Construction of chimeric shark antibody fragment binding p24 nucleocapsid protein for detection of antibodies for immunodeficiency virus type 1 in serum using hemagglutination

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**Background:** It has been studied that shark antibodies or antibody fragments are important tools for experimental research and medical application. The advantages of using these sorts of molecules are their small size, high solubility and good tissue penetration in vivo. A chimeric shark antibody fragment binding p24 nucleocapsid protein was successfully constructed for HIV detection. The aim of this research was to determine the presence of antibodies for immunodeficiency virus type 1 in serum through ex vivo hemagglutination.

**Methods:** Using a shark gene that codifies a antibody fragment capable of recognising glycoporin A from erythrocytes membrane, was obtained from a non immune shark library. The gene was bind with p24 gene using a double cloning method in order to construct a chimeric gene. A recombinant chimeric protein was produced cloning the chimeric gene in an expression vector through Escherichia coli. The effectiveness of the chimeric protein was evaluated carrying out hemagglutination assays. Erythrocytes free of plasma and serum were subjected to a series of wash phosphate buffers and 38 HIV positive serum samples donated by the CAPASITS clinic, Tijuana B. C. México, were analysed.

**Results:** The p24 gen was isolated from clinical samples, amplified and ligated to both the vector carrier and the shark gene. An enzyme-linked immunosorbent assay (ELISA) was performed to the chimeric protein with the aim of verifying the presence of p24 and recognition of glycoporins. Once the functionality of the chimeric protein was confirmed, the 38 HIV positive serum samples were submitted to hemagglutination assays. Positive results were obtained in 36 samples out of 38, which represent 95% of efficiency.

**Conclusion:** These findings indicate the efficiency of using this chimeric protein for detection of antibodies for immunodeficiency virus type 1 in serum and the possibility to carry out further research in whole blood samples as well as another HIV type. Also, a viable potential HIV-1 rapid diagnosis test, aiming it to rural clinical practice for it is easy to perform without any special equipment.