Regulatory role of fructose-2,6-bisP on glucose metabolism in frog oocytes: In vivo inhibition of glycogen synthesis

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Glycogen synthesis following glucose microinjection in frog oocytes proceeds preferentially by an indirect pathway involving gluconeogenesis from triose compounds. Because of the known regulatory role of fructose-2,6-bisP on glucose utilization in most vertebrate tissues we coinjected [U- 14C]glucose and fructose-2,6-bisP into oocytes and observed a marked inhibition of label incorporation into glycogen, with an I50 value of 2 ?M, which is similar to the value measured for the in vitro inhibition of oocyte fructose-1,6-bisphosphatase. Other hexoses-bisP were tested: 2,5-anhydromannitol-1,6-bisP was as effective as inhibitor as fructose-2,6-bisP; glucose-1,6-bisP showed some effect although 50% inhibition was obtained at a concentration 10 times higher than with fructose-2,6-bisP; fructose-1,6-bisP had no effect at all. The inhibition pattern for the in vivo glycogen synthesis by these analogs closely matched the one obtained with partially purified oocyte fructose-1,6-bisphosphatase.