

Improving reliability of pregnancy tests

Biochemical tests can detect the presence of particular molecules, for example through an antibody and antigen interaction. These immunoassays are commonly used in sport anti-doping analysis, environmental monitoring and for medical applications, e.g. home pregnancy tests.

THE PROBLEM TO SOLVE:

Although very reliable, home pregnancy tests do very occasionally produce false results. False positives can occur when coloured particulates stick to the pregnancy test surface even when the hCG antigen that indicates pregnancy is not actually present, creating the recognizable positive test line. This is believed to happen because the particulates adsorb onto antibody-free areas on the surface through nonspecific physical processes rather than through the normal binding mechanism.

A STEP TOWARDS THE SOLUTION

Neutron reflection can be used to closely study a surface. This technique was used to look at a model pregnancy test surface to discover more about how the antigen, antibody and hCG molecules involved are arranged and interact with each other. The effect of the human serum albumin (HSA) molecule, used to fill the anti-body free surface spaces to counteract unwanted adsorption, could also be studied.

THE RESULTS

The molecular arrangement of surface antibodies and the blocking agent HSA was determined. It was also possible to demonstrate that once a certain antibody surface coverage level was achieved, the uptake of the antigen reaches saturation as the molecules are unable to reach the binding sites still available. Therefore companies can save on production costs by not using more expensive antibody than is necessary for optimum coverage. Finally, the study showed that HSA is effective at blocking empty sites on the test surface to stop the adsorption of intruder molecules.

“These results are of importance for a full understanding of immunoassay systems that are widely used in clinical tests and in the detection of environmental contaminants.” Cowsill et. al.



Fig. 1 A home use pregnancy test is one of the more familiar immunoassays and it is important for them to be reliable .

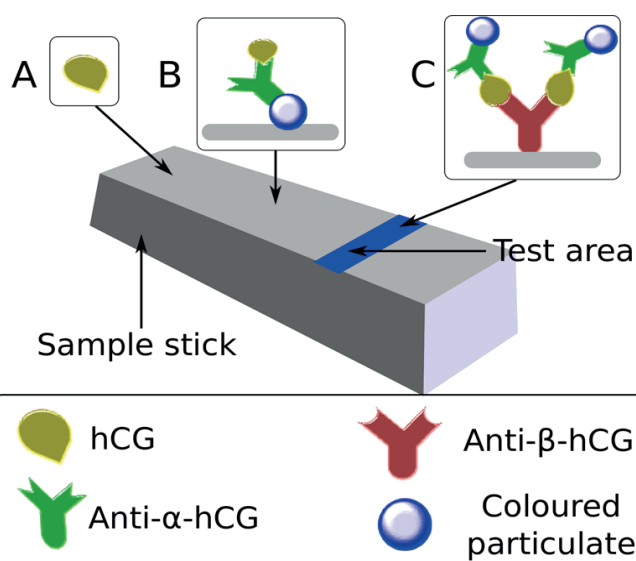


Fig.2 Schematic diagram of a lateral flow pregnancy test. Urine wets the left end of the sample stick (A), moves onto the conjugate pad (B) containing antibody-coated colored particulate labels and further onto the test and control lines within the test area (C), and finally to the absorbent sink pad on the right end. A specific binding event anchors the particles to the test line, whose color intensity increases with the concentration of hCG. The control line will immunologically capture the label regardless of the presence of hCG to indicate that the device has worked properly and that the urine has flowed past the test line. Source: Cowsill et. al.

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FLEXIBLE SERVICES

In many cases industrial processes and conditions can be re-created in the test laboratory. Final data analysis and reporting are provided.

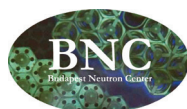
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