EXPANDED ABSTRACT

Effects of pilocarpine and cevimeline on Ca\(^{2+}\) mobilization in rat parotid acini and ducts

Kentaro Ono\(^1\), Tomohiro Inagaki\(^{1,2}\), Taichi Iida\(^{1,2}\), Ryuji Hosokawa\(^1\), and Kiyotoshi Inenaga\(^1\)

\(^1\)Department of Biosciences and \(^2\)Department of Oral Functional Reconstruction, Kyushu Dental College, Kitakyushu, Japan

Abstract: Previous reports suggested that there is no significant difference in the binding affinity of pilocarpine and cevimeline on muscarinic receptors (1). However, in vivo studies from our laboratory suggested that pilocarpine-induced salivation from the parotid gland is greater than that induced by cevimeline in rats (2, 3). Therefore, in the present study, sialogogue-induced intracellular Ca\(^{2+}\) mobilization was investigated in isolated parotid gland cells in vitro. Pilocarpine and cevimeline increased the intracellular Ca\(^{2+}\) concentration of parotid gland acinar and duct cells over 1 \(\mu\)M in a dose-dependent manner. Pilocarpine-induced responses were higher than cevimeline-induced responses. Ca\(^{2+}\) responses to both agents were completely blocked by 1 \(\mu\)M 4-DAMP, an M3 muscarinic receptor antagonist. In the absence of extracellular Ca\(^{2+}\), both sialogogues induced transient Ca\(^{2+}\) increase in parotid gland acinar cells. These results suggest that the sialogogues stimulate some common routes via the Ca\(^{2+}\) signaling in parotid gland acinar cells. We also report a significant difference of Ca\(^{2+}\) responses in concentration between pilocarpine and cevimeline in parotid gland acinar cells. The different Ca\(^{2+}\) responses between the sialogogues would explain the different saliva volumes from the parotid gland between them that we have observed in previous in vivo studies (2, 3). J. Med. Invest. 56 Suppl.: 375, December, 2009

Keywords: pilocarpine, cevimeline, parotid cells

ACKNOWLEDGEMENTS

This work was supported by Grants-in-Aid from the Ministry of Education, Culture, Sports, Science and Technology, Japan, for Scientific Research for Young Scientists (B) to K.O. (20791357) and for Scientific Research (C) to K.I. (90131903).

REFERENCES