

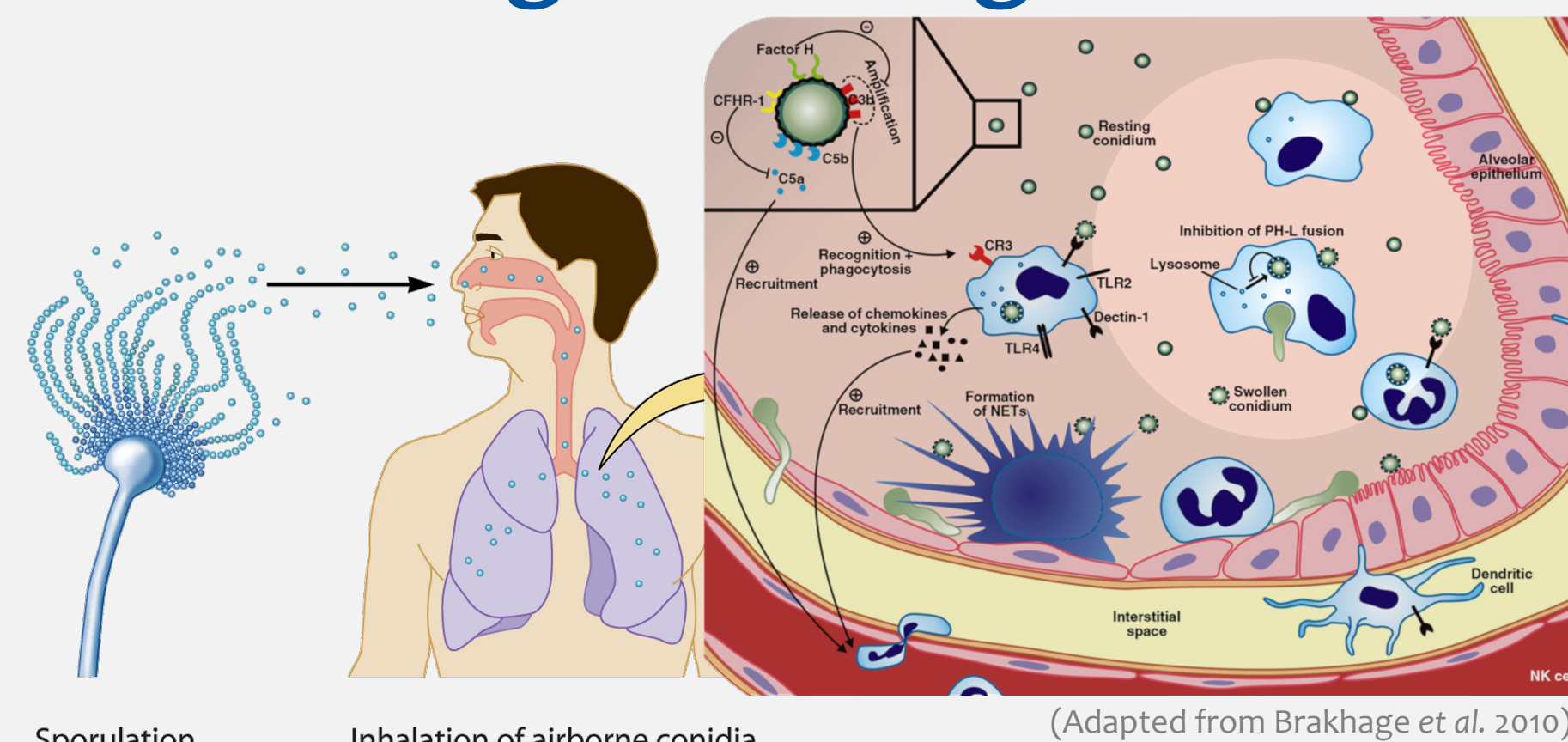
Virtual phagocytosis assays reveal strain-specific differences in the microscopic parameters of the interaction between alveolar macrophages and two *A. fumigatus* strains

