

Amphibian oocyte maturation and protein synthesis: related inhibition by cyclic AMP, theophylline, and papaverine

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Two inhibitors of cyclic AMP phosphodiesterase (3':5'-cyclic-AMP 5'-nucleotidohydrolase, EC 3.1.4.17), theophylline and papaverine, inhibit the maturation of *Xenopus laevis* oocytes induced by 4 different stimuli: human chorionic gonadotropin, progesterone, testosterone, and lanthanum ions. Addition of 1 mM cyclic AMP to the medium delays maturation by approximately 2 hr. Papaverine, theophylline, and cyclic AMP inhibit amino acid incorporation into oocyte proteins by 50% or more but do not inhibit amino acid uptake. The capacity of theophylline to block maturation and protein synthesis is reversed in a parallel fashion by addition of 1-5 mM calcium ion to the medium. Addition of papaverine, theophylline, and cycloheximide to oocytes at different times after hormonal treatment shows that the step sensitive to blockage by the 3 drugs is coincident and precedes germinal vesicle breakdown by about 1.5 hr. Theophylline and papaverine do not increase endogenous cyclic AMP levels observed 3 h