

<https://doi.org/10.29289/259453942025V36S11016>

1016 – Rapid test for the detection of a specific breast cancer biomarker in human serum samples

Nicole Anita Brito Madurro¹, Izabella Campos Ferreira¹, Donizeti Wiliam Santos¹, Carlos Eduardo Paiva¹, Yara Cristina Paiva Maia¹

¹Universidade Federal de Uberlândia – Uberlândia (MG), Brazil.

Introduction: Breast cancer is one of the major challenges in global health, with 2.3 million cases and 670,000 deaths per year among women. Early detection enables less invasive treatment and higher cure rates.

Objective: To describe the development of a rapid and simple test based on gold nanoparticles (AuNPs) conjugated with a breast cancer-specific antibody (anti-CA 15-3) for the detection of the CA 15-3 biomarker in serum from patients with benign breast disease (BBD) or advanced breast cancer (ABC).

Methods: AuNPs were synthesized by citrate reduction and functionalized with cysteine in phosphate buffer (pH 7.4) at room temperature. The immobilization of the anti-CA 15-3 on AuNPs was performed by incubation at room temperature. Serum samples (2 µL) from patients with BBD or ABC were added to microtubes containing the AuNPs/anti-CA 15-3 kits, incubated for 30 minutes at room temperature, followed by the addition of 3 µL of saturated NaCl solution.

Results: A total of 12 serum samples from patients with BBD or ABC, two from healthy individuals, and one containing the ovarian cancer biomarker CA-125 were analyzed. Experiments performed in triplicate were evaluated by UV-vis spectrophotometry. Color changes and spectral shifts were observed in all BBD and ABC samples when compared with samples from healthy individuals. The kit containing AuNPs/anti-CA 15-3 initially presented a pink coloration with a peak at 526 nm. After contact with BBD or ABC samples, the color changed to intense purple, with peaks between 550–560 nm (BBD) and 610–620 nm (ABC). The stability of the kit was evaluated for 90 days, remaining stable throughout the period.

Conclusion: The kit was effective in discriminating between healthy individuals and patients with BBD or ABC, demonstrating potential as a low-cost, rapid, and easy-to-use diagnostic tool for breast cancer monitoring.

Ethics: Research Ethics Committee Approval (CAAE 78501924.0.0000.5152; Approval No. 5.796.210).

Keywords: breast cancer; diagnosis; CA 15-3.