DECIPHERING THE INSIDE CELL´S STORY BY CYTOCHECK SPACHIP®!

Deciphering metabolism through a combination of SPAchip® technology and genetic screening

Understanding how the genetic information give rise to the phenotype, and how genomic perturbation affects a given phenotype are some of the main objectives of genetic screening. Recently, microscopy or FACS-based screening have emerged as new option to unravel different aspects of cell biology. This blog dives into how genetic screening approaches in combination with SPAchip technology can be use to understand the metabolism for fundamental biology or identification of molecular targets of drug candidates.

Mapping Genotypes to phenotypes by image-based genetic screening

The integration of image-based profiling allows researchers to capture intricate spatial and morphological changes in cells, providing a richer dataset that complements next-generation sequencing (NGS) methods. Key advancements include the use of multiplexed imaging to simultaneously analyze multiple phenotypic markers, enabling a comprehensive view of how genetic modifications affect cellular structures and functions. This method is particularly powerful for dissecting complex biological processes and understanding the spatial organization within cells.
Different kinds of image-based genetic screenings include:

- **Arrayed Screens:** ·each well contains a specific mutant which phenotype can be assessed. The logistics of working with thousands of samples poses a major challenge for large-scale arrayed screens

- **Pooled enrichment screens:** in a single sample the genome of individual cells is disrupted. The phenotype of interest is enriched followed by abundance estimation through NGS. Different approaches can be used to enrich the desired phenotype including image-based phenotypes of subcellular parameters,

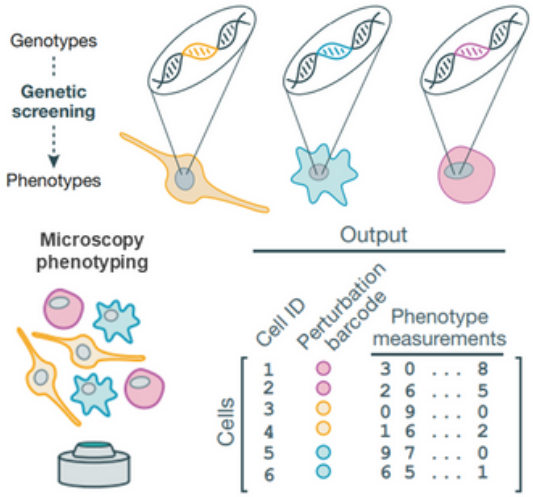

Figure 1. Genetic screens seek to map genotypes to the phenotypes they produce. Phenotypic changes can be assessed by live cell analysis using microscopy or HCS methods. Individual cells are subjected to specific perturbations and multidimensional phenotypic measurements. Figure adapted from (Walton et al., 2022)

SPAchip® as an image-based real-time readout of metabolic activity in genetic screening

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Key advancements in this study include the use of multiplexed imaging to simultaneously analyze multiple phenotypic markers, enabling a comprehensive view of how genetic modifications affect cellular structures and functions.
Application of SPAchip products to determines key players in regulation of pH, ROS, Ca2+. Their dynamic range of fluorescent emission might be used in both arrayed and pooled enrichments screens. In the later, enrichment of the desired population can be in principle done through FACS or substituted by the approaches mentioned above.

Conclusion

SPAchip® ability to provide detailed phenotypic analysis in conjunction with pooled genetic screens makes it a valuable tool for advancing our understanding of cellular biology and improving research and therapeutical outcomes.

It all translates into saving costs and time, and increasing relevance, quality and versatility

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