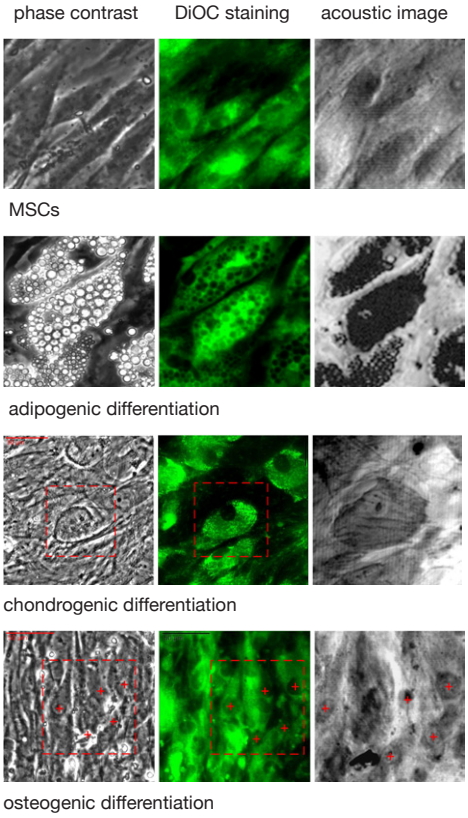
SASAM®
Acoustic Microscopy
Stem Cell Applications



Multilineage differentiation of human mesenchymal stem cells. Acoustic microscopy enables the detection of specific cellular structures with a resolution comparable to phase contrast images. Subcellular structures, e.g. nuclei, lipid vacuoles, are shown and it is possible to distinguish clearly between cellular bodies and surrounding ECM in dense cultures.

Weiss, E. C.; Anastasiadis, P.; Hildebrandt, C.; Gorjup, E. & Lemor, R. M. (2007), Characterization of Adipogenic, Chondrogenic and Osteogenic Differentiation with Time-Resolved Acoustic Microscopy, in ‚Proc. IEEE Ultrasonics Symp', pp. 809--812.

The **SASAM®** Technology enables high resolution imaging of individual cells and subcelluar structures.

The non-invasive feature of acoustic microscopy provides marker-free detection of vital cells. It is ideally suited for long term studies of in vitro cultures.

Next to broad applications in the field of substance testing, migration studies or cell volumetry, acoustic microscopy is a powerful tool for investigation of developmental processes in stem cells.

Investigation of cellular changes in stem cell cultures

Differentiation of stem cells is associated with a wide range of cellular changes affecting the cell shape, the architecture of the cytoskeleton and the expression of specific organelles and extracellular matrix.

With acoustic microscopy it is possible to detect these morphological changes. At the same time additional information of the specific mechanical properties are provided.

Quantitative analysis of mechanical properties in stem cells

In contrast to conventional invasive analytic methods, e.g. PCR, histological staining and FACS, acoustic microscopy is capable to quantify developmental changes in stem cells non invasively.

The specific changes of the cellular morphology are associated with the mechanical properties. This parameter is essential for the specific cellular functionality in vivo and can be used as a non-invasive marker for process and quality control of stem cell differentiation.

	Substrate echo / J	Front echo / J
Adipocytes	0,075±12%	0,350±21%
Chondroblasts	0,038±4%	0,200±10%
Osteoblasts	0,037±7%	0,125±12%

Quantification of the mechanical properties of human mesenchymal stem cells after differentiation. The echo amplitudes demonstrate specific values for each cell type.

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