Coral cell proliferation *in vitro* and *in situ*

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In colonial Scleractinian corals, continuous growth with periodic upward withdrawal of the tissue results in continuous vertical extension of the calcified exoskeleton, building the framework of reef ecosystems. Tissue homeostasis is controlled within the individual polyps, maintaining a balance between cell proliferation for self-renewal, and differentiation into specialized cell types. Localization of active zones of proliferation within the polyp tissue layers and in derived primary cell cultures has not yet been determined.

In this study, spatial variations of proliferation in the coral *Pocillopora damicornis* (Linnaeus 1758) have been characterized with a method based on DNA synthesis assessment via 5-bromo-2'-deoxyuridine (BrdU) incorporation into nuclear DNA over a 24h labeling period and detection by immunolocalization with a fluorescent secondary antibody. *In situ,* BrdU was incorporated in all four cellular layers of the polyp, with lowest incorporation in the calicoderm (<4% BrdU-positive cells) involved in skeletal formation, and highest incorporation in the aboral gastroderm (~30% BrdU-positive cells) lining the gastric cavity. An intermediate rate (~10% BrdU-positive cells) was observed in the oral pseudo-stratified epithelium, in contact with seawater, which is the site of insertion of terminally differentiated mucocytes and cnidocytes.

In vitro, spatially heterogeneous proliferation events were recorded in tissue balls (~7% BrdU-positive cells) which are cell aggregates with a smooth surface, formed during the second day of coral primary cultures. Furthermore a transient rise in zooxanthellae density within isolated gastrodermal host cells indicated perturbation in the control of their cell cycle upon tissue dissociation in primary culture.