



RNA quality for diagnostic applications; Integrity vs. Degradation

LGC scientists, using their expertise in RNA degradation measurements and standards have helped Lab901, an Edinburgh based SME, develop a fast, simple and robust system for determining RNA integrity.



The Requirement

The analysis of RNA, particularly for gene expression determination, is an important molecular biology tool that has wide ranging use in areas such as disease diagnosis and pharmaceutical development. With the world market for technologies that require high quality RNA expected to reach \$3,800m by 2013, related RNA quality analysis is of increasing importance. Since isolated RNA is more likely to degrade than DNA, accurate methods are essential to determine RNA quality prior to further analysis. Any deficiencies in RNA quality will result in a lack of measurement robustness which, if occurring in a diagnostic application, could ultimately lead to misdiagnosis of a patient's condition.

The Solution

It is universally accepted that RNA purity and integrity are an essential requirement for meaningful and reproducible diagnostic applications, and more accurate methods for the determination of RNA quality are required. This collaborative project was designed to develop and evaluate the performance of a new approach for determining RNA sample quality; Lab901's ScreenTape® platform and an integrated version of their Degradometer RNA quality determination software.

The Implementation

Through the Chemical and Biological Metrology Programme, LGC had previously investigated the impact of RNA degradation on the quality of results obtained when using commercial microarray systems to measure gene expression in liver cells – an important model for pharmaceutical development. By employing the scientific expertise and RNA degradation standards generated during this programme, LGC was able to assist Lab901 in assessing the performance of ScreenTape® for the determination of RNA quality.

Comparison of the performance of Lab901's RNA quality metric, the ScreenTape Degradation Value (SDV), with both the widely used RNA Integrity Number (RIN) developed by Agilent and traditional 28S/18S ratio measurements of RNA quality demonstrated that the SDV provides a valid alternative metric for the determination of RNA integrity within the laboratory and that the method is both reproducible and robust.

Impact

Lab901 successfully launched their new ScreenTape R6K product for rapid RNA sample Quality Control (RNA QC) in July 2009. Richard Rowling from Lab901 says "We are pleased with the results of this research as LGC's independent analysis and verification of our technology has helped us to successfully launch our product. Having access to LGC's expertise in genomics and quality control standards has contributed to the successful validation of a robust system for RNA quality control".

This successful collaboration enabled LGC, as the UK's designated National Measurement Institute for chemical and bioanalytical measurement, to utilise expertise developed on RNA degradation analysis and support innovation in industry by assisting the translational development of a new technology into the market place.

"Accurate measurement of RNA quality is crucial for the reliability and quality of diagnostic measurements" says Carole Foy, LGC's Principal Scientist for molecular biology. "This project highlights the value of the assistance that LGC is able to offer SMEs who are developing innovative products and ideas and we are pleased to have been given early access to this novel system".

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