

## Accepted Manuscript

Title: Population balance modelling of stem cell culture in 3D suspension bioreactors

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**Highlights:**

- Mathematical model developed for ESC 3D suspension culture
- Modelled effects of varying substrate and gas concentration on total cell number
- Model behaviour shown to be consistent with literature data
- High initial substrate, O<sub>2</sub>, fed-batch system maximise total cell number
- Proof-of-concept model for optimization of stem cell culture in 3D

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