INTRODUCING SEAHORSE ANALYZER TO MAMMALIAN CELL CULTURE PROCESS DEVELOPMENT

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The Agilent Seahorse XF Pro Analyzer (Santa Clara, CA) is an automation-enabled high throughput device that measures the energy metabolism of live cells in real time. It measures oxygen consumption rate (OCR) and extracellular acidification rate (ECAR) in live cells with precision and in a temperature-controlled environment. Within this device, the fiber optics emit light that excites the embedded fluorophores and then read back the change in fluorophore emission due to the change in oxygen and protons. To date, this robust screening platform has been commonly used for drug target discovery and small molecule screening.

One of the major goals of the Upstream Process Development team within the Biologics CMC group is to develop robust and scalable mammalian cell culture processes for clinical and commercial manufacturing to ensure uninterrupted clinical supply to our patients. Therefore, we are in constant search of innovative technologies and tools that improve our process understanding, support decision-making, and cut down clinical development timelines. In this study, we investigated the scope and application of the Seahorse XF Pro Analyzer in mammalian cell culture process development. For this case study, we utilized clonal CHO cell lines expressing a monoclonal antibody and performed experiments to metabolically characterize top clones, and define the effects of process conditions on process performance and scale-up. Briefly, our data suggest that higher spare capacity and mitochondrial ATP production are indicative of high-performing clones and a robust cell culture process. Knowledge gained from this study allowed us to characterize and select robust clones, optimize process conditions and troubleshoot process development-related issues more efficiently.