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Cytotoxicity of quinonoid pigments from sea urchins

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Secondary metabolites specific to sea urchins are known as spinochromes or Poly Hydroxy Naphtho Quinone (PHNQ) pigments. The most well-known sea urchin pigment echinochrome A exhibit a wide range of pharmacological activities: antioxidant, anti-allergic, antidiabetic and cardioprotective. At the same time, properties of other PHNQ pigments are not studied in detail. For this investigation echinochrome A (1) and echinamines A (2) and B (3) were isolated from sand dollar *Scaphechinus mirabilis*; spinochromes B (4) and E (5) were isolated from *Mesocentrotus nudus* and the concentration ($\mu\text{g}/\text{ml}$) that inhibits cleavage of eggs 20 hours after the beginning of cell division in the control was studied. In this study, we determined the cytotoxic effects of PHNQs 1-5 on embryos of the sea urchin *M. nudus*. Sea urchin gamete is an attractive bioassay object since it is easy to obtain synchronous samples of dividing cells, and the cell cycle duration lasts only 1 hour. This model, rapidly and at low cost, provides information on the disruption of the cell proliferation. The cytotoxic action of steroid glycosides from starfish, synthetic naphthoquinones and sesquiterpenoid quinones have been successfully studied using sea urchin eggs. In the present work we have shown that quinones 1-5 exhibited slight activities on the first cell cleavage of eggs with IC values ranging between 50 and 100 $\mu\text{g}/\text{ml}$. The cytostatic action of 1, 2 and 3 was increased on the stage of eight blastomers. On gastrula stage quinones 1, 2 and 3 displayed a moderate cytotoxic effect (MIC 10, 25 and 25 $\mu\text{g}/\text{ml}$, respectively) (Table 1). When the insemination was performed with eggs previously incubated with 1, 2 and 3 at the concentration of 2 $\mu\text{g}/\text{ml}$ for 30 min, the fertilization was blocked completely, while the other compounds showed no significant inhibited effect. Thus, the cytotoxic activity of quinones 1-5 varied in the following sequence: 1 > 2, 3 > 4, 5.

Biography

Elena A Vasileva is a PhD student in the Laboratory of the Chemistry of Natural Quinonoid Compounds, G B Elyakov Pacific Institute of Bioorganic Chemistry, Vladivostok, Russia. She has experience in identification, isolation and structure elucidation of natural quinonoid compounds from plants, their cell cultures and from sea urchins.

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