

Phosphorylation of phosphatidylinositol by transverse tubule vesicles and its possible role in excitation-contraction coupling

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Phosphorylation of phosphatidylinositol to phosphatidylinositol 4-monophosphate and to phosphatidylinositol 4,5-bisphosphate was demonstrated in transverse-tubule membranes isolated from frog skeletal muscle using [32 P]ATP as substrate. At millimolar concentrations of Mg^{2+} both phosphorylation reactions were completed within 15 s at 25°C. Isolated sarcoplasmic reticulum vesicles phosphorylated phosphatidylinositol to phosphatidylinositol 4-phosphate with a lower specific activity than the transverse tubules, and lacked the ability to produce phosphatidylinositol 4,5-bisphosphate. These findings show, for the first time, that isolated transverse-tubule membranes carry out one of the steps required to sustain a role for inositol trisphosphate as the physiological messenger in excitation-contraction coupling in skeletal muscle. The finding that 0.5 mM tetracaine apparently inhibits the phosphorylation of phosphatidylinositol 4-phosphate to phosphatidylinositol 4,5-bisphosphate also su