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Biological Background

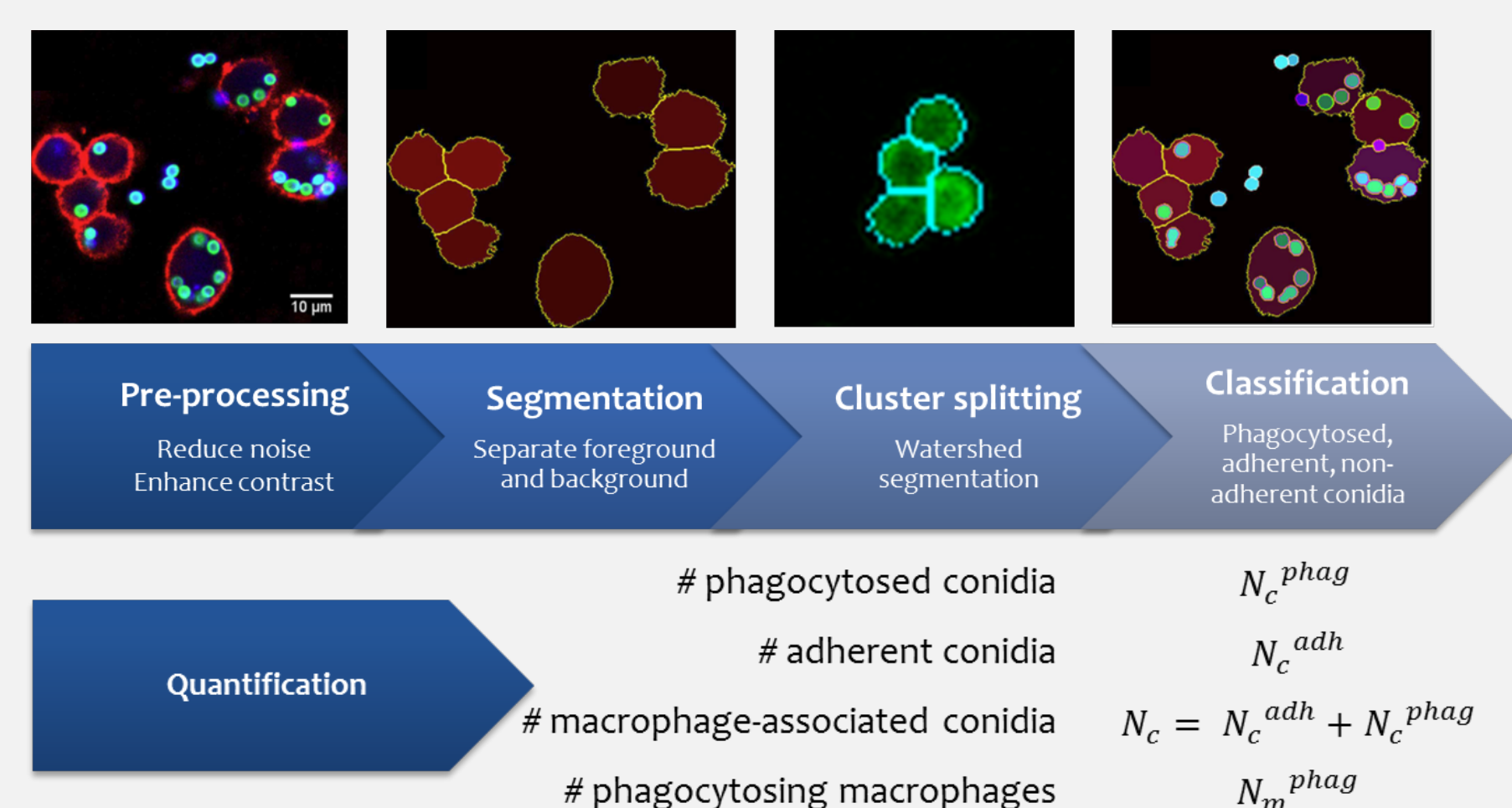


Aspergillus fumigatus is a ubiquitous human-pathogenic fungus. It distributes its small spores (conidia), with a diameter of 2 - 3 μm , via the air. Thus, every human individual inhales several hundred conidia per day. The resident immune cells in the lung - the alveolar macrophages (AM) - phagocytose these conidia and thereby are major players against this pathogen. However, in immunocompromised patients the clearance of the conidia is disturbed leading to severe infections with mortality rates ranging from 30 - 90%. Therefore, it is very important to better understand the host-pathogen interaction of *A. fumigatus* and AM.

