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SURFACE PLASMON RESONANCE IMMUNOSENSORS FOR HGH DETECTION

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Human Growth Hormone (HGH) is a peptide hormone that is secreted by the anterior pituitary gland. HGH is responsible for tissue development, formation of bones and muscles and it is important not only for children but also for adults. The lack of hormone can increase a risk of developing health problems, such as poor memory, depression, reduced heart muscle function. Increased levels of HGH produces high blood pressure, sleep apnea. An excess of HGH can also be caused by pituitary tumors [1]. Therefore, it is important to maintain sufficient levels of HGH in the body. Since 1960 HGH produced by pituitary was used as an experimental treatment for children who suffered from lack of HGH. Side effects were registered only thirty years later. In 1981 Genentech developed the first recombinant HGH (rhHGH) by a biosynthetic process. Since then therapy using rhHGH is used in medicine for Turner syndrome, Prader-Willi syndrome, Noonan syndrome treatment [2]. Because normal levels of the HGH in blood serum are only 2.73 – 227.27 pmol/L, very sensitive analytical methods are required. A powerful tool for determination of the HGH concentration in complex samples can be surface plasmon resonance (SPR) immunosensors that detect interactions between immobilized biologically active substance and analyte in real-time and it is possible for multiple analysis, if proper regeneration conditions are presented [3]. Since the size of an analytical signal of the SPR immunosensor depends on the molecular weight of the substance to be determined, the sensitivity of the assay is dependent on a concentration determination method. Direct method can be used if molecular weight of analyte is more than 10 kDa. Indirect methods are more suitable to analyze small biomolecules and to detect low analyte concentrations. In this work two HGH SPR immunosensors were designed and compared. One of them was able to detect HGH in a direct method and the other in an indirect competitive inhibition method.

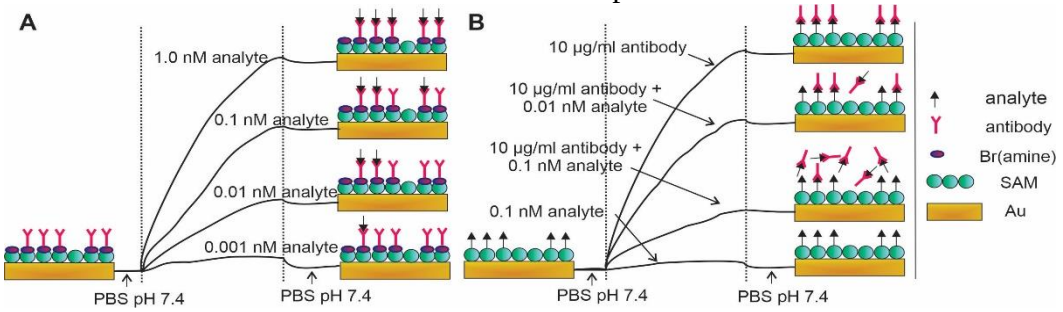

Illustration of analyte concentration determination: A – direct method, B – indirect competitive inhibition method. Br(amine) – 3- against HGH.aminophenylboronic acid; SAM – self-assembled monolayer; Au – gold coated SPR sensor chip; analyte – HGH; antibody – antibody

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