

Synthesis of Nano-gold labeled steroid derivatives for electrochemical immunoassays.

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Abstract

On site fertility testing is of particular interest to the dairy industry, where milk is a readily available matrix for such hormone analysis. Optimum fertility rates are achieved when artificial insemination (AI) is performed 3 days after the level of progesterone has fallen to less than 16 nM (<5 ng/ml) in whole milk and a reliable on-the-spot progesterone-milk test for use by farmers and dairy technicians is a proven requirement ^[1]. Immunosensing technology takes advantage of the latest developments in nano-materials science – benefiting from their unprecedented optical tenability as well as electrical and electrochemical qualities. Here we present immunochemically modified gold nano-materials and will demonstrate synthesis routes for novel linker thione molecules and their self-assembly, co-ordination complex reactivity, to nano-Au ^[2]. Focus is directed at forming a class of progesterone/steroid thiosemicarbazone derivatives which are physico-chemically characterised, with data on reaction yield and purity, molecular structure and electronic properties, and know-how extendable to other C3 carbonyl steroid molecules. Subsequent utilisation of the new steroid nano-Au reagents will be realised with the development of a sensitive “redox gold immunoassay” in a microwell format (see Fig 1.). Overall, the project will advance thione-hapten coupling chemistry and gold-ligand co-ordination chemistry resulting in functionalised nano-Au, possessing defined electrochemical properties. This will provide a means of sensitive progesterone measurement (pM concentration level).

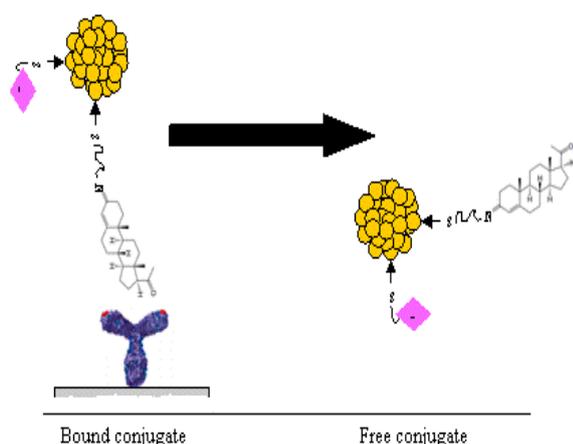


Fig 1: Progesterone conjugate binding to surface confined anti-progesterone antibody, enabling nano-gold redox detection for progesterone quantitation.

References

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