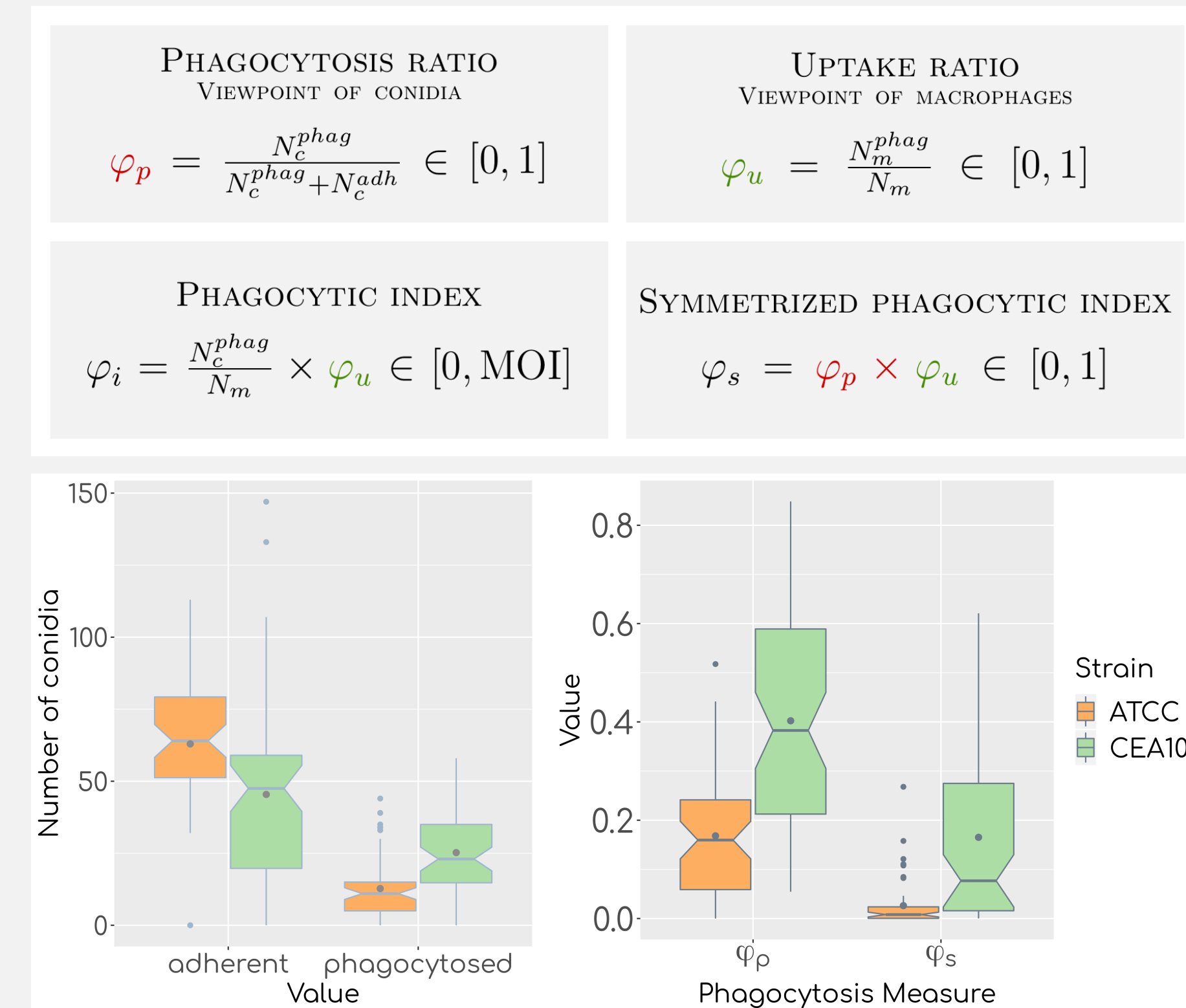
Experiments and Image Analysis

- ▷ co-incubation: AM and *A. fumigatus*
- ▷ two Af strains: ATCC, CEA10
- ▷ co-incubation for 1 h
- ▷ differential staining

