Properties of the Ryanodine?sensitive Release Channels that Underlie Caffeine?induced Ca2+ Mobilization from Intracellular Stores in Mammalian Sympathetic Neurons

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The most compelling evidence for a functional role of caffeine?sensitive intracellular Ca2+ reservoirs in nerve cells derives from experiments on peripheral neurons. However, the properties of their ryanodine receptor calcium release channels have not been studied. This work combines single?cell fura?2 microfluorometry, [3 H]ryanodine binding and recording of Ca2+ release channels to examine calcium release from these intracellular stores in rat sympathetic neurons from the superior cervical ganglion. Intracellular Ca2+ measurements showed that these cells possess caffeine?sensitive intracellular Ca2+ stores capable of releasing the equivalent of 40% of the calcium that enters through voltage?gated calcium channels. The efficiency of caffeine in releasing Ca2+ showed a complex dependence on [Ca2+]i. Transient elevations of [Ca2+]i by 50?500 nM were facilitatory, but they became less facilitatory or depressing when [Ca2+]i reached higher levels. The caffeine?induced Ca2+ release and its