Label-Free High-Throughput Viability Analysis Using Automated Microscopy and Advanced Machine Learning

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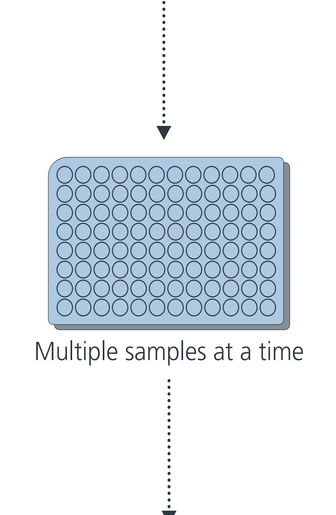
Method

Multiple samples at a time

Imaging with automated microscope



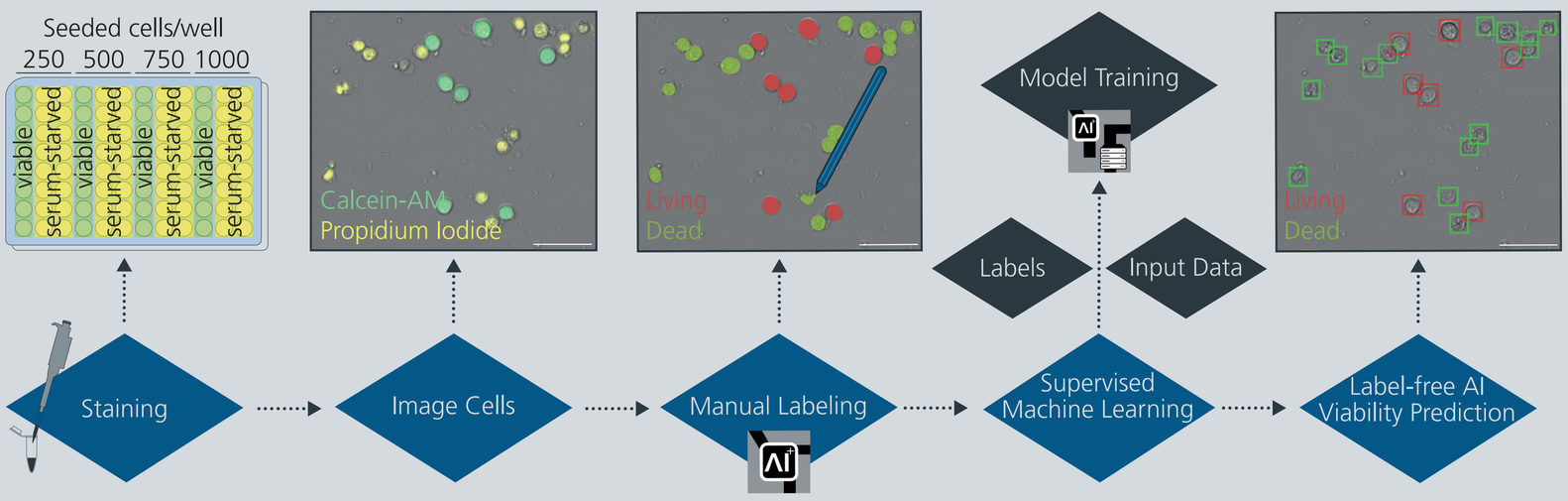
Cells can be further cultivated

Introduction

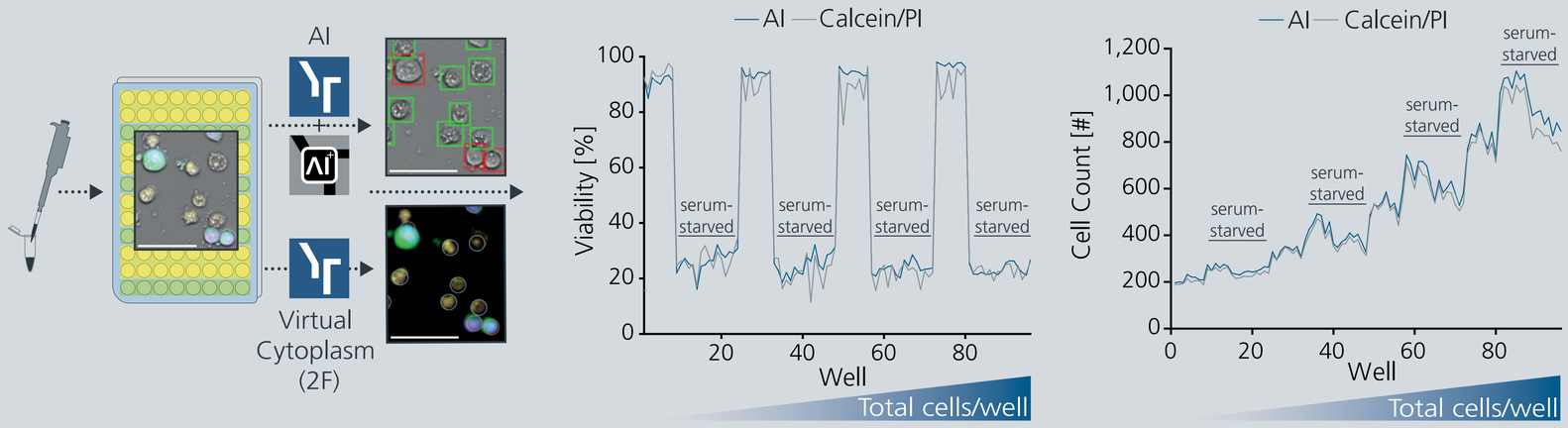
Cell viability assays are indispensable in various research areas. One of the most common standard techniques for assessing viability is Trypan Blue (TB) staining. However, TB has drawbacks: the dye exhibits cytotoxicity and is classified as carcinogenic. To overcome these obstacles, we developed an alternative solution. (1) We labeled stained suspension cells in the brightfield channel and assigned them to live or dead class using our AI-STUDIO+ software. (2) Advanced machine learning algorithms were trained on this data to detect cells and evaluate their viability based on morphological differences. (3) We validated the accuracy of our model by comparing its results with classical image processing of TB staining.

