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## Belma Turan Ankara University, Turkey

## Cardiac β-adrenoceptor subtypes in diabetes: Regulation of cardiac β<sub>3</sub>-adrenergic receptors

**P**ositive inotropic action of catecholamines is mediated through their interaction with beta-adrenergic receptors ( $\beta$ -ARs), while they can also mediate some deleterious effects, such as cardiac arrhythmias. The  $\beta$ -ARs are members of the G protein-coupled receptors and play important roles in the regulation of heart function. Cellular signaling associated with cardiac  $\beta$ -ARs is composed of coupled mechanism between  $\beta_1$ - $/\beta_2$ -AR and  $G_s$  proteins with contribution of constitutive  $\beta_3$ -AR coupling to G i proteins. This coupled mechanism further leads to the activation of adenylyl cyclase, and thereby increases intracellular cAMP level. However, recent studies have emphasized the contribution of constitutive  $\beta_3$ -AR coupling to G i proteins, thereby initiating additional signal transduction pathways, particularly under physiopathological conditions such as hyperglycemia. Diabetic cardiomyopathy, as a distinct entity, is recognized due to its diminished responsiveness to  $\beta_1$ -AR agonist stimulation in the heart from diabetic rats with no important changes in the responses mediated with  $\beta_2$ -AR. Furthermore, an upregulation of  $\beta_3$ -AR has been shown in diabetic rat heart with a strong negative inotropic effect on left ventricular function. Experimental data provide evidences that the mechanisms for the negative inotropic effect with  $\beta_3$ -AR activation appears to involve activation of a nitric oxide synthase pathway. On the other hand, we have shown that although insulin resistance and cardiomyopathy are developed under high-carbohydrate diet-induced Metabolic Syndrome (MetS), compared to type 1 diabetes, MetS-associated cardiac dysfunction seems not to be associated with any change in  $\beta_3$ -AR system, with similar ultrastructural changes into the myocardium.

## **Biography**

Belma Turan has completed her PhD from Ankara University and Post-doctoral studies from INSERM France and University of Ottawa School of Medicine. She is a Professor and the Head of Biophysics department in Ankara University Faculty of Medicine. She has published more than 100 papers in reputed journals and has been serving as an Editorial Board Member of more than 10 international journals. She is also the member of International Academy of Cardiovascular Sciences since 2005. She has supervised over 20 PhD and MSc thesis. Her research interest is focused on cardiac electrophysiology, calcium and zinc ion regulations, oxidant stress, antioxidants and diabetic cardiomyopathy.

Belma.Turan@medicine.ankara.edu.tr