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Differential Expression of the Insulin Receptor in Primary Sensory Neurons Innervating Somatic and Visceral Organs

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In recent years, several studies indicated functional interactions between the insulin receptor (InsR) and the Transient Receptor Potential Vanilloid Type 1 receptor (TRPV1) co-expressed in a subset of Primary Sensory Neurons (PSNs) of unidentified target innervation. The aim of the present study was to reveal the target-specific expression of the InsR and its co-localization with TRPV1 in adult rats. Adult male Wistar rats (n=12) weighing 300-350 g were used. To identify somatic and visceral PSNs biotin-conjugated wheat germ agglutinin (bWGA) was injected into the hind paw skin, the lateral gastrocnemius muscle, the pancreas and the urinary bladder. Three days later representative serial sections were cut from Th10-13 and L3-S1 dorsal root ganglia. Immunohistochemistry and quantitative morphometry were used to analyze the expression of InsR and TRPV1 in bWGA-labeled somatic and visceral PSNs. The largest proportions of retrogradely labeled InsR-positive neurons were identified among PSNs serving the pancreas (~54%) and the urinary bladder (~52%). InsR-positive neurons innervating the hind paw skin and the gastrocnemius muscle amounted to ~22% and ~21% of labeled neurons. The majority (~64%) of the labeled PSNs exhibited TRPV1 immunoreactivity. Co-localization of the TRPV1 and the InsR was observed in ~16%, ~15%, ~29% and ~30% of labeled cutaneous, muscular, pancreatic and urinary bladder PSNs. Our quantitative morphological data provide evidence for the co-localization of InsR and TRPV1 in PSNs innervating somatic and visceral organs and demonstrate a preponderance of InsR-immunoreactivity among PSNs which innervate visceral targets. These findings suggest that visceral spinal PSNs might be more sensitive to the modulatory influence of insulin than PSNs innervating somatic organs.

Biography

Bence Andras Lazar is currently pursuing PhD in the Department of Physiology, University of Szeged and working as a Clinical Doctor in the Department of Psychiatry, University of Szeged. His current research fields include neuromorphology and addictology. Presently he is working with a Fellowship of the UNKP-17-3 New National Excellence Program of the Ministry of Human Capacities.

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