

Emerging roles of the single EF-hand Ca²⁺ sensor tescalcin in the regulation of gene expression, cell growth and differentiation

Kolobynina K., Solovyova V., Levay K., Rizvanov A., Slepak V.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2016. Published by The Company of Biologists Ltd. Tescalcin (TESC, also known as calcineurin-homologous protein 3, CHP3) is a 24-kDa EF-hand Ca²⁺-binding protein that has recently emerged as a regulator of cell differentiation and growth. The TESC gene has also been linked to human brain abnormalities, and high expression of tescalcin has been found in several cancers. The expression level of tescalcin changes dramatically during development and upon signal-induced cell differentiation. Recent studies have shown that tescalcin is not only subjected to up- or down-regulation, but also has an active role in pathways that drive cell growth and differentiation programs. At the molecular level, there is compelling experimental evidence showing that tescalcin can directly interact with and regulate the activities of the Na⁺/H⁺ exchanger NHE1, subunit 4 of the COP9 signalosome (CSN4) and protein kinase glycogen-synthase kinase 3 (GSK3). In hematopoietic precursor cells, tescalcin has been shown to couple activation of the extracellular signal-regulated kinase (ERK) cascade to the expression of transcription factors that control cell differentiation. The purpose of this Commentary is to summarize recent efforts that have served to characterize the biochemical, genetic and physiological attributes of tescalcin, and its unique role in the regulation of various cellular functions.

<http://dx.doi.org/10.1242/jcs.191486>

Keywords

CHP3, COP9, Differentiation, GSK3, NHE1, Tescalcin