ORIGINAL ARTICLE

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Production of Herceptin– Nanoparticles by chemical conjugation of Herceptin to Potato virus X

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Background: In recent years, there has been a re-orientation of virus studies toward the beneficial use of virus in nanotechnology. Application of viral nanoparticles (VNPs) in nanotechnology is in the nascent stage. VNPs are biocompatible and biodegradable; self-assembly systems and they can be purified inexpensively on a large scale. Herceptin is currently used as a targeted therapy in (HER2+) breast cancer patients. We demonstrate that nanoparticles formed from the Filamentous plant virus potato virus x (PVX) can conjugate to a herceptin (trastuzumab) as a monoclonal antibody.

Methodes: Bioconjugation was performed by EDC/Sulfo-NHS in a two step protocol. Particle formation and conjugation were investigated by different techniques, including SDS-PAGE, Western-Blot, ELISA, Zeta-Sizer and Electron Microscopy.

Results: SDS-PAGE and Western-Blot confirmed the formation of 82 KDa proteins which are 27 add 56 KDa. Sandwich ELISA using two antibodies against Herceptin and PVX, respectively confirmed the Herceptin-PVX conjugation. Analysis by zeta-sizer based on charge showed that the Herceptin-PVX charge is -7.05 which -1.48 Herceptin is between 21.4 and PVX.

Conclution: Based on our data, we have confirmed the conjugation of PVX and Herceptin. In this study we focus on the use of the capsid of Potato Virus X as a Filamentous virus in nanotechnology. Applying bioconjugation of herceptin to PVX reduce the dose of drug and cost of treatment in breast cancer patients.

Keywords: Nanoparticles, Viral nanoparticles (VNPs), Potato virus *X* (PVX), Herceptin, cross-linker.