GAP43, is a nervous tissue-specific cytoplasmic protein that can be attached to the membrane via a dual palmitoylation sequence on cysteines 3 and 4.

GAP43 (Growth-Associated Protein 43), also known as Neuromodulin or B-50, is a protein that plays a crucial role in neuronal development, regeneration, and plasticity. It is predominantly expressed in the nervous system, particularly during embryonic and early postnatal stages, and is involved in axonal growth and synaptic remodeling.

Here are some key features and functions of GAP43:

Structure: GAP43 is a small protein of approximately 43 kilodaltons (hence the name “43”). It contains a lipid modification site near its N-terminus, allowing it to associate with cell membranes.

Neuronal development: During embryonic and early postnatal development, GAP43 is highly expressed in growing axons and growth cones, which are specialized structures at the tips of growing axons. It promotes axonal outgrowth and guides the elongation of developing neurons.

Axon regeneration: After injury to the nervous system, such as nerve damage, GAP43 expression is upregulated in regenerating axons. It plays a crucial role in promoting axonal sprouting and regeneration, facilitating the reconnection of damaged neural pathways.

Synaptic plasticity: GAP43 is involved in synaptic remodeling and plasticity, which refers to the ability of synapses to undergo changes in strength and structure in response to neuronal activity and experience. It has been implicated in synaptic vesicle dynamics, neurotransmitter release, and the formation and stabilization of new synaptic connections.

Learning and memory: GAP43 has been linked to learning and memory processes. Its expression levels have been found to change in brain regions associated with learning and memory tasks. Furthermore, studies have suggested that altering GAP43 expression can affect synaptic plasticity and memory formation.

Neurological disorders: Dysregulation of GAP43 has been associated with several neurological disorders. For example, abnormal expression of GAP43 has been observed in Alzheimer's disease, epilepsy, schizophrenia, and traumatic brain injury. These findings highlight the potential involvement of GAP43 in the pathophysiology of these conditions.

In summary, GAP43 is a neuronal protein that plays essential roles in axonal growth, synaptic plasticity, and neuronal regeneration. Its functions make it a key player in the development and maintenance of the nervous system and contribute to processes such as learning and memory.