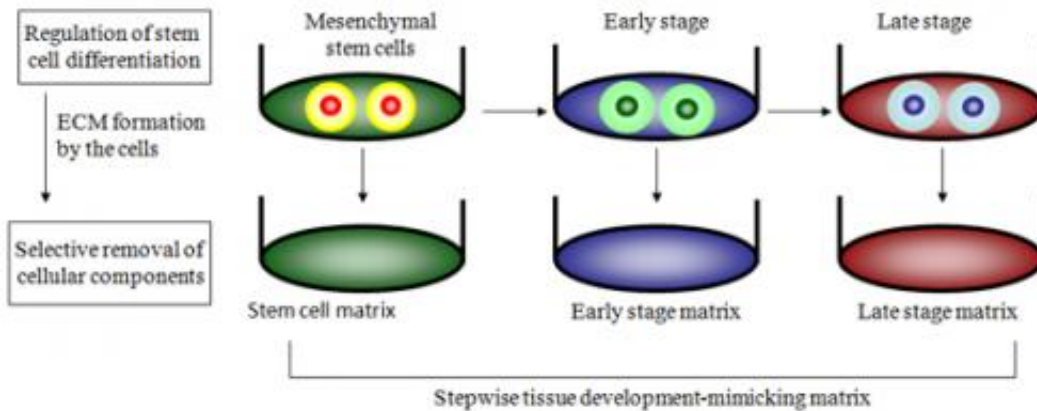


# Development of 'matrix' material controlling differentiation of stem cells

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Fabrication of stepwise tissue development-mimicking matrix materials which mimic the extracellular matrix during osteogenic and adipogenic differentiation of mesenchymal stem cells.

The Tissue Regeneration Materials Unit of the International Center for Materials Nanoarchitectonics, National Institute for Materials Science in Japan succeeded in developing a matrix material which can control the differentiation of stem cells for regenerative medicine.

In order to realize regenerative medicine, it is necessary to induce the differentiation of stem cells into specific cell types to reconstruct desirable tissues or organs to treat diseases and defects. Technique for controlling the differentiation of stem cells is the most critical aspect of this process. As one such technique, attention is now focused on the role

of extracellular matrix (ECM) that surrounds cell in vivo and can influence stem cell differentiation. However, it has been difficult to fabricate ECM material mimicking the stepwise matrix because the ECM surrounding differentiating cells is very complicated and remodelled according to the stage of differentiation.

In this study, the research team succeeded in fabricating two types of matrix materials that mimic the dynamically changing ECM during [stem cell differentiation](#). They are “stepwise osteogenesis-mimicking matrix” and “stepwise adipogenesis-mimicking matrix” which mimic the ECM when mesenchymal stem cells are differentiated to osteoblasts and adipocytes (fat cells). Using the two types of “stepwise [tissue development-mimicking matrix](#)”, the researcher team also succeeded in controlling the osteogenic and adipogenic differentiation of mesenchymal stem cells. The results indicate that ECM plays an important role in controlling the balance of osteogenesis and adipogenesis of mesenchymal stem cells.

In the future, the stepwise tissue development-mimicking matrix is expected to play a key role in research aimed at elucidating the ECM functions on the differentiation of iPS cells, ES cells and other [stem cells](#) in regenerative medicine. These materials will also be useful in elucidating the disease mechanism of osteoporosis, which may be triggered by an unbalance of osteogenic differentiation and adipogenic [differentiation](#).

The research results will be soon published online in *Biomaterials*.

Provided by National Institute for Materials Science

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