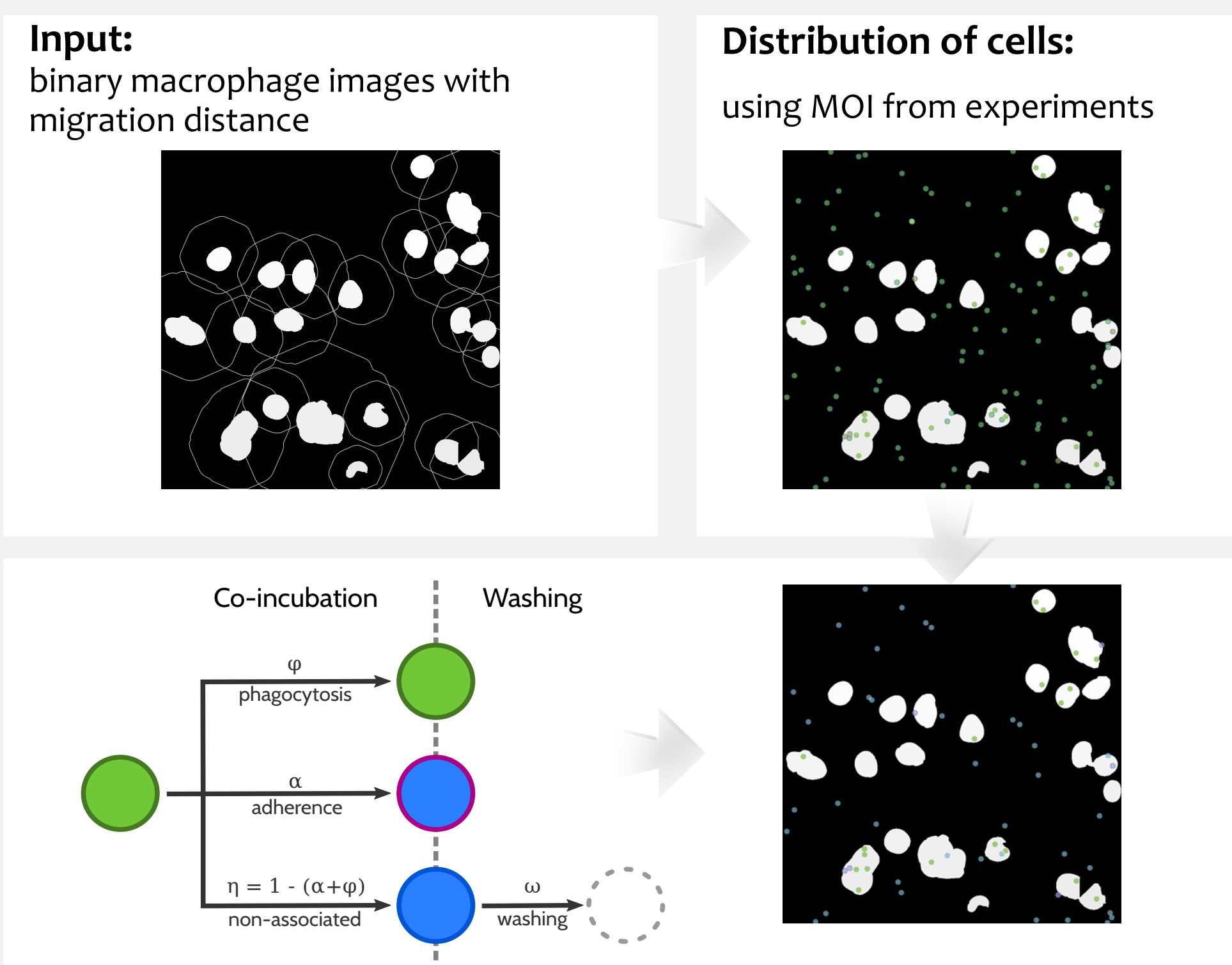
▷ conidia: FITC
▷ macrophages: anti-CD9 antibody
▷ non-phagocytosed conidia after co-incubation: calcofluor white



