Measuring Circulating miRNAs: The New “PSA” for Breast Cancer?

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Disclosures: Jeffrey S. Ross: *Employment/leadership position:* Scientific advisor, BioReference Laboratories, Inc.; *Intellectual property/patents:* HER2 gene amplification detected by FISH; *Consultant/advisory role:* Novartis, Genentech, EMD Merck Serono, Boehringer Ingelheim, Foundation Medicine; *Honoraria:* Genentech; *Research contracts/funded research:* Veridex, Roche, Novartis (pending), Constellation Pharma (pending).

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Micro-RNAs (miRNAs), small noncoding sets of 19–24 nucleotides associated with mRNA expression, regulate the expression of downstream gene targets including transcription factors, oncogenes, and tumor suppressor genes [1–3]. In the past 5 years, a number of studies have focused on the use of serum-based detection of miRNAs as novel biomarkers for cancer diagnosis, classification, and outcome after therapy [1–3]. In their study of circulating miRNA profiles in patients with cancer, which appears in this issue of *The Oncologist*, Heneghan et al. [4] report that, using a quantitative polymerase chain reaction method, *miR-195* levels were found to be breast cancer specific and could differentiate patients with breast cancer from patients with other cancers and from controls with a sensitivity of 88%, at a specificity of 91%. Moreover, when *miR-195* measurements were combined with levels of the miRNAs *let-7a* and *miR-155*, this panel of three circulating miRNAs further enhanced the discriminative power of this test for breast cancer to 94%. This level of predictive accuracy has

not been previously achieved by well-known serum immunoassays for circulating antigens such as carcinoembryonic antigen, cancer antigen 15.3, maspin, and mammaglobin. Thus, there is significant potential for serum miRNA testing to become standard practice for the management of patients with established disease, both to differentiate breast origin in patients with carcinomas of unknown primary site and, especially, to monitor the response of breast cancer to hormonal, conventional, and targeted therapies. Moreover, the potential for circulating miRNA levels to detect early-stage breast cancer and help resolve borderline clinical imaging studies further adds to the growing excitement concerning this new approach to cancer diagnostics. Although the requirement for larger confirmatory prospective studies cannot be minimized, and competition from other approaches such as circulating tumor cell assays will be extensive, the future looks very bright for rapid growth in the widespread use of miRNA diagnostics in everyday oncology practice.

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