

Production of Camel Nanobodies against of Anti-Morphine-3-Glucuronide for the Development of a Biosensor for Detecting Illicit Drug

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Abstract : Morphine is one of the most medicinally important analgesics and narcotics. Structurally, it is classified as an alkaloid because of the presence of nitrogen. Its structure is similar to that of codeine, thebaine, and heroin. An immunoassay to accurately discriminate between these analogous alkaloids would be highly beneficial. A key factor for such an assay is specificity with high sensitivity, which is totally dependent on the antibody employed. However, most antibodies against haptens are polyclonal serum antibodies that exhibit significant cross-reactivities with closely related compounds. The camel-derived single-chain antibody fragments (VHH) are the smallest molecules with antigen-binding capacity, possessing unique properties compared to other conventional antibodies. In this study, a library containing the VHH genes of a camel immunized with with morphine conjugated BSA following phage display technology was generated. By screening the camel-derived variable region of the heavy chain cDNA phage display library with the ability to bind the desired hapten, we obtained some nanobodies that recognize this hapten. Phage display expression of the Nbs from this library and pannings against this hapten resulted in a clear enrichment of four distinct Nb-displaying phages with specificity for morphine that could be a potential target site for the development of new strategies for the development of a biosensor for detecting illicit drug.

Keywords : phage display, nanobody, Morphine-3, glucuronide, ELISA, biosensor

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