muscle, however, glyceraldehydes-3-phosphate dehydrogenase, lactate dehydrogenase and acetylcholinesterase all were substantially protected to a similar degree. Both in heat and trypsin treatment the stability of pectoral muscle enzymes appeared to be more substantially protected by ATP compared to liver enzymes among which glyceraldehydes-3-phosphate dehydrogenase revealed the greatest protection. Overall results suggest that the effect of 6-aminonicotinamide treatment on the stability of enzymes in liver and muscle appears to be specifically and selectively affected by exogenous ATP.

E145 Identification of Calcium Channel Subtypes in Human Spermatozoa

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The acrosome reaction is a calcium-required exocytotic event for which external calcium entry through voltage-activated calcium channels have been known to be critically involved in mammalian sperm. Here we identified calcium channel subtypes expressing in human spermatozoa. T-type and non-L-type channel messages were detected by RT-PCR using degenerate primers, while L-type channel messages were rarely detected. Sequencing of the PCR products displayed 1B, 1E, 1G, 1H, and 1C sequences. RT-PCR using specific primers showed the similar results as those detected by the degenerate primers. These results indicated that human spermatozoa express multiple subtypes of voltage-activated calcium channels. Taken together, we propose that T-type and non-L-type channels expressing in human sperm might be main gates for external calcium entry, evoking the acrosome reaction. Relative expression levels of 1B, 1E, 1G, 1H, and 1C mRNA messages in human sperm will be evaluated by RNase protection assays.

E201 Salicylic acid and Paraquat Tolerance in Arabidopsis thaliana Plants

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This study was aimed to investigate the physiological role of salicylic acid(SA), with special regard to the interaction among SA, H_2O_2 levels and antioxidant enzymes, in the protection from paraquat(PQ)-induced oxidative damages in *Arabidopsis thaliana* leaves. Foliar spraying of *A. thaliana* plants with 1.0 mM SA solution significantly improved their tolerance to a subsequent PQ-induced oxidative stress. This observation was confirmed by reduction of leaf injuries such as the decrease of leaf fresh weight and the loss of chlorophyll and proein. The analysis of antioxidant enzymes showed that whereas SA pretreatment effectively retarded the rapid decrease of superoxide dismutase(SOD), catalase and ascorbate peroxidase activities due to 10 M PQ treatment, there was an increase in guaiacol peroxidase activity. However, we also found that 12 h pretreatment of plants with SA alone caused a mild leaf injury symptoms along with a small increase of H_2O_2 content. This enhanced H_2O_2 levels occurred in parallel with the inrease of SOD and the catalase inhibition. From our results it can be assumed that due to an increase of SOD and a catalase inhibition by SA pretreatment, a moderate increase in H_2O_2 levels may occur, which can cause a developmental change of antioxidant enzymes leading to enhanced PQ tolerance in *A. thaliana* plants.