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Recognizing the Value of Precision Medicine: Oncology and Beyond

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A NEW ERA OF HEALTH CARE delivery and treatment is emerging. The focus is changing from a one-size-fits-all model to tailored care that accounts for each patient's clinical situation and targets the precise molecular alterations involved in disease processes. Known as precision medicine, this fresh perspective on care involves understanding the underlying mechanisms of disease, specifically targeting molecular abnormalities and stratifying patients' responses to specific drugs.^{1,2}

Considering individual variability when addressing healthcare strategies is not a novel idea. For instance, blood typing has been used for more than a century to guide blood transfusions; however, informatics and information breakthroughs, such as full-genome sequencing, next-generation sequencing (NGS) technologies, and the ability to stratify patients based on proteomic, genomic, and metabolomic signatures has expanded the application of personalized medicine to a wider range of possibilities, from initial diagnosis to treatment selection to dosing.^{2,3}

Two components that are crucial in the implementation of precision medicine (PM) are targeted therapies and companion diagnostics. Targeted therapies are specifically designed to treat a subpopulation of patients within a given disease, typically based on genetic markers (or immunologic markers). For these patients, companion diagnostics are used to identify the genes, proteins, and other signatures needed to implement use of the targeted therapies. Through the disease course, companion diagnostics also may help provide additional information on the effectiveness of treatment or the progression of disease.³

Precision Medicine Today

Cancer is among the leading causes of death, both nationally and worldwide. Today, PM is particularly important in oncology, as it requires an in-depth understanding of the tumor biology of each patient. Over the past several decades, researchers have identified molecular patterns and targets that are useful in defining the prognosis of a given cancer, determining the appropriate treatments to administer, and designing targeted treatments to address specific molecular alterations. By concentrating on certain molecular features and characteristics that are present only in cancer tissues or predominantly in cancer tissues, PM therapeutics minimize the effects of treatment on healthy cells and improve the diagnosis and use of targeted treatments.^{1,4} »