Sea Urchin Embryo
In Vivo Test Model for Bioscreening

Advantages
- Simple and inexpensive growth procedure
- Synchronous development
- Transparent embryos. Changes in their morphology are easily observed by light microscope
- Permeability of eggs and embryos to various chemicals
- Simple structure and well-studied embryonic development
- Rapid cell divisions during cleavage stage (every 40-60 min)
- Convenient and observable markers of embryo viability
- Biochemical similarity to Vertebrate and Mammals

Current Approaches
- The use of non-toxic fluorescent probes for in vivo study of drug effects on cellular biomolecules/processes
- Preliminary estimation of anti-proliferative activity of putative tubulin/microtubule-binding chemicals
- Evaluation of nitric oxide donor effects by NO-deficiency simulation

References


Possible drug tests on early sea urchin embryos

- **fertilization procedure**: easy, fast, without sacrifice of adult sea urchins

  - **fertilized egg**: 40-60 min
  - **cleavage**: 9-10 h
  - **40-60 min**: 13-15 h

- **Cell proliferation**

  - **early blastula**: 9-10 h
  - **mesenchyme blastula**: 13-15 h
  - **late gastrula**: 20-25 h

- **Hatching** (viability marker)

  - **general toxicity**: test procedure: visual observation

- **Active swimming/ciliary movement** (viability marker)

  - **general toxicity**: test procedure:
    - tubulin/microtubule binding agents,
    - inhibitors of DNA synthesis, telomerase inhibitors
  - **test procedures**:
    - visual observation, fluorescent probe assay

- **Skeleton formation**

  - **inhibitors of biomineralization**
  - **test procedures**:
    - visual observation

- **Larval morphogenesis**

  - **general toxicity**: test procedure:
    - NO-synthase inhibitors, NO-donors
  - **general toxicity**: test procedure:
    - visual observation, fluorescent probe assay

- **General toxicity**: anti-proliferative effects:

  - tubulin/microtubule binding agents,
  - inhibitors of DNA synthesis, telomerase inhibitors

  - **test procedures**:
    - visual observation, fluorescent probe assay