Echinoderms are valid deuterostome marine invertebrate models to study repair phase events after arm injury

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Echinoderms are often subjected to traumatic amputations that damage or remove whole body parts *i.e.* arms. After such severe injuries, the repair phase must be effective with rapid emergency reaction and re-epithelialisation as well finely regulated extracellular matrix (ECM) remodelling to ensure subsequent arm regeneration.
Here, we used the brittle star *Amphiura filiformis* (Ophiuroidea) and the starfish *Echinaster sepositus* (Asteroidea) as valid deuterostome marine invertebrate models to study similarities and differences in the repair phase phenomena of these two echinoderm species and discuss them in comparison with those of animals with limited regenerative abilities (*i.e.* mammals). To achieve this goal, we used an integrated approach based on both microscopy and molecular analyses.
We showed that in both echinoderm models, immediately after injury, emergency reaction and re-epithelialisation are extremely rapid and more efficient than those displayed by mammals. The remodelling and the formation of the ECM, mainly collagen, is ensured by delayed activation of ECM genes and protein deposition and, together with absence of fibrosis (*i.e.* over-deposition of ECM), seem to be advantageous for regeneration-competent animals in comparison to mammals.
Overall, we found that the echinoderm species here studied show comparable repair events. The differences between regeneration-competent and non-competent animals suggest that rapid wound closure and delayed ECM deposition are necessary to ensure an effective regeneration of whole lost body parts. Further molecular and functional analyses must be performed to confirm this hypothesis.