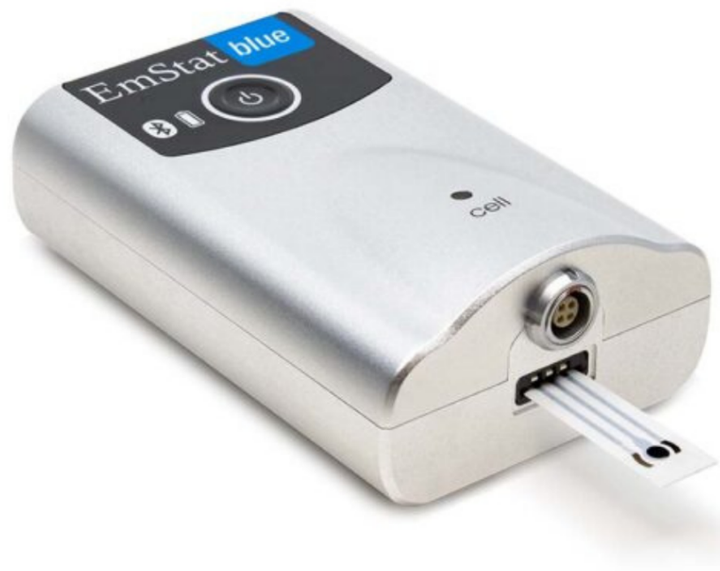
IMMUNOSENSOR DETECTION OF IN AMNIOTIC FOR INFLAMMATION FLUID



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STAGE OF DEVELOPMENT
Proof of Concept

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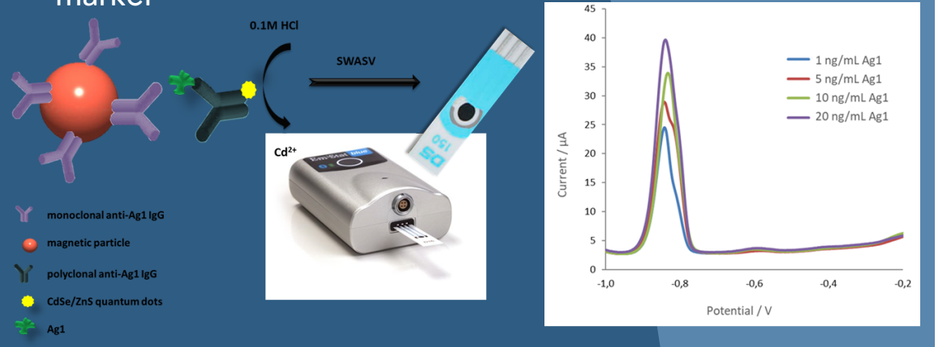
Background

Preterm Prelabour Rupture of Membranes (PPROM) is a **pregnancy complication**. In this condition, the sac (amniotic membrane) surrounding the fetus breaks (ruptures) before week 37 of pregnancy. Once the sac breaks, pregnant woman has increased risk for infection. PPROM complicates 3 – 4 % of all pregnancies and is up to **1/3 complicated by microbial invasion of the amniotic cavity** (MIAC) leading to infection in amniotic fluid (AF) and development of intra-amniotic inflammation. Although this complication is usually asymptomatic, it is a major cause of preterm birth and neonatal morbidity and mortality worldwide. Neonates from these pregnancies are at **increased risk** of developing **neonatal sepsis**, **impaired psychomotor development** and other sometimes lifelong health consequences.

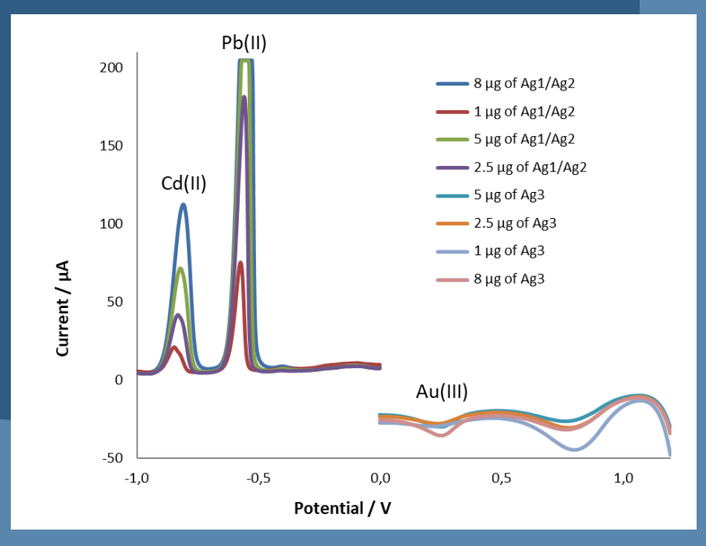
Description

Invention is a **point-of-care test (POCT)** based on electrochemical immunosensor for **simultaneous detection of three inflammatory protein biomarkers** in AF collected by amniocentesis with high predictive value. The aim of the test is to **confirm intra-amniotic inflammation**. The entire biosensor consists of an immunosorbent - magnetically active microparticles modified with a specific antibody. After capturing the protein biomarker by the immunosorbent, the bioconjugate (IgG antibody conjugated with an electroactive indicator, specifically quantum dots or gold nanoparticles) is added. A final measurable signal proportional to the concentration of the inflammatory protein biomarker is provided by metal ions released from the electroactive indicator. Disposable screen-printed three-electrode sensors are used for electrochemical analysis.

Principle of electrochemical detection of inflammatory marker



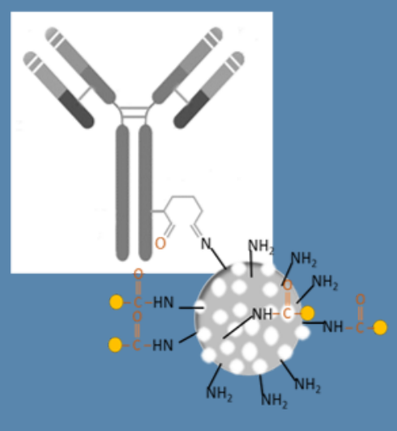
Simultaneous electrochemical detection of 3 bioconjugates



Advantages

Currently, determining the inflammation in AF is based on inflammatory markers assessment (IL-6, MMP-8) that is not specific enough to initiated targeted treatment. To confirm presence of microorganisms in AF is very time-consuming and technically demanding. It is based on combination of cultivation and molecular methods. Main disadvantage is that results are available in days, which is already clinically irrelevant for the initiation of targeted antibiotic treatment.

Our **point-of-care test enables to speed up the process of confirmation or elimination inflammation in AF** and can be **easily performed and evaluated** in minutes beside the patient's bed and thus **enables personalized approach** to therapeutic intervention of the pregnant woman. Further research is focused on test verification in **cervicovaginal fluid** to avoid amniocentesis. POCT is intended to be used by medical facilities that take care of pregnant women esp. regional hospitals or perinatology centres.



BIOCONJUGATE

Structure of bioconjugate based on IgG molecule decorated by nanocomposite (SiNP + Qdots)

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