

PLENARY PRESENTATIONS

β-ECDYSTERONE MODULATES MAMMALIAN CELL BIOENERGETICS AND ATTENUATES MPTP-ASSOCIATED MITOCHONDRIAL DEPOLARIZATION

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Ecdysterone, or 20-hydroxyecdysone, is a naturally occurring ecdysteroid widely distributed in plants and known to exert biological effects in mammals. We have previously shown that ecdysterone stimulates mitochondrial bioenergetics in intact cells, but has no substantial effect on isolated mitochondria, suggesting that its action may depend on cellular regulatory mechanisms. Here, we examined whether ecdysterone modulates activation of the mitochondrial permeability transition pore (mPTP) in intact cells.

Human SH-SY5Y neuroblastoma cells were used as an experimental model. Ferutinin, a natural estrogen, was applied at 25 μM to induce mPTP-associated mitochondrial depolarization. Mitochondrial membrane potential was assessed by fluorescence microscopy using TMRM. Ferutinin induced pronounced mitochondrial depolarization, which was markedly suppressed by cyclosporin A, a selective mPTP inhibitor, confirming the involvement of the permeability transition pore.

To evaluate the effect of ecdysterone, cells were treated under two experimental conditions: short-term exposure for 10 or 30 min before the experiment to assess rapid effects, and prolonged exposure for 24 h. Ecdysterone significantly reduced ferutinin-induced mitochondrial depolarization in intact cells by approximately 10% compared with control. Notably, the magnitude of this effect was similar after 10 min, 30 min and 24 h treatment, indicating that the protective response does not strongly depend on treatment duration.

These findings suggest that ecdysterone lowers mitochondrial sensitivity to Ca²⁺-dependent stress in intact cells. However, its protective efficacy was lower than that of cyclosporin A, indicating that ecdysterone is unlikely to act as a direct mPTP inhibitor. Instead, its effect may be mediated indirectly through cellular mechanisms that regulate mitochondrial bioenergetics and resistance to permeability transition.