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PLURIPOTENT *VERSUS* REPROGRAMMED CELLS: CELL PLASTICITY IN ECHINODERM REGENERATION

Echinoderms display remarkable regenerative capabilities and offer a variety of models to study this phenomenon widely distributed throughout the Phylum. Although their regenerative phenomena have been traditionally attributed to two different mechanisms (i.e. epimorphosis and morphallaxis), the true origin and fate of the involved cells are still unclear. An up-to-date overview of cell recruitment processes in the different echinoderm classes is here provided in order to define the state of the art, including the main unsolved issues, as well as the necessary future steps to cover the knowledge gap.

Among stellate echinoderms, crinoids are the only group clearly displaying the recruitment of morphologically undifferentiated cells stocked in the stump tissues (*i.e.* coelomic canals and brachial nerve): these undifferentiated cells actively migrate to form a true blastema where they undergo proliferation and differentiation up to to regenerate the lost tissues. Reprogramming of differentiated cells occurs only in stress conditions.

In contrast, a true regenerative blastema is missing in brittle stars and starfish, which apparently mainly rely on recruitment of dedifferentiated cells from mature tissues. In starfish, dedifferentiation is massively employed at the level of muscle tissues, also in location far from the wound site. In both these classes progenitor-like cells are provided and recruited via epithelial-mesenchymal transition (EMT) from coelomic epithelium.

In sea cucumbers neural and intestinal regeneration are the main process under investigation. In the former, the absence of "stemness" marker in the transcriptome suggests that radial nerve cord regeneration depends on dedifferentiation of the supporting glial cells that re-differentiate in both the same cytotype and new neurons. Myocyte dedifferentiation markedly occurs during gut regeneration.

In sea urchins, damaged test and broken spines are reformed through dedifferentiation of stump cells with only minor local cell proliferation, whereas totally removed spines are regenerated via undifferentiated (pluripotent) cells.

Overall, echinoderm regeneration appear mainly to rely on dedifferentiation phenomena rather than recruitment of pluripotent cells already stocked in the stump tissues, the exact origin, identity and fate of the involved cells being still unknown in most cases. Echinoderm tissues, especially coelomic epithelium and muscles, show a high potential of plasticity in terms of cell differentiation/dedifferentiation and activity (proliferation, migration), and EMT plays key roles in this plasticity. Cell tracking coupled to molecular and microscopy approaches will be strongly needed to unravel in detail the strikingly effective cellular mechanisms and pathways (from cell origin to fate) employed by echinoderms in their regeneration processes.

Comunicazione orale X **Poster** □

□ Simposio 1 **Riconoscimento e comunicazione nel mondo animale**
□ Simposio 2 **La valutazione della biodiversità a diversi livelli di organizzazione**
□ Simposio 3 **Le aree naturali protette per la gestione e protezione della fauna**
X Simposio 4 **Cellule staminali, differenziamento e riprogrammazione cellulare: modelli tradizionali e modelli innovativi**
□ Tema libero (solo poster)

Premio UZI **Partecipa** (solo poster) □ **Non partecipa** X