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SINGAPORE STANDARD

Design, development and validation of miRNA-based diagnostics

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Diagnostics Development Hub – Accelerate Technologies Pte Ltd
Health Sciences Authority
Janssen – Johnson & Johnson
MiRXES Pte Ltd
National Institute of Standards and Technology
National University of Singapore
Singapore Polytechnic
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Foreword

This Singapore Standard was prepared by the Working Group on Validation of miRNA Diagnostics set up by the Technical Committee on Laboratory Testing under the purview of BHSC.

This standard sets out the key considerations for the design, development and performance evaluation for miRNA-based clinical diagnostic assays.

In preparing this standard, reference was made to the following publications:

1. GHTF/SG5/N7:2012 Clinical Evidence for IVD Medical Devices – Scientific Validity Determination and Performance Evaluation, Global Harmonization Task Force Study Group 5 Final Document

2. GHTF/SG5/N8:2012 Clinical Evidence for IVD Medical Devices – Clinical Performance Studies for *In Vitro* Diagnostic Medical Devices, Global Harmonization Task Force Study Group 5 Final Document

3. IMDRF/GRRP WG/N47 FINAL:2018 Essential Principles of Safety and Performance of Medical Devices and IVD Medical Devices

4. SG5/N2R8:2007 Clinical Evaluation, Global Harmonization Task Force Study Group 5 Final Document

Acknowledgement is made for the use of information from the above publications.

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Design, development and validation of miRNA-based diagnostics

0 Introduction

MicroRNA(s) (miRNA(s)) are short non-coding RNAs (approximately 22 nucleotides in length) that regulate the expression of target genes by binding to the 3' untranslated region of the target miRNA(s)[1]. It is a novel class of biomolecules discovered in the early 21st century which has continuously been the reason for breakthrough discoveries in biomedical research worldwide[2]. Apart from DNA mutations, there are dynamic and real-time changes of miRNA expression throughout the entire disease state. Unlike DNA and other RNA species, circulating miRNA(s) are encapsulated by proteins, lipids and/or exosomes, making it exceptionally stable in biofluids[3]. Indeed, studies showed that miRNA(s) offer high clinical values for early disease detection, disease progression, recurrence and responses to the monitoring of therapeutic drugs[4].

1 Scope

This standard describes key considerations for the design, development and performance evaluation of miRNA-based molecular diagnostic assays. It also provides guidance for the development process and the design of the analytical and clinical performance evaluation studies of the assay based on its defined intended purpose(s). The considerations described in this standard are applicable to all miRNA-based diagnostic assays including commercial *in vitro* diagnostic assays and also for assays developed and used within clinical laboratories for diagnostic purposes.

2 Normative references

The following referenced documents are indispensable for the application of this standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

SS 647 : 2019 Accelerated aging of sterile barrier systems for medical devices