Molecular Zipper Assays with Immunonanoprobes

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Purpose*:* Detection of viral load or antigens present in the body fluids is a desirable diagnostic or monitoring tool for many infectious diseases. For example, in case of HIV infection, Nucleic acid based quantitative PCR/ RTPCR assay could be used for measuring viral load to follow the course of therapy or infection. The key limitation of such assays is however the high cost of such complex assays. Additional well known problems of these assays include need for sample extraction, inhibitors, variability, complexity and sample contamination issues. **Methods*:*** A molecular zipper assay based on the simple homosandwich concept for repeated epitopes was developed where the analyte or virus is sandwiched between similar antibodies for detection. Monoclonal and bispecific antibodies against the model M13 phage were used as capture and detection antibodies. **Result:** Homosandwich molecular Zipper assay captured the model virus almost irreversibly resisting multiple rounds of washing. Detection of the virus by enzyme labeled MAb in combination with chemiluminescent substrates provided practical assay sensitivities of 7-15 phages and a theoretical detection sensitivity of one virus particle. **Conclusion:** The significance of our results on the molecular zipper assay with the model virus relates to the development of ultrasensitive pathogen assays at low cost for bacteria and viruses, especially HIV & HCV virus, which are ravaging impoverished continents of Africa, Asia and Latin America.

Proceedings of the 2004 International Conference on MEMS, NANO and Smart Systems (ICMENS'04)
0-7695-2189-4/04 $20.00 © 2004 **IEEE**

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