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DEVELOPMENT OF NANO-BASED BIOSENSOR FOR FMDV

A thesis presented by

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(Virology)

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Abstract

Nano-PCR represents a recent sensitive diagnostic tool for viral diseases depending on the fundamental Nano effects of AuNPs. In the present work, AuNPs- FMDV biosensor is designed with thiol-linked oligonucleotides for the conserved 3D gene of FMDV. This biosensor has been validated with RNA standard and 10 swine vesicular disease virus isolates (SVDV) as a negative control. Likewise, it has been applied on 13 viral isolates (IZSLER institute) and 31 clinical samples collected from Egypt during March 2012 to September 2015. AuNPs-FMDV biosensor demonstrates superior analytical and clinical performance for FMDV diagnosis. The analytical sensitivity, dynamic range and limit of detection (LOD) of AuNPs – FMDV biosensor was 100 copies number RNA standard in RT-PCR and 1 copy number RNA standard in real time RT-PCR (rRT-PCR) with 94.5% efficiency, 0.989 R2, -3.544 Slope and 100% specificity without cross-reactivity with SVDV. It has a simple workflow, and it accelerates the epidemiological surveillance. Hence, it is suitable for quarantine stations and farms for diagnosis, particularly in FMDV endemic areas.

Key words: FMDV, AuNPs, biosensor, Diagnosis.

Dedication

To my fantastically supportive parents, Dad, whose insatiable appetite for knowledge, tenacity, and hard work ethic led me by example; and Mom, whose great teaching, organizational skills, and love kept me sane during my work.

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