Comparison of Breast Cancer Tumor Marker Test Results: A Retrospective Analysis of Paired CA 15-3 and CA 27.29 Testing at a National Reference Laboratory

David Lin, Jonathan Genzen; ARUP Laboratories

Objectives: Cancer antigens (CAs) 15-3 and 27.29 are commonly used in the clinical management of breast cancer patients. While monitoring the serological concentration of tumor markers over time should always be conducted using the same assay/platform, inconsistent test ordering and parallel testing of multiple markers remains common. Given that immunoassays for CA 15-3 and CA 27.29 target different epitopes of the same glycoprotein, Mucin 1 (MUC1), we set out to examine the correlation and/or potential differences of tumor marker results when both tests were ordered by clinicians.

Methods: Using a protocol approved by our internal review board, a retrospective limited dataset of paired CA 15-3 and CA 27.29 clinical results (generated on the same specimen) was obtained. CA 15-3 testing was conducted with Roche reagents on either E170 or e602 instruments (Roche Diagnostics). CA 27.29 testing was performed with Siemens reagents on Advia Centaur or Centaur XP instruments (Siemens Diagnostics). Vendor-specific instrumentation changes reflected clinical laboratory use of prior and/or current platforms over time. For the purpose of statistical analysis, CA 15-3 results <1 U/mL were converted to 0 (n = 37) and CA 27.29 results <4 U/mL were converted to 3 (n = 98).

Results: 37,705 paired results from 12,474 distinct patients (98.9% women) were available for analysis. Patient medians analysis demonstrated stable performance of both tumor marker assays over time and instrumentation. The average age of the population at the time of testing was 62 ± 13 years old. 4,856 patients had ≥2 separate paired tests conducted. The correlation between CA 15-3 and CA 27.29 concentrations was high, and demonstrated Pearson and Spearman correlation coefficients of 0.967 and 0.971 respectively. Paired t-tests, however, showed a significant difference between the overall average CA 15-3 and CA 27.29 concentrations. When comparing results based on whether pairs were either (1) concordant between the 2 assays (ie, both results within or outside the reference interval [RI]), or (2) discordant (ie, one test result within but the other outside the RI), concordance was observed in the vast majority (93.7%) of pairs. Among discordant results, CA 27-29 results tended to be outside of the RI, while CA 15-3 results tended to be within the RI (observed in 73.6% of discordant cases). Most individual patient results over time trended similarly across both markers.

Conclusions: The present findings indicate that substantial correlation exists between CA 15-3 and CA 27.29 results, while also reinforcing that they should not be used interchangeably. As CA 15-3 and CA 27.29 result patterns trend similarly across sequential specimens for individual patients, there is little evidence for value in performing both tests unless discordance with clinical condition is suspected. Clinicians should therefore consider using either (but not both) for routine tumor marker testing in breast cancer patients.