Orbital Mixing as an Alternative to Stirred-Tank Bioreactors for Scale-Up and Commercial Production of Cell-Based Therapies

D. Laidlaw[1], T. Anderlei[2], T. Burgin[2], A. Richter[2], T. Adams [3], J. Herrmann [3], C. Burki[4], F. M. Wurm[4], D. Monteil[5], M. Kuhner[2].

1 – Kuhner Shaker Inc., 2-Kuhner Shaker AG, 3 – Sartorius Stedim Biotech GmbH, 4 – ExcellGene SA, 5 – LBTC-EPFL

Commercial-scale production of cell-based therapies will, in many instances, require process scale-up prior to delivery of final product to the patient. Here, orbital shaken bioreactors are presented as an alternative to stirred-tank vessels for process development and scale-up. Orbital shaken bioreactors offer a low shear and technically conservative approach capable of preserving mixing hydrodynamics from the µl stage to scales as large as 2500L. Due to the simplicity of the technology, the speed of scale-up is fast and the cost of implementation is low in comparison to stirred systems or other more complex approaches. kLa's and mixing times for scales from 1ml to 2500L are presented here. Basic characterization with microcarriers at the 200L scale is also shown.

Kuhner ISF1-XC

Sensors may be added to any of these scales

*96LWP** 50-200µl

*96+24DWP*** 300µl-5ml

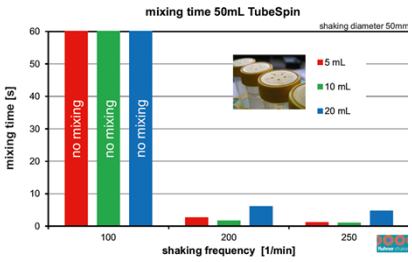
*50ml TS**** 1-40ml

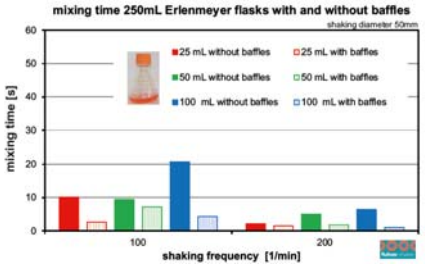
600ml TS and flasks 25ml-5L

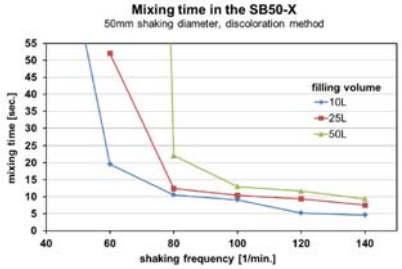
SB50, Single Use Bioreactor 10L-50L

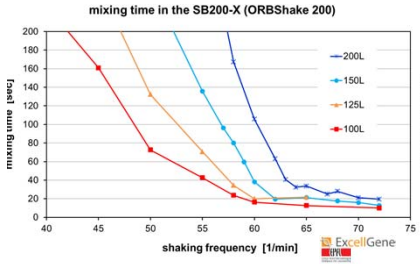
SB200, Single Use Bioreactor 50L-200L

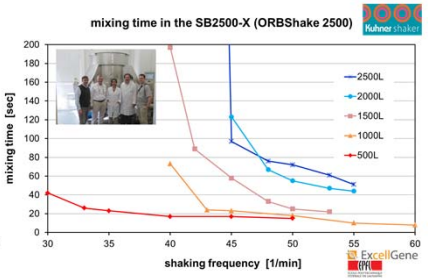
SB2500, Single Use Bioreactor 200L-2500L

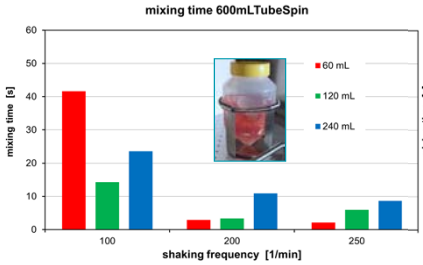


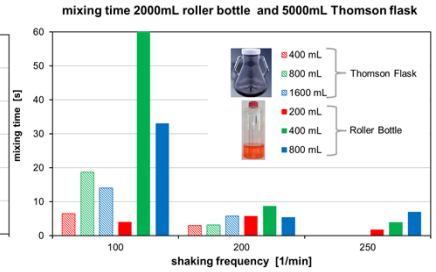


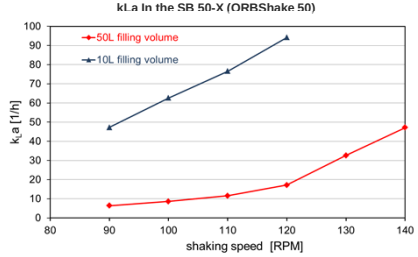


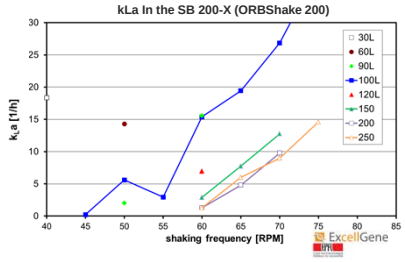


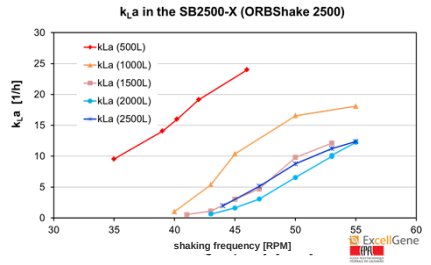


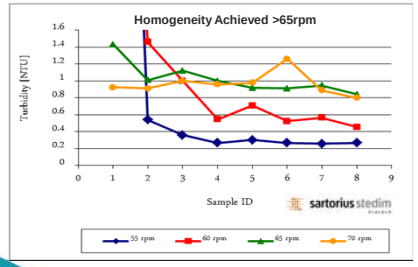


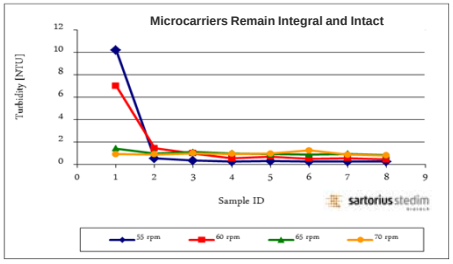


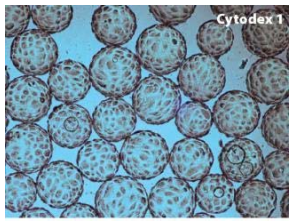












- Conserved hydrodynamics = rapidly scale to 2500L.
- Mixing times and kLa data are available at each scale.
- All scales allow sensors for process monitoring.
- Simple 'no-impeller' bag is low cost and flexible.

- 200L has been shown suitable for microcarriers:
  - Homogeneity achieved >65rpm.
  - Microcarriers remain integral and intact.

*LWP = Low Well Plate, **DWP = Deep Well Plate, ***TS = Tubespin

Kuhner shaker

ExcellGene

sartorius stedim biotech