

The Reference Values in the Precision Medicine Era: They still make sense?

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Laboratory reference ranges have historically been essential for interpreting biomarker levels and guiding clinical decisions. Derived from population-based studies, these ranges offer a standardized framework for detecting abnormalities and assessing health status. However, with the advent of Omics technologies—including genomics, proteomics, and metabolomics—and the rise of Personalized Medicine, the relevance of traditional reference ranges is increasingly being questioned. Omics enables comprehensive molecular profiling at an individual level, allowing for the development of personalized baseline values that account for genetic, environmental, and lifestyle factors. These individualized reference ranges provide a more accurate assessment of health, disease onset, and treatment response, compared to standard population-based thresholds. Although traditional ranges continue to serve as useful tools for initial screening and epidemiological studies, their static nature limits their utility in precise, tailored healthcare. Integrating personalized molecular data into clinical practice promises to enhance diagnostic accuracy, monitor disease progression, and optimize therapeutic interventions. Overall, while traditional reference ranges remain relevant in broad contexts, their role is diminishing as personalized, data-driven benchmarks become central to modern medicine, ultimately supporting the transition toward more precise and individualized patient care.