

# Personalised testing for tailored training of elite athletes

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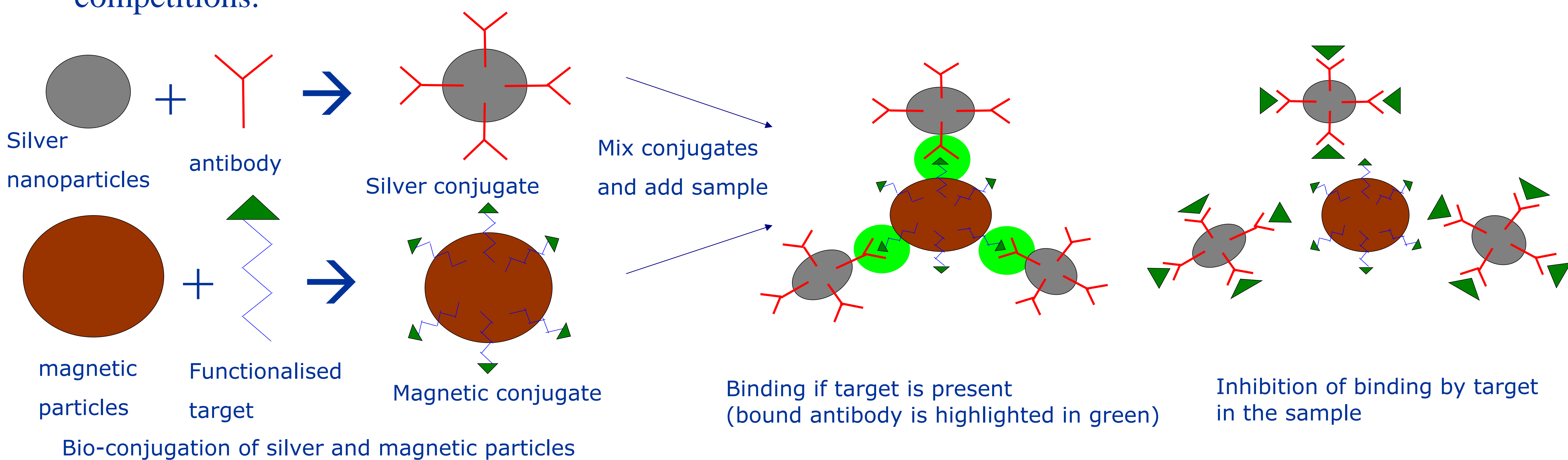
## Abstract

Elite athletes currently monitor various biomarkers pre, during and after training sessions through time consuming tests at centralised laboratories. While these tests provide useful information retrospectively, rapid tests on location could allow adjustment to the training programme in real time.

Argento Diagnostics uses metalloimmunoassay technology based on functionalised silver nanoparticles and magnetic beads to perform rapid, quantitative tests at the point of care. The readout is electrochemical and is presented in a digital readout, which can also be transferred via Bluetooth or Wi-Fi for easy upload to a centralised data monitoring system.



Working with UK Sport's Research & Innovation team, Argento Diagnostics aim to combine the availability of real-time monitoring with the coaching expertise to interpret the result. This will enable training to be customised not only to the individual but also to their current condition. The aim of this work is to use this information to enhance the preparation of UK athletes for major international competitions.

