

Gene name: **CALCA**

Previous HGNC Symbols for CALCA Gene: CALC1

External Ids for CALCA Gene: HGNC: [1437](#) NCBI Gene: [796](#) Ensembl: [ENSG00000110680](#) OMIM®: [114130](#) UniProtKB/Swiss-Prot: [P06881](#) UniProtKB/Swiss-Prot: [P01258](#)

NCBI Gene Summary: This gene encodes the peptide hormones calcitonin, calcitonin gene-related peptide and katacalcin by tissue-specific alternative RNA splicing of the gene transcripts and cleavage of inactive precursor proteins. Calcitonin is involved in calcium regulation and acts to regulate phosphorus metabolism. Calcitonin gene-related peptide functions as a vasodilator and as an antimicrobial peptide while katacalcin is a calcium-lowering peptide. Multiple transcript variants encoding different isoforms have been found for this gene.

GeneCards Summary: CALCA (Calcitonin Related Polypeptide Alpha) is a Protein Coding gene. Diseases associated with CALCA include [Hepatocellular Carcinoma](#) and [Reflex Sympathetic Dystrophy](#). Among its related pathways are [GPCR downstream signalling](#) and [Presynaptic function of Kainate receptors](#). Gene Ontology (GO) annotations related to this gene include *identical protein binding* and *protein-containing complex binding*. An important paralog of this gene is [CALCB](#).

UniProtKB/Swiss-Prot Summary: CGRP induces vasodilation. It dilates a variety of vessels including the coronary, cerebral and systemic vasculature. Its abundance in the CNS also points toward a neurotransmitter or neuromodulator role. It also elevates platelet cAMP.

Cellular localization: mainly in the extracellular region.

The **CALCA** gene encodes the precursor protein **procalcitonin (PCT)**, which is cleaved into several peptides, including **calcitonin** and **calcitonin gene-related peptide (CGRP)**. Under normal physiological conditions, procalcitonin is primarily produced by the C cells of the thyroid gland and is involved in calcium homeostasis.

Function in Sepsis: In the context of sepsis the expression and role of procalcitonin undergo significant changes:

- **Biomarker for Sepsis:** During sepsis, procalcitonin levels can increase dramatically, often correlating with the severity of the infection. This elevation is due to the ubiquitous expression of the CALCA gene in multiple tissues in response to systemic inflammation, leading to increased procalcitonin production beyond the thyroid gland.
- **Mediator of Inflammatory Response:** Beyond serving as a biomarker, procalcitonin may play a direct role in the pathophysiology of sepsis. Studies have suggested that procalcitonin can act as a mediator in sepsis-related events, potentially contributing to the inflammatory process and adverse outcomes.

Pathways Involved in Sepsis: The induction of procalcitonin during sepsis involves several pathways:

- **Systemic Inflammatory Response:** The widespread activation of the immune system during sepsis leads to the induction of the CALCA gene in various tissues, resulting in elevated procalcitonin levels.

- **Epigenetic Regulation:** Epigenetic changes, such as DNA methylation patterns in the promoter region of the CALCA gene, have been observed in preterm neonates with bacterial sepsis, indicating a role in the gene's regulation during infection.

Diagnostic and Prognostic Role:

- **Diagnostic Marker:** Procalcitonin is widely used as a biomarker for the early detection of sepsis. Its levels rise significantly in bacterial infections, aiding in distinguishing sepsis from other non-infectious causes of systemic inflammation.
- **Prognostic Indicator:** Elevated procalcitonin levels have been associated with increased severity of sepsis and higher mortality rates, making it a useful prognostic marker for patient outcomes.

Therapeutic Implications: Given its role as a mediator in sepsis, targeting procalcitonin or its pathways may offer therapeutic benefits. For instance, immunoneutralization of endogenous procalcitonin has been shown to attenuate sepsis-induced acute lung injury in experimental models.