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Calreticulin and calnexin — calcium binding and signaling endoplasmic reticulum chaperones

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A review of recent research using knockout and transgenic mice by Dr Marek Michalak

Abstract

The endoplasmic reticulum is an intracellular organelle involved in virtually every cellular function. Its unique luminal environment consists of Ca²⁺ binding chaperones, which are involved in protein folding, posttranslational modification, Ca²⁺ storage and release, and lipid synthesis and metabolism. Calreticulin, a major Ca²⁺ binding (storage) chaperone in the endoplasmic reticulum, is a key component of the calreticulin/calnexin cycle which is responsible for the folding of newly synthesized proteins and glycoproteins and for quality control pathways in the endoplasmic reticulum. Calreticulin-deficient and transgenic mice have revealed that calreticulin and the endoplasmic reticulum may be upstream regulators in the Ca²⁺-dependent pathways that control cellular differentiation and/or organ development. Calnexin deficiency, however, affects neuronal development and function.