

# Developing coral explants and micropropagates for biotechnological uses

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As the marine environment is becoming increasingly affected by anthropogenically driven stressors, the development of cell and tissue models of key invertebrates is essential. Recently we harnessed the developmental plasticity of some scleractinian corals and established a process of tissue explantation and micropropagation under controlled laboratory conditions. This enabled us to produce lines of clonally derived coral tissue micropropagates, 1-5mm in size, devoid of, or including skeletal element, from a variety of coral species, and for a variety of uses. We found that explantation of these minute tissue fragments from adult coral colonies or polyps, and maintaining them under specific and properly controlled conditions of temperature, light, salinity, and water motion regimes, gives rise to micropropagates that can either be maintained as undifferentiated tissue balls or caused to develop into polyps or colonies. Using histology, immunohistochemistry and transmission electron microscopy we followed cellular processes occurring during reorganization of the tissues following explantation. These processes include programmed cell death, cell migration, proliferation and *de novo* differentiation, and are comparative to processes occurring during coral tissue regeneration. We further showed that under proper conditions the explants re-differentiate into fully functioning miniature polyps that are able to feed and calcify. We then applied different physical and chemical stressors to the micropropagates, and recorded morphological and physiological changes, thus providing proof that they can be used as models for research purposes. The miniature size and ease of manipulation of these micropropagates allows the production and long-term maintenance of these clonally derived lines for numerous research purposes. In addition, repetitive explantation of micropropagates, facilitates the development of lines of specific genotypes making them amenable to comparative and collaborative studies worldwide.