Interstitial Cells of Cajal as the Regulators of Smooth Muscle Activity: Associations with Smooth Muscle and Nerve Axons

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ABSTRACT:
The interstitial cells (ICs) were first reported by the great Spanish neuroanatomist, Santiago Ramón y Cajal (1852–1934). Cajal is considered to be one of the founders in the field of neuroscience. In 1911, he described interstitial neurons in the gut, saying that they were primitive accessory components that perhaps modify smooth muscle contraction, themselves subject to the neural inputs. The accuracy of his description of their appearance and activities has led to these cells now being called the interstitial cells of Cajal (ICC). The historical attention of the gastroenterologists and pathologists towards the ICC was driven by Thuneberg and Faussone-Pellegrini in the early 1980s. Cajal first stained these ICs with methylene blue in the intestine of frog. Cajal while studying these cells arrived at the hypothesis that networks of anastomosing interstitial cells were influenced by ‘principal’ components of the nervous system, while the interstitial cells (seen as ‘accessory’ primitive neurons) exerted direct regulatory effects on smooth muscle contraction. Since then, the ICC has been an interesting topic of discourse among the cell biologists and physiologists. In our research on chicken oviduct, we found that ICC localize in close vicinity of smooth muscles and nerves, and where they established typical junctions. Such associations might be indicative of the role of ICC in the regulation of the smooth muscle activity.

KEY WORDS: ICC-Smooth Muscle contacts, TEM, Chicken oviduct

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