Results

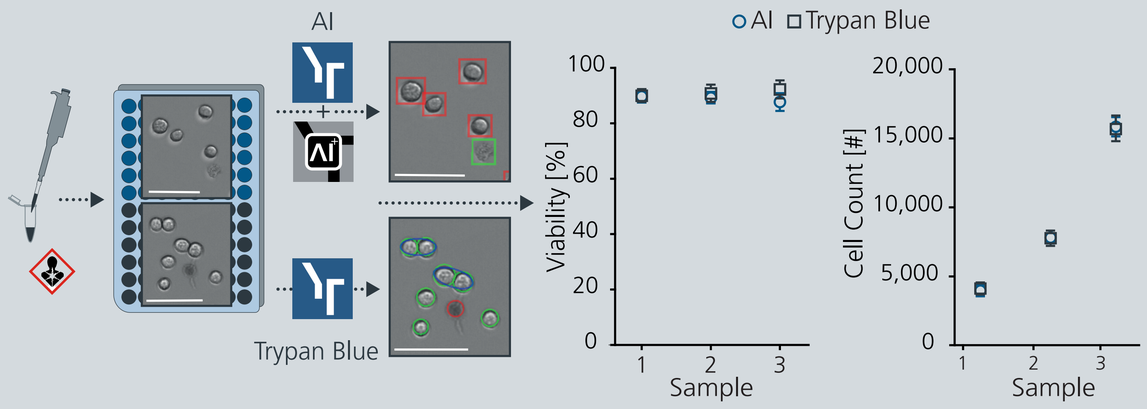
Generation of Training Data and Machine Learning



Live/Dead Staining vs. AI Viability Analysis



Trypan Blue Assay vs. AI Viability Analysis



Viability [%]

	AI	Trypan Blue
1	89.9 ± 1.7	90.2 ± 2.3
2	89.5 ± 2.1	91.0 ± 3.1
3	87.9 ± 3.2	92.4 ± 3.3

Cell Count [#]

	AI	Trypan Blue
1	3,974 ± 4.1%	4,131 ± 6.2%
2	7,809 ± 2.7%	7,769 ± 5.9%
3	15,830 ± 3.8%	15,664 ± 5.6%

Learn more!

Benefits of SYNENTEC's AI-based Viability Assay

- Label-free, non-invasive, no interference with test compounds
- Safe, rapid, reliable, efficient, and time-and cost-effective
- Imaging and image analysis in one software platform
- Suitable for high throughput (96-well plate can be imaged in 3-4 minutes)

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Institut für Experimentelle Tumorforschung