

Press release

Democratizing RNA sequencing: A breakthrough in cost and efficiency

- RNA sequencing becomes universally accessible
- Time and cost savings thanks to fewer reagents and less manual effort
- Attractive key technology for the life science industry

Neuchâtel / Lausanne, May 16, 2023 – CSEM has supported the Lausanne-based start-up Alithea Genomics in developing a technology capable of processing hundreds of ribonucleic acid (RNA) samples in a single tube, which translates to a significant reduction in reagents and manual effort in the overall workflow.

Over the past decade, RNA sequencing (RNA-seq) has become increasingly popular in genomics and therapeutic drug testing. RNA-seq examines gene expression in the entire genome, providing a complete and unbiased gene expression readout. RNA-seq can help us understand the biology of living things. However, despite the method's potential, at present there is a lack of large-scale and cost-efficient sample preparation for RNA-seq, which has so far prevented this method's widespread adoption by industry professionals.

BRB-seq technology helps advance our understanding of biological processes

To overcome the high expense of routine sample preparation for RNA-seq operations, the Laboratory of Systems Biology and Genetics at EPFL and its spin-off company Alithea Genomics have developed "Bulk RNA Barcoding and sequencing" (BRB-seq) technology. It allows researchers to analyze the gene expression of cells, which can help them understand how cells function and respond to different conditions. The method relies on early-stage molecular barcoding to tag the different samples, enabling them to be processed together for bulk sequencing RNA. Aiming at medium to high-throughput, samples are processed in 96 or 384 multi-well plates before being collected into a single tube.

Simple and effective systems based on CSEM's Smart Lid platform

In the framework of Bridge and Innosuisse projects, Alithea Genomics and CSEM's Tools for Life Sciences team developed a technology to automate the collection of all samples from the multi-well plates into a single tube. Their solution, called *Microfluidic Pooling Lid*, is based on CSEM's Smart Lid platform, which integrates microfluidic channels and can accommodate different, standard microwell plate formats. Connected by a pump in a standalone platform, the lid can transfer the liquids from the wells via vacuum extraction into a single tube. This allows the potential processing of hundreds to thousands of wells in one go. The final design can pool over 90% of the contents of up to four 96-well plates in under two minutes.

Thanks to its compact nature and great potential for upscaling, this simple but effective system is ideally suited for research laboratories operating in a limited physical space. The medium-throughput system relies on disposable labware and was tested in stacked conditions, increasing the amount of RNA that can be processed with the same time and footprint. Validated by EPFL for RNA-seq sample processing, it shows the same performance as manual handling while improving time efficiency.

"The easy-to-use barcoding kit and simple pooling of all samples significantly reduce RNA sequencing cost per sample. We anticipate that these technologies will reach the intended market within the next five years, enabling big data RNA processing for drug discovery," underlines Stéphanie Boder-Pasche, Senior Project Manager at CSEM.

Making biobank analysis and drug screening efforts more efficient

“The market need for pooling technology will be driven by the adoption of the BRB-seq technology by big pharma and R&D players,” explains Dr. Riccardo Dainese, CEO of Alithea Genomics. “Our BRB-seq patented method significantly lowers expenses while boosting RNA-seq throughput. The technology allows to perform tasks that were previously impossible due to cost and labor constraints.”

Applications from single-cell analysis to diagnostics

The assessment of gene activity in biological samples, such as transcriptome analysis, gene expression profiling, novel transcript identification, and mutations in cancer research, among others, holds significant potential for the discovery and development of novel drugs and diagnostics. “This collaboration has enabled us to serve the field of high-throughput genomics and push our Smart Lid technology further. The variety of smart lids formats and functions is promoting them as enabling technologies for the life sciences industry,” adds Gilles Weder, Co-Head Research & Business Development Life Science Technologies at CSEM. “This know-how, combined with our expertise in AI for life sciences and biosystems engineering in the Switzerland Innovation Park Basel Area in Allschwil, allows us to provide interdisciplinary solutions for life sciences applications.”

Note: While DNA sequencing studies genetic inheritance (genomics), RNA sequencing studies how our genes are expressed in our cells (transcriptomics). Genes are like instructions for our body, which are transmitted by RNA. By analyzing the RNA profile of a cell, it is possible to detect which genes are active. This information can be used to better understand diseases and develop new treatments.



Successful collaboration between start-up Alithea and Swiss technology innovation center CSEM (from left to right): Vincent Revol (CSEM, Co-Head Research & Business Development Life Science Technologies), Daria Gudkova (Alithea, Product Manager), Stéphanie Boder-Pasche (CSEM, Senior Project Manager Cell Microtechnologies), Marine Vallez (Alithea, R&D scientist), and Gilles Weder (CSEM, Co-Head Research & Business Development Life Science Technologies). They hold an Alithea Reagent Kit in their hands.

Additional pictures available on www.csem.ch

Additional information

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About Alithea Genomics

Founded in 2020, Alithea Genomics SA is a rapidly growing provider of high-throughput RNA-seq services, kits and bioinformatic solutions. Alithea's products are ideal for large-scale transcriptomics studies such as biomarker discovery, antibody development and drug screening. In addition to human health, BRB-seq can easily be applied to model organisms, plants, and in-vitro models. Alithea Genomics is a privately held company based in Lausanne (Switzerland) and is shipping its kits directly and worldwide. For more information about Alithea Genomics, visit <https://www.alitheagenomics.com/>

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