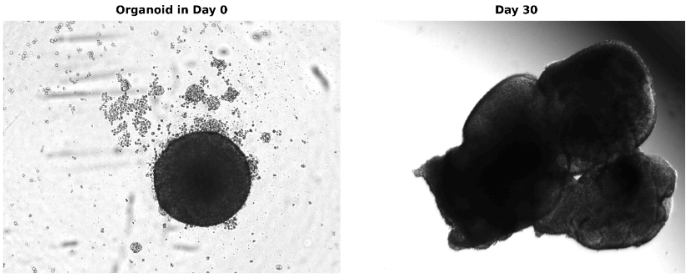
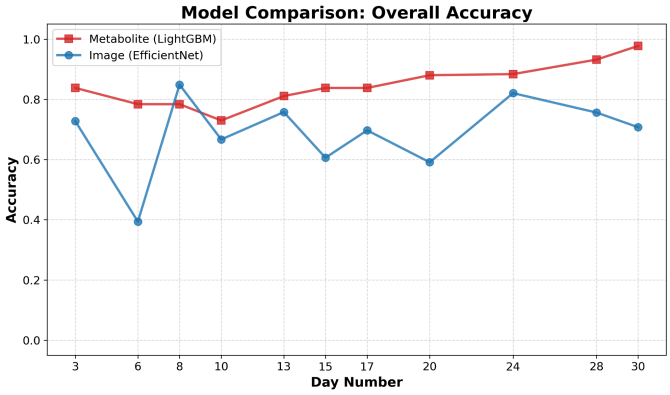
Promega developed biotechnology tools that relied on the healthy growth of organoids, small clusters of human cells used in research (see image below). When an organoid failed, scientists often discovered it late in the growth process, after time and resources had already been spent. The team's goal was to help detect unhealthy organoids earlier by using two forms of data Promega already collected: biochemical measurements and microscope images.



Using the biochemical data, the team built a model that evaluated organoid quality each day. The model struggled at first but improved over time, reaching 98% accuracy on Day 30. This showed that biochemical patterns became stronger and easier to detect as organoids matured (see graph on the right).



The team also trained a second model using microscope images. This model performed best on Day 8, even outperforming the biochemical model, reaching 85% accuracy. Unlike the biochemical model, however, its accuracy did not improve later in development.

Together, these approaches demonstrated that quality signals were detectable, and that combining imaging and biochemical information could lead to earlier, more reliable organoid assessment tools in future research.