Identification of peptide L, a novel neuropeptide that regulates the expression of L-type voltage-gated calcium channels in photoreceptors

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Introduction:
• Neuropeptides act like peptide/hormones or neurotransmitters and play diverse roles in regulating neural functions (1).
• Computational bioinformatics has become a powerful tool to identify novel bioactive peptides (2).
• L-Type voltage-gated calcium channels (L-VGCCs) mediate a voltage-dependent, depolarization-induced Ca2+ influx and regulate diverse biologic processes such as contraction, secretion, differentiation, synaptic plasticity, and gene expression (3).
• L-VGCCs are essential in gating prolonged neurotransmitter release in retinal photoreceptors (4).

Methods:
Cloning of mouse peptide L full length cDNA
Cell culture and transfection
High-performance liquid chromatography (HPLC) and mass spectrometry (MS)
Cell culture and transfection
In situ hybridization
Cloning of mouse peptide L full length cDNA
screening strategy and procedure.

Figure 1: A flow chart illustration of our in silico computational screening strategy and procedure.

Figure 2: Sequence alignment between human and mouse propeptide L.

Protein sequence alignment

Figure 3: Expression of peptide L in mouse tissues.

Figure 4: Verification of peptide L secretion by MALDI-TOF mass spectrometry.

Figure 5: GST-peptide L increased L-VGCC currents in cone photoreceptors.

Figure 6: Synthesized peptide L enhanced the protein expression L-VGCCα1 subunits, cAMP production, and ERK phosphorylation in chicken cone photoreceptors.

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References: