Personalized medicine: a comprehensive approach in oncology

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Received: 18 August 2011 / Accepted: 6 September 2011 / Published online: 11 October 2011
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The explosion of genomics and its application to biomarker research has the potential to revolutionize modern medical practice in oncology. Although “one size fits all” systemic therapy has been successful in increasing cure rates in cancer patients, it has come at a cost of great toxicity and inefficiency: the great majority of cancer patients receive toxic therapies of no benefit to them. The development of targeted therapies has ushered in the promise of a new age of “personalized medicine”, often, reductively, conceived of as the selection of therapy according to the molecular characteristics of each individual’s tumor. Several successes have resulted in the improvement of survival of molecularly defined subpopulations of cancer patients, such as trastuzumab for HER2 amplified breast cancers [1], imatinib for GIST tumors [2] and crizotinib for ALK translocated lung cancers [3]. However, as science’s ability to probe ever deeper into the molecular makeup of individual tumors improves, clinicians are faced with a problem of incomparable complexity. For instance, we learned that virtually each form of breast cancer [4] presents a different molecular profile that purports a different susceptibility or lack thereof to chemotherapy. Recent initial results from next generation sequencing projects have shown few recurrent somatic mutations in human tumors,

and a great plethora of infrequent hits in many genes [5]. The complexity further increases if we take into consideration not only the tumor, but also the tumor microenvironment and the reaction that the patient’s immune system organizes against the tumor. What is the meaning of this complexity? How are clinical researchers grappling with it? How can it but confuse the clinician? Are we witnessing the impending failure of the scientific approach to medicine? Or the end game of the monumental war on cancer, with a final majestic thrust to understand the details of every tumor?

This biological complexity, which underlines the uniqueness of each and every tumor, and perhaps every tumor lesion, mirrors, in a sense, the uniqueness of each and every individual carrying that tumor. Indeed, personalized medicine really implies a much wider focus than that currently used in modern oncology: it points to the irreplaceable uniqueness of each individual, of “the person”, including his or her psychosocial make-up, his or her personal history and experiences, the socioeconomic environment he or she lives in, the nature of family support, host characteristics (such as differences in metabolism), and finally, the unique molecular characteristics of the tumor.

These are not mere theoretical concepts. Indeed, there are individuals who require a specific form of therapy for their own tumor, which is ineffective for any other tumor. One of our patients is receiving a medical treatment, which failed clinical trials, but which has kept her tumor at bay for years. The pharmaceutical company has agreed to continue producing this drug just for this patient. This is clearly not a highly effective business model, and may foreshadow the future of clinical oncology. Why is it that this otherwise ineffective treatment is effective in this one person?

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In short, personalized medicine is a tribute to the person, a recognition that medical technology should submit to and serve the uniqueness of each individuals including, albeit not limited to the unique intricacy of metabolic and genetic interactions.

As the title suggests, this journal has a particular mission regarding the place of the person in medicine. This is why we feel that it is particularly opportune for this journal to begin to address the many facets of personalized medicine, including those that may be perhaps forgotten in modern medicine's single-minded focus on biology. The following two issues of the *Journal of Medicine and the Person* will include invited articles on topics in personalized medicine, beginning with three articles in this issue addressing evolutionary changes in the way we do medical research as a result of the genomic revolution in biology, making possible a personalized medicine from a biological viewpoint. Keating and Cambrosio masterfully illustrate how clinical trials, the backbone of research in oncology, are changing as a result of the novel focus on personalized cancer care. An overview article by Yeatman details the successful partnership between private industry and a public cancer center for personalized cancer care dovetails well with an article from the Segal Cancer Center in Montreal, Canada, by Aguilar-Mahecha, which describes their experience in building up the research program underlying personalized care.

The following articles to be published in the subsequent issue begin with a definition of the person and human dignity by a theologian and philosopher, Michael Waldstein. Articles from the Moffitt Cancer Center in Tampa Bay, Florida, highlight the breadth of what personalized medicine may imply, with one by Benedetti dealing with the scientific basis for a personalized approach to pain management and another by Jacobson describing a personalized approaches to psychosocial care.

These somewhat eclectic articles cover an unusual range of topics from philosophy to psychology and finally to

molecular biology and genomics. In our view, they serve as an introduction to a debate which is ongoing, but which we would like to foster and certainly broaden. Our objective is to see “personalized medicine” in its true context, the context of the whole person. After all, the whole person is the true object of medical care.

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