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# Optimizing culture conditions for stem cells

**Cornelia Kasper**

*University of Natural Resources and Life Science (BOKU), Austria*

## Abstract

Oxygen concentration appears to be a significant factor which influences stem cell proliferation, stemness and differentiation capacity. In vivo tissue oxygen concentrations are maintained within range of 3-8 % (in most solid tissues) minimizing the risk of oxydative stress related damage. This range of oxygen concentration is referred to as "hypoxic" conditions - but meaning actual "physiological" conditions. Thus, tailor made bioreactors and processes for the cultivation of human MSC under hypoxic conditions are rapidly gaining importance. Initial studies have shown that the gene and protein expression levels (secretome) differ significantly from MSC cultured under "standard" cell culture conditions (static conditions at 5% $CO_2$, 37°C, in plastic well plates in ambient atmosphere) in comparison to MSC cultures under hypoxic conditions. This is even more significant when cultured under dynamic conditions in bioreactors.

The lecture will give a brief overview on different dynamic systems (e.g. stirred tank bioreactors, rocking platforms, perfusion systems, rotating bioreactors) including bioreactors for the applications of biomechanical stimulation e.g. shear stress via fluid flow, strain, compression, torsion. Physiological “training” is of special interest in stem cell differentiation and towards functional 3 D tissues. The lecture covers also the presentation of systems and processes suitable for automatization.

## Biography

Cornelia Kasper completed her Ph.D. 1998 from Leibniz University of Hannover (Germany) and her habilitation in 2007 at the Institute for Technical Chemistry at the Leibniz University of Hannover. She was appointed as full university professor for “Biopharmaceutical Production and Technology” at University of Natural Resources and Life Science (BOKU) in Vienna (Austria) at the department of biotechnology. She has published more than 60 papers in reputed journals and several book chapters and is editor within the series “Advances in Biochemical Engineering and Biotechnology” (Springer) of several volumes covering actual areas in stem cell research.