

Precision Medicine

Accelerating the science to revolutionize cancer care

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BACKGROUND: Precision medicine in cancer care uses specific information about a person's tumor to help diagnose, plan treatment, prognosticate, and surveil throughout the cancer trajectory. Applications exist for cancer prevention, early detection, cancer treatment, and supportive care. Several national initiatives (e.g., National Cancer Moonshot Initiative) support these efforts to accelerate this science forward.

OBJECTIVES: This article presents an overview of the way in which precision medicine is revolutionizing cancer care.

METHODS: Definitions, historic perspectives, and specific examples are provided, which illustrate the use of precision medicine in cancer care.

FINDINGS: Oncology nurses and other healthcare professionals have a responsibility to learn about the science and national initiatives supporting precision medicine, provide clear patient education messages for optimal understanding, and address challenges.

KEYWORDS

precision medicine; cancer care; National Cancer Moonshot Initiative; oncology nurses

DIGITAL OBJECT IDENTIFIER

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PRECISION MEDICINE IS REVOLUTIONIZING CANCER CARE, and great potential exists to cure more types of cancer, increase survival, and improve overall patient care. The accelerated rate of precision medicine science requires nurses and others healthcare professionals to stay abreast of the latest advances in this area, which are vast. This article provides an overview of precision medicine, discusses the driving forces behind the precision medicine initiative, gives examples of precision medicine in cancer care, and highlights implications for patient care.

The definition of precision medicine has evolved with time. In its broadest sense, it is about developing and delivering the right approach (whether diagnostic or therapeutic) for the right person at the right time (Warner, 2017). It was historically called personalized medicine, but this was confusing in that people thought they were receiving “personalized” care; therefore, the term has shifted to “precision medicine” for disease prevention and treatment. The definition has evolved and become more accurate with time. Prasad and Gale (2017) analyzed “precision oncology” articles from 2005–2016 and saw a shift from a focus on targeted therapies, to treatment selection based on tumor biomarkers, to using next-generation sequencing to guide cancer treatment. They defined precision oncology as “directing therapy independent of cancer type as currently defined (based on anatomy and histology), and instead by mutation” (Prasad & Gale, 2017, p. 143). According to the National Cancer Institute ([NCI], 2017c), precision medicine is “a form of medicine that uses information about a person’s genes, proteins, and environment to prevent, diagnose, and treat disease. In cancer care, precision medicine uses specific information about a person’s tumor to help diagnose, plan treatment, monitor the effectiveness of treatment, or make a prognosis.” Unnecessary treatments also can be avoided if the individual’s profile does not match a particular therapy. Understanding precision medicine requires knowledge about the nomenclature of the field. Table 1 provides a glossary of terms.

Evolution of Precision Medicine

Traditionally, cancers were treated by site of origin, tumor histology, and extent of disease. As knowledge about the makeup of cancers and their growth mechanisms has been refined, this approach has changed. One early example is the ability to measure estrogen receptors on breast cancer cells and use those results to predict response to endocrine therapy. This became standard clinical practice in the 1970s and is still an important indicator, but the methods for testing have changed with time (McGuire, 1973). Another example is the ability to measure the expression of the human epidermal growth factor receptor 2 of the *ERBB2* gene in breast cancer. Overexpression of