Quantification & Phagocytosis Measures

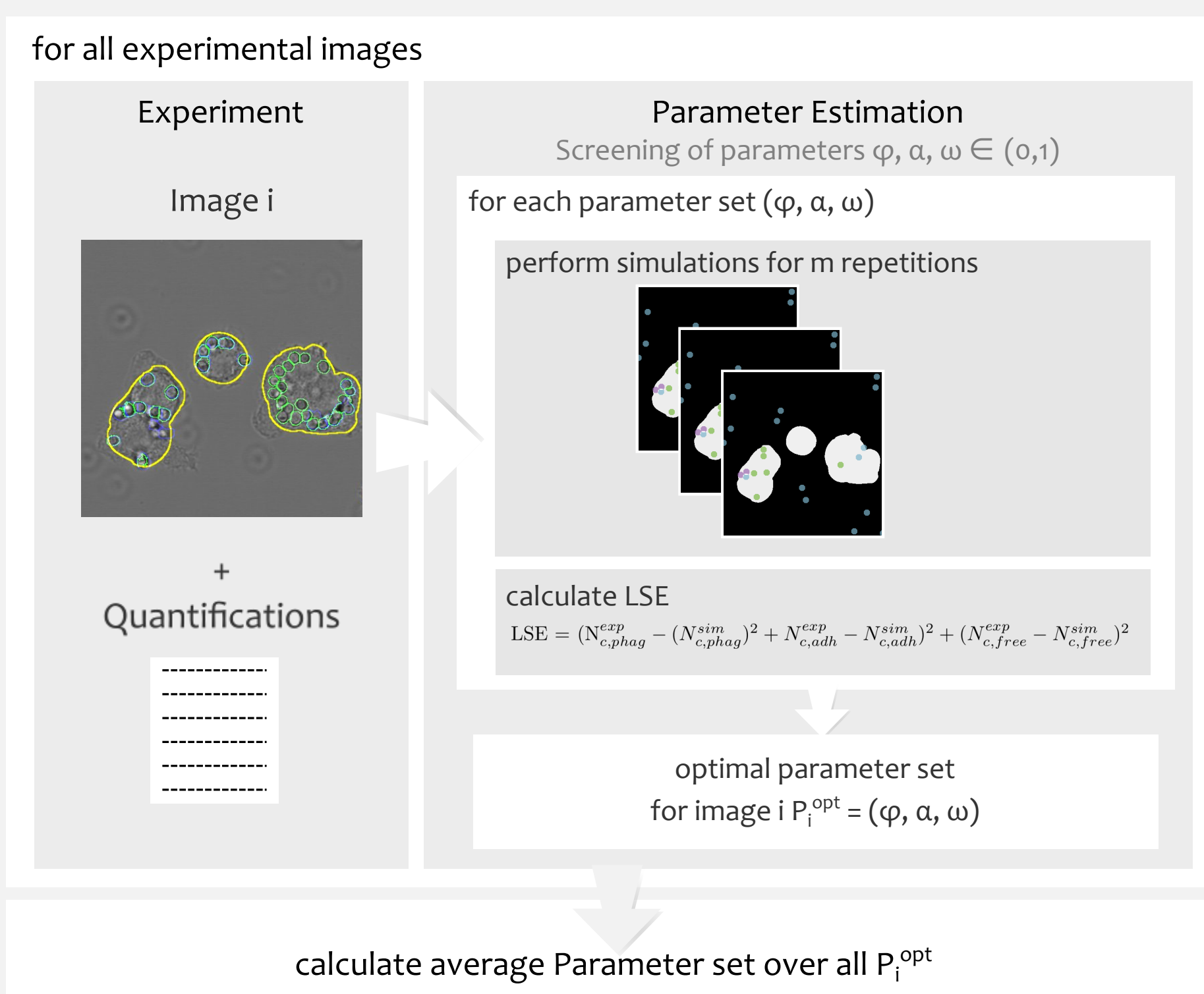


Model & Simulation

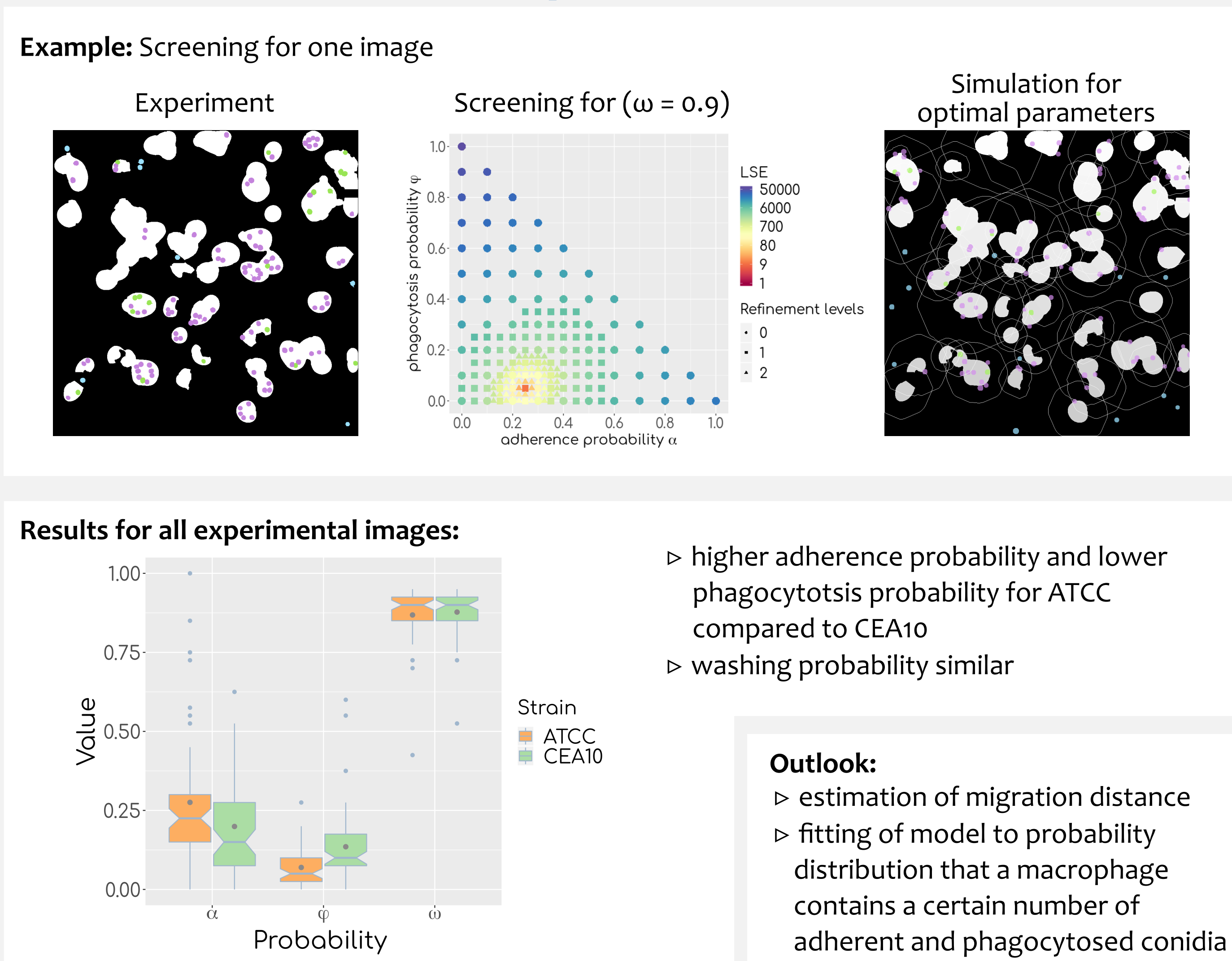


CellRain

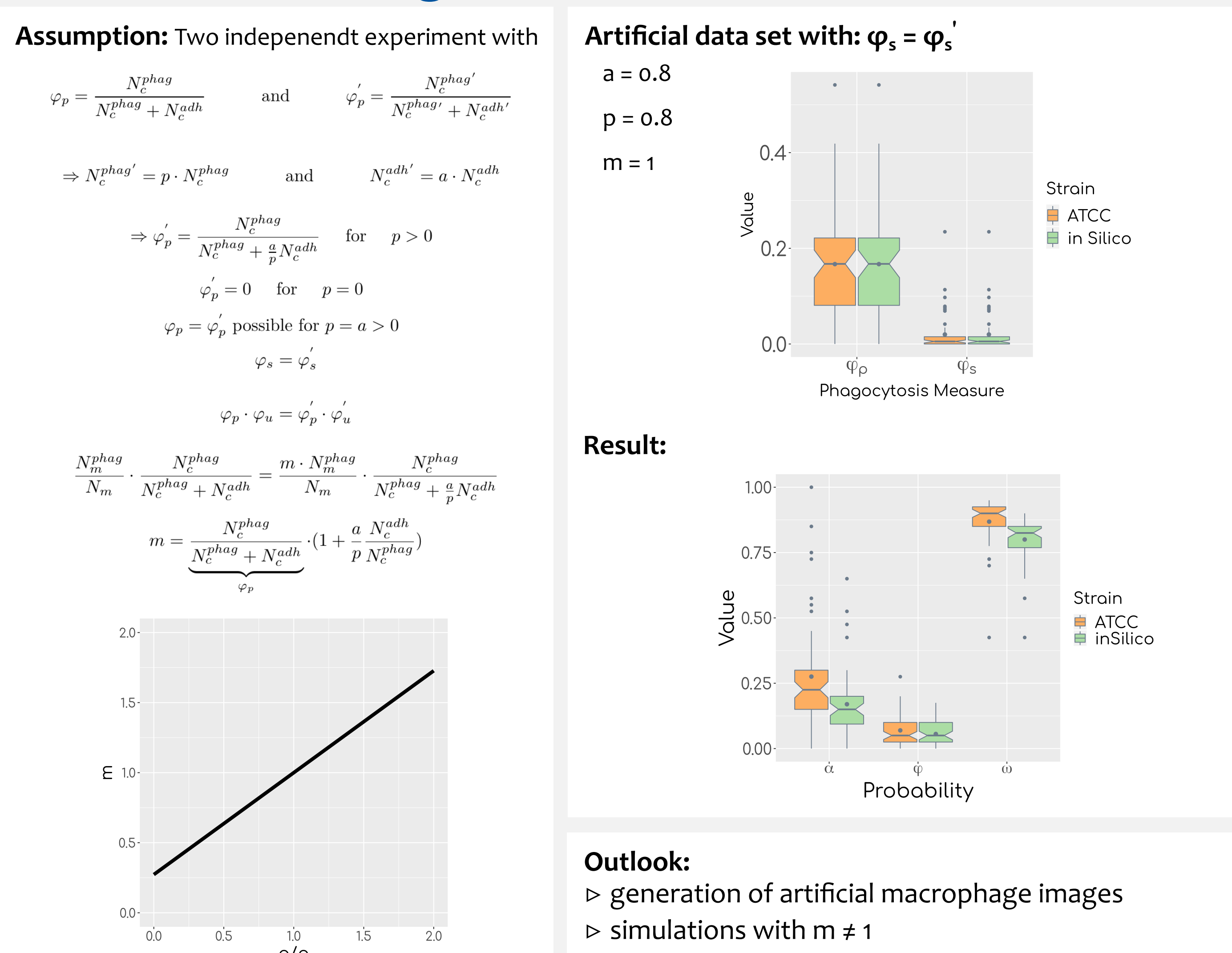
Parameter Estimation Workflow



Estimation of Microscopic Parameters



Resolve Ambiguities of Phagocytosis Measures



References:

Cseresnyés Z*, Kraibooj K*, Figge MT, *authors contributed equally (2018) *Hessian-based quantitative image analysis of host-pathogen confrontation assays*. Cytometry A 93(3), 346-356.

Kraibooj K*, Schoeler H*, Svensson C-M, Brakhage AA, Figge MT (2015) *Automated quantification of the phagocytosis of Aspergillus fumigatus conidia by a novel image analysis algorithm*. Frontiers in Microbiology 6(549), *authors contributed equally.

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Pathogenic fungi and their human host:
Networks of interaction
Collaborative Research Center / Transregio

