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Ca-MOBILIZING MECHANISMS IN NORADRENALINE- AND ATP-INDUCED
CONTRACTION OF LONGITUDINAL MUSCLE OF RAT VAS DEFERENS

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1. The contractile responses to noradrenaline (NA) and ATP, and their Ca-mobilizing mechanisms were examined in the longitudinal muscle strip of the epididymal end of rat vas deferens.
2. NA ($>10^{-8}\text{M}$) induced phasic contraction followed by tonic contraction. The tonic phase was selectively abolished by La, nifedipine (nif) or in isotonic potassium solution, and enhanced by Bay K 8644 (Bay K).
3. ATP ($>3\times 10^{-7}\text{M}$) induced sustained phasic contraction, which was abolished by La and slightly suppressed by nif or in isotonic potassium solution, and enhanced by Bay K.
4. In Ca-free solution containing nif, the application of Ca caused no response but NA ($10^{-6}\sim 3\times 10^{-5}\text{M}$) induced slow contraction. Joint application of Ca and NA also induced slow contraction, which slightly increased in a Ca- and NA-concentration-dependent manner. Although the application of ATP ($3\times 10^{-5}\sim 10^{-3}\text{M}$) resulted in no response, joint application of Ca and ATP induced contraction, which markedly increased in a Ca- or ATP-concentration-dependent manner.
5. In Ca-free solution containing nif, the contractions caused by NA or joint application of Ca and NA were blocked by prazosin, and the contraction caused by joint application of Ca and ATP was blocked by β, γ -methylene ATP or La.
6. When extracellular Ca was removed after Ca was loaded from an intracellular Ca store, NA ($>3\times 10^{-8}\text{M}$) or ATP ($>3\times 10^{-5}\text{M}$) induced a transient contraction. These contractions were suppressed by TMB-8 or dinitrophenol. The NA-induced transient contraction was suppressed by preapplication of ATP, and the ATP-induced transient contraction was abolished by preapplication of NA.
7. The intracellular free-Ca level, measured by the fura-2 method, was simultaneously increased with tension development during joint application of Ca and ATP in Ca-free solution containing nif. NA also caused a simultaneous increase in the intracellular free-Ca level with tension development when extracellular Ca was removed after Ca was loaded.
8. In conclusion, NA-induced phasic contraction is evoked by Ca release from the intracellular Ca store and tonic contraction is mediated by extracellular Ca influx through a voltage-dependent Ca channel. ATP-induced contraction is mainly mediated by Ca influx through a voltage-independent Ca channel.