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Molecularly Imprinted Nanoparticles (MIP NPs) as Non-Animal Antibodies Substitutes for Detection of Viruses

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Abstract : The recent increasing emergency threat to public health of infectious influenza diseases has prompted interest in the detection of avian influenza virus (AIV) H5N1 in humans as well as animals. A variety of technologies for diagnosing AIV infection have been developed. However, various disadvantages (costs, lengthy analyses, and need for high-containment facilities) make these methods less than ideal in their practical application. Molecularly Imprinted Polymeric Nanoparticles (MIP NPs) are suitable to overcome these limitations by having high affinity, selectivity, versatility, scalability and cost-effectiveness with the versatility of post-modification (labeling – fluorescent, magnetic, optical) opening the way to the potential introduction of improved diagnostic tests capable of providing rapid differential diagnosis. Here we present our first results in the production and testing of MIP NPs for the detection of AIV H5N1. Recent developments in the solid-phase synthesis of MIP NPs mean that for the first time a reliable supply of 'soluble' synthetic antibodies can be made available for testing as potential biological or diagnostic active molecules. The MIP NPs have the potential to detect viruses that are widely circulating in farm animals and indeed humans. Early and accurate identification of the infectious agent will expedite appropriate control measures. Thus, diagnosis at an early stage of infection of a herd or flock or individual maximizes the efficiency with which containment, prevention and possibly treatment strategies can be implemented. More importantly, substantiating the practicability's of these novel reagents should lead to an initial reduction and eventually to a potential total replacement of animals, both large and small, to raise such specific serological materials.

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