

## **Estradiol in the reproductive biology of edible sea urchins: which is the function?**

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Sea urchins are key-elements of the marine ecosystems and their gonads are commercially overexploited as food. They are also historical and extensively used models in embryology. Despite this, the specific hormonal mechanisms regulating sea urchin gonad development and reproduction are scarcely known. To overcome this gap of knowledge, in this research we focused on the sex steroid estradiol (E2), a well-known regulator of many reproductive aspects in vertebrates and invertebrates and whose presence as well as seasonal and sex-specific variations were previously reported in different echinoderm tissues. In order to understand E2 role we set up an experiment of direct hormone administration, using the edible sea urchin *Paracentrotus lividus* as model. We injected three different concentrations (2 ng/mL, 20 ng/mL and 200 ng/mL) of 17 $\beta$ -estradiol for 2 and 12 weeks (2 injections/week) and we checked the effects on different reproductive parameters. The lowest concentration was close to the “physiological” one. Results showed a lack of dose-dependent increase of endogenous hormone levels in both body fluids and gonads, thus suggesting the presence of potent homeostatic mechanisms: these latter are particularly activated over a critical threshold and work much more efficiently in short-term period and in specific tissues. These homeostatic mechanisms do not involve enzymes such as aromatase, sulfotransferase and acyltransferase, whose activities were not influenced by the hormone treatment. Despite the actual increase of endogenous E2, both short- and long-term hormonal treatment did not induce marked variations in most the reproductive parameters, such as sex-ratio, Gonad Index and maturative stage. Only lipid content resulted negatively correlated with E2 level in the gonad. Overall our present results contribute to a better knowledge of sea urchin endocrinology and suggest that E2 does not markedly influence their reproduction and, particularly, it does not promote gonad maturation, as commonly reported for many vertebrates and also suggested for other echinoderms.