Expression and potential significance of purinergic P2X7 receptors in endometrial cell lines

The purinergic receptor P2X7 (P2X7R) is an ATP-gated ion channel involved in the regulation of cell proliferation and differentiation, as well as in the induction of cell death. While its function has been widely described in inflammatory and neoplastic processes, its contribution to the pathogenesis of endometrial diseases, such as endometriosis and endometrial cancer, remains unclear. The aim of this study was to evaluate the expression, localization, and functional activity of the P2X7 receptor in two cellular models: 12Z (derived from an endometriotic lesion) and Ishikawa (endometrial adenocarcinoma), and to analyze its interactions with pro-inflammatory cytokines. *P2RX7* expression was determined by qRT-PCR, protein levels were assessed by Western blot, and receptor localization was examined using immunofluorescence. Functional activity was analyzed through Ca^{2+} influx (Fluo-8) and YO-PRO-1 uptake assays, applying the agonist BzATP and the antagonist A438079. Proliferation was examined following BzATP stimulation, and the regulation of *P2RX7* expression by cytokines (IL-1α, TNF, TGF-β1) was evaluated at the transcript level. P2X7R was detected in both cell lines, with higher expression in 12Z. The receptor localized to the plasma membrane and cytoplasm, and its stimulation with BzATP induced Ca^{2+} influx and pore formation, which were inhibited by A438079. Strong receptor activation suppressed proliferation in 12Z cells, whereas the effect in Ishikawa cells was weaker. Cytokines modulated *P2RX7* expression in a cell line–dependent manner, with IL-1α upregulating and TGF-β1 downregulating its expression in 12Z. The results indicate that P2X7R plays distinct roles in endometriotic and cancer-derived endometrial cells – in 12Z, it promotes inflammatory responses and limits proliferation under strong activation, whereas in Ishikawa its cytotoxic potential is less pronounced. These findings highlight the dual nature of P2X7R and its relevance in the pathophysiology of endometrial diseases.