, through diagnostic tests, how the patient is likely to respond to therapy. Unfortunately, many providers are still unaware of the importance of getting the right diagnosis at the molecular level before making a decision as to which medicines to employ. In fact, a PMC-commissioned survey suggests that only 11% of patients have been exposed to the concept.

AJMC®: In 1981, former FDA commissioner Robert Califf, MD, published an article in *West Journal of Medicine* stating that computer-aided decision making would be the future of medicine. However, this paradigm has largely not materialized. How are personalized medicine and information technology coming together to finally enable this transformation?

ABRAHAMS: In 1981, there were very few electronic medical records. Even in 2003, only 17% of physicians had electronic medical records. However, today, the percentage of physicians with electronic medical record systems is approaching 90%. The widespread availability of electronic medical record systems will facilitate the incorporation of personalized medicine more rapidly in healthcare. I would also add that there is less genomic information in those electronic medical records as we might like to have, but that surely will come.

AJMC®: Why is it important for insurers to cover tests for genetic markers, even when there is no available treatment to target those genetic markers?

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ABRAHAMS: I think we should focus first on ensuring that diagnostic tests linked to therapies are covered. One can understand that insurers want to see clinical utility, and I understand their reluctance to cover a test for which the yield is information alone. In contrast, it makes no sense not to cover a test that is required to inform the decision of whether or not to use a particular therapy.

AJMC®: What is the role of PMC in making the shift to personalized medicine happen, legislatively and through advocacy?

ABRAHAMS: The role of the Personalized Medicine Coalition is to address problems in three areas: regulation, reimbursement (especially with regard to adequate reimbursement for diagnostic tests that provide value to the healthcare system), and clinical adoption. While we have our work cut out for us, the good news is that most people recognize that personalized medicine represents a better paradigm than the one-size-fits-all, trial-and-error paradigm we are largely centered on today. Each new success story in personalized medicine brings the future closer.

AJMC®: What were some of the important pivotal moments in the development of personalized medicine?

ABRAHAMS: The first big milestone was the approval of Herceptin (trastuzumab) for breast cancer in 1998. Another important milestone in personalized medicine occurred in 2011 with the simultaneous approval of two medications and precision medicine diagnostics. One of these approvals was for Xalkori (crizotinib), for the treatment for non-small cell lung cancer, and the other was for Zelboraf (vemurafenib), for melanoma. With the approval of these two medications, we saw pharmaceutical companies and diagnostic companies working together closely to develop precision medicine treatments. More recently, Keytruda (pembrolizumab) has been approved for the treatment of patients with tumors that express the microsatellite instability-high or mismatch repair

deficient biomarker, regardless of where on the body the tumor is located.

AJMC®: What does the future of personalized medicine look like?

ABRAHAMS: On the horizon are many avenues for development of personalized medicines, including gene editing, wearables, and point-of-care products. Based upon these new technologies, I expect the medicine of the future to be much more personalized than the treatments of the present. Critical to this shift is our ability to integrate data into healthcare.

AJMC®: What is the attitude of insurers toward personalized medicine at the present?

ABRAHAMS: I think that insurers are beginning to understand that if personalized medicine makes our health system more efficient, everyone will benefit, including them. For example, in a newly announced deal between Harvard Pilgrim and Amgen, reimbursement for an injectable anticholesterol medication called Repatha is contingent on patient outcomes.

AJMC®: In your view, what is the next step in precision medicine?

ABRAHAMS: The next chapter has to be more alignment of all stakeholders and systems to produce better outcomes to derive greater value and increase the efficiency of the healthcare system. We must have researchers, regulators, payers, and providers all working together to move the system toward this new paradigm. That is something for which the Personalized Medicine Coalition has been advocating for over a decade, and I would say that we are making some progress, as can be seen in some of the legislative successes—specifically with the December 2016 passage of the 21st Century Cures Act and the growth in the number of available products. This has required leadership and coordination from many institutions. I am pleased that so many people are now talking about personalized medicine, but we have a lot of work to do, especially in terms of public and provider education. ■