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RAPID ACTIONS OF STEROID RECEPTORS: BRINGING THE RHYTHM OF SIGNALING TO A NEW PACE

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In the last two decades, several studies have unveiled a series of original signaling mechanisms through which so-called "nuclear" receptors can mediate rapid actions of steroid hormones. These rapid signaling actions are independent by the synthesis of mRNA or protein, and are therefore known as "non-transcriptional" or "nongenomic" as opposed to the classical genomic mechanisms. Nongenomic signaling of estrogens plays a prominent role in non-reproductive tissues, and between these is the vascular wall. At this level, estrogen triggers rapid vasodilatation, exerts anti-inflammatory effects, stimulates endothelial growth and migration and protects the vessels from atherosclerotic degeneration. Nongenomic signaling mechanisms have been involved in many of these actions and are more and more considered to be of importance for vascular function in physiological and pathophysiological conditions. Rapid actions of steroid hormones have been implicated with vascular as well as with myocardial protection in animal experimental models. Moreover, the nongenomic signaling of estrogens are tightly interconnected with the nuclear pathways, and there are several indications that, through nongenomic modulation of signaling cascades, estrogens are also able to modulate the expression of several relevant genes in endothelial cells. In conclusion, while we are still in an early phase of the investigations of the non-transcriptional actions of steroid hormone receptors, it is clear that this newly recognized category of signaling mechanisms is responsible for critical steroid actions in non-reproductive tissues.