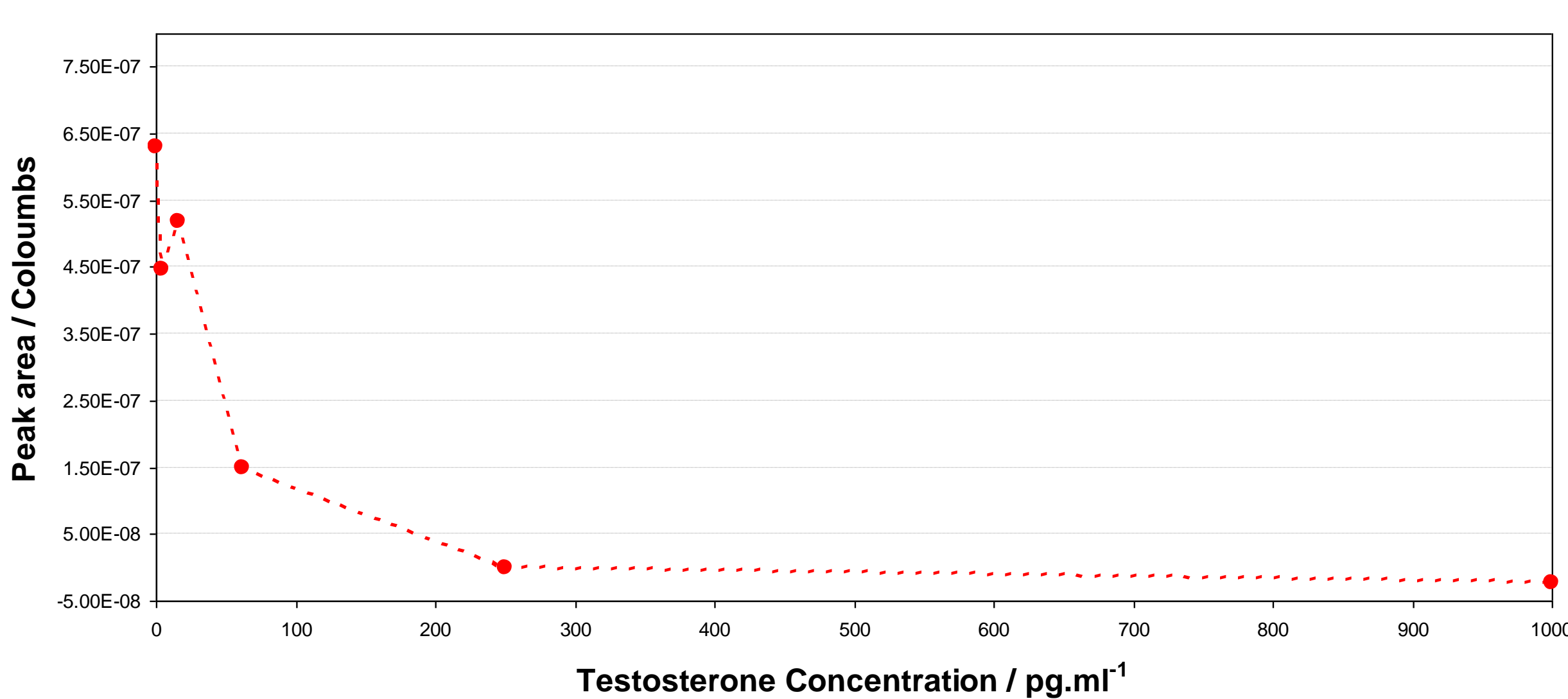


Bio-conjugation of silver and magnetic particles

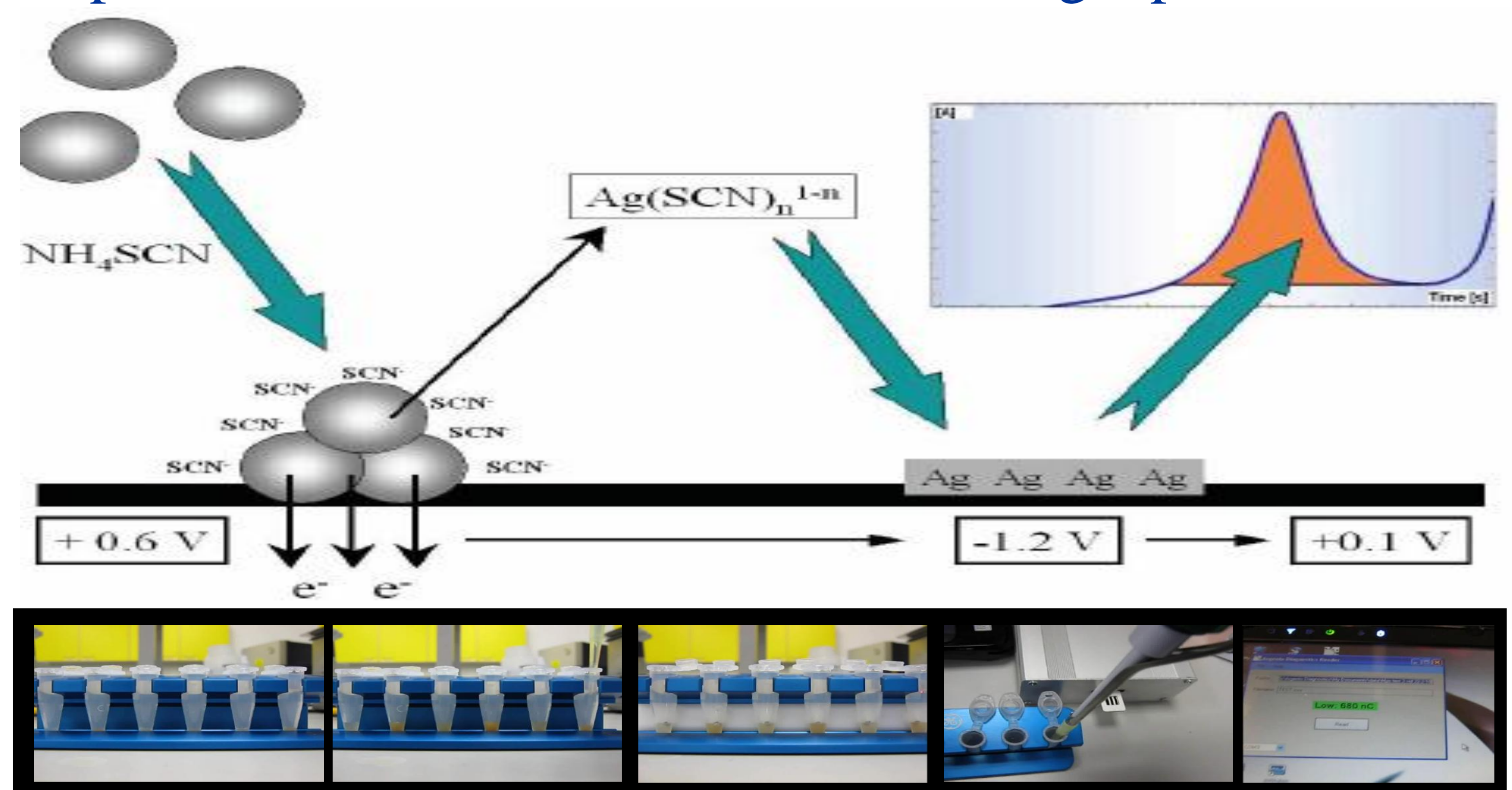
## Materials and Methods

The Argento assay platform is based on bio-conjugated silver nanoparticles and magnetic beads. Antibodies are attached to silver nanoparticles and an analogue of the target chemical is attached to magnetic beads.

The sample is then added to a mix of silver and magnetic beads. If the target is not present in the sample the antibodies on the silver particles will bind to the target on the magnetic beads and result in a large signal after electrochemical analysis. However, if the target is present this binding will be inhibited, causing a decrease in signal. The signal can then be processed to indicate the amount of target present.



Above is an early calibration curve for testosterone levels, showing a decrease in signal as the testosterone concentration increases. This data gives a reference signal for particular testosterone concentrations, allowing the level in unknown samples to be measured.



The Argento assay in action. From left to right; pre-loaded assay tubes, add sample and incubate, separate magnetic beads from sample by application of a magnet, add ammonium thiocyanate, then transfer to the instrument for measurement and readout.

## Conclusions

Argento Diagnostics and UK Sport are working together to develop rapid biomarker tests for elite athletes at the point of care, using cutting edge diagnostic technology. The first assays have already been demonstrated and are being deployed and are in trials. The trial data will enable trainers to interpret the results and determine the best courses of action to enhance the performance of each athlete during their training.

We believe that the availability of real time measurement of biomarkers will ultimately lead to improvement of UK athletes performance in major international competitions

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