

“Development of a rapid and sensitive detection of hGH-dependent serum markers based on fluorescence”

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Project overview

Recombinant human growth hormone (rhGH) has been on the list of forbidden substances since availability of its recombinant form in the early 1990s; however adequate routine doping tests are lacking. The project aims to develop a fast and highly sensitive drug test for detecting two or more hGH-dependent markers in the serum of elite adolescent athletes. In our approach proteomic markers for hGH action such as insulin-like growth factor 1 (IGF-1) and pro-collagen type III N-terminal peptide (P-III-P) will be identified in just a single immunoassay. Considering the desirable reduction of time, costs and workload using FCS instead of other currently available IGF-1 and P-III-NP assays the presented methodology will be an important contribution for a functional doping test for proper use of rhGH.

Results and Conclusions

Two approaches have been developed to detect recombinant hGH in blood in order to control its misuse with the intention of improving athletic performance. Adequate non-invasive tests for human growth hormone (hGH)-dependent markers such as insulin-like growth factor 1 (IGF-1) and pro-collagen type III N-terminal peptide (PIIINP) are still lacking. In this one-year project a fast and sensitive bead-based immunoassay for IGF-1 and PIIINP detection in serum was developed based on Fluorescence Correlation Spectroscopy (FCS). FCS was used as a reliable technology for measuring absolute concentrations in the nano-molar range. Three FCS immunoassays - a sandwich and a competitive immunoassay for IGF-1 as well as a competitive PIIINP assay - were established and validated against commercially available ELISA. We were able to detect molarities between 0.5 and 10nM of IGF-1 and between 0.5 and 2.5nM of PIIINP with high accuracy in serum samples.

Considering the desirable reduction of time, costs and workload using FCS instead of other currently available IGF-1 and PIIINP assays the presented methodology might be an important contribution for proper use of rhGH in sports.