ELECTROCHEMICAL IMMUNOSENSOR USING MAGNETIC CAPTURE FOR DISEASE DIAGNOSIS

Reference	Presenter	Authors (Institution)	Abstract
03-062	Fabiane Nunes Riello	Riello, F.N. (Instituto de pesquisas energéticas e nucleares); Notário, A.O. (Universidade Federal de Uberlândia); Goulart, I.B. (Centro de Referência Nacional em Dermatologia Sanitária e Hanseníase); Goulart, L.R. (Universidade Federal de Uberlândia);	Immunosensors are small devices that use biological reactions, relying on antigen-antibody binding to form an immune complex. Methods involving this detection have shown great possibilities for the diagnosis of diseases, but there are still some limitations. In a search for new techniques to increase specific recognition between biomolecules and electrode surface adhesion with faster, lower cost and portability for point-of-care tests, an antibody-coupled magnetic nanoparticle capture system was developed in order to detect antigens in an electrochemical biosensor. Mycobacterium leprae samples were used as an experimental model of more accurate diagnostic tools for this disease. Magnetic iron oxide (Fe_3O_4) nanoparticles were bioconjugated by covalent binding with M. leprae specific antibody (anti-PGL-I) using EDC promoting direct binding and NHS for stability. Slit-skin smear from leprosy patients with different bacillus concentrations and healthy contacts (negative control) previously quantified by real-time PCR (qPCR / RLEP) were incubated with the bioconjugate and adsorbed on the modified screen-electrode work area. The readings were taken in cyclic voltammetry with portable potentiostat support electrolyte and the PSTouch smartphone software was used to interpret the results. Voltammogram curves have qualitatively discriminated positive from negative samples. Quantitative differences were given by means of logarithmic calculations of the highest values of oxidation peaks in cyclic voltammetry and calibrated based on the number of bacilli previously quantified by qPCR. The novel biosensor presented a detection range from 1 to 1,000,000 bacilli. Briefly, our immunosensor was the first successfully prototype demonstrated for M. leprae detection in direct biological samples from patients. The strategy of magnetic antigen capture proved to be efficient by increasing the sensitivity of the test, because this technique allows the recognition and precipitation of specific antigens. Although it has been used for a specific model, this type of sensor can be applied to different types of diagnostics using antigen and antibody recognition, as the methodology used for bioconjugation is not restricted to the antibody used here. It is also efficient for samples that are difficult to

process and where the analyte concentration is low. It is important to emphasize that the new biosensor is portable, fast, sensitive, specific, low-cost and ideal for field screening programs.

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