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Product Information

Platelet-Derived Growth Factor-BB, human recombinant, expressed in *E. coli*

Catalog Number **P4306**
Storage Temperature –20 °C

Product Description

Platelet-Derived Growth Factor (PDGF), first identified by Ross et al.,[1] is the principle mitogen present in serum for cells of mesenchymal origin.[2,3] PDGF is a potent mitogen for a wide range of cell types including fibroblasts, smooth muscle, and connective tissue. PDGF is localized in α-granules of platelets and released during clot formation.[4] PDGF is composed of a dimer of two chains (A and B). It can be present as AA or BB homodimers, or as an AB heterodimer.[5-8] Human PDGF-BB is a 24.3 kDa B chain homodimer protein containing 109 amino acid residues.

In platelets, ~70% of the PDGF is present as the AB dimer, with most of the remainder as BB.[9] Purified human PDGF shows substantial size heterogeneity with multiple species probably due to the presence of isoforms, glycosylation processing, aging of the platelets, and partial proteolysis during purification. A and B chains are 40% homologous in sequence and are encoded by distinctly different genes.[10] Each chain contains 8 cysteine residues, which are involved in intra- and inter-chain disulfide bonds.[11,12] Cleavage of these bonds by reduction causes irreversible loss of biological activity.[8]

PDGF elicits multifunctional actions with a variety of cells.[13-15] It is mitogenic to mesoderm-derived cells, such as dermal and tendon fibroblasts, vascular smooth muscle cells, glial cells, and chondrocytes. PDGF is a potent chemoattractant and activator of neutrophils, monocytes, and fibroblasts. It also increases the synthesis of phospholipids, cholesterol esters, glycogen, and prostaglandins and modulates LDL receptor binding.

Other actions of PDGF include its ability to regulate the synthesis and degradation of extracellular matrix protein and to stimulate the synthesis of additional growth factors. PDGF also may increase erythropoiesis and stimulate vaso-constriction.

PDGF is believed to play an essential role in the cellular response to tissue injury, both as a stimulant of mesodermal cell growth and activity and as a chemoattractant to other cells involved in the repair process.[16] In this role, PDGF appears to interact with Transforming Growth Factor-Beta-1 (TGFβ-1, Catalog Number T1654), which is also released by degranulating platelets at the source of the damaged tissue.[17] The sources of PDGF during wound repair include platelets (predominantly PDGF-AB), smooth muscles (PDGF-A),[18] monocyte-derived macrophages (PDGF-B),[19] and endothelial cells (PDGF-B).[20] PDGF may also play a role during normal embryonic development.[14] Pathologically, PDGF appears to be an initial mediator and a contributing sustaining factor in the development of atherosclerosis.[18-21] Abnormal cellular expression of PDGF is also associated with certain malignant transformations.[13] In fact, a transforming protein ($p28^{sis}$) encoded by the simian sarcoma virus oncogene (*v-cis*) contains a section that is virtually identical to the PDGF-B in its amino acid sequence,[23] is processed into a PDGF-BB-like homodimer,[24] and exhibits biological actions identical to PDGF.[25] Detection of *v-cis*-related mRNA (*c-cis* RNA) has been reported in certain malignancies of mesenchymal cell origin, including fibrosarcoma, glioblastoma, and osteosarcoma.[26,27] PDGF-A chain or both A and B chains are expressed by certain other tumor cell lines.[10,28] Other pathological conditions in which PDGF has been implicated include scleroderma, inflammatory joint disease, myelofibrosis and pulmonary fibrosis.[9,14]

Purified PDGF activates two distinct PDGF receptors encoded by separate genes.[29,30] PDGF-AA binds only to the α-PDGF receptor but PDGF-AB and PDGF-BB bind to both α and β receptors; i.e., the α receptor binds either A or B chain and the β receptor binds only the B chain.[29,31] Perhaps the independent expression of specific receptor types and the availability of the different isoforms of PDGF may explain the diverse range of observed cellular PDGF responses.[30]

For example, the PDGF-B gene has a much greater transforming potency than the PDGF-A gene when transfected into NIH 3T3 cells but the PDGF-A gene product is more efficiently secreted into the medium.[32]

The sequence domains on each chain responsible for the greater receptor activation and secretory ability have recently been mapped.[33] Furthermore, certain tumors have been found to express the β PDGF receptor with or without the coexpression of the PDGF-B chain, indicating that a tumor may be autocrinically growth stimulated,[34] or it may be stimulated by exogenous PDGF.[35] Binding of either PDGF receptor to its substrate induces receptor autophosphorylation at a tyrosine residue,[31] which then becomes detectable by immunoreaction to Monoclonal Anti-Phosphotyrosine (Catalog Number P3300).

Reagent
Recombinant Human Platelet-Derived Growth Factor-BB is supplied as a lyophilized powder from a sterile filtered solution in 30 mM acetic acid (HoAc).

Precautions and Disclaimer
This product is for R&D use only, not for drug, household, or other uses. Please consult the Safety Data Sheet for information regarding hazards and safe handling practices.

Preparation Instructions
To prepare a stock solution, reconstitute the vial contents in water to a concentration of 0.1–1.0 mg/ml. This solution can then be diluted into other aqueous buffers and stored at 2–8 °C for up to 1 week or for future use, store in working aliquots at –20 °C.

Storage/Stability
The lyophilized protein is stable for up to a few weeks at room temperature, but is best stored at –20 °C. After reconstitution, store in working aliquots at –20 °C. Because of its extreme hydrophobicity, reconstituted PDGF-BB should not be stored in a glass container. Repeated freezing and thawing is not recommended.

Product Profile
The biological activity of PDGF-BB is measured by the dose-dependent stimulation of thymidine uptake using BALB/c 3T3 cells. The ED_{50} is defined as the effective concentration of growth factor that elicits a 50% increase in cell growth in a cell based bioassay.

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BG,KAA,MAM 07/16-1