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JOURNAL ARTICLE

Synthesis of docosahexaenoyl coenzyme A in human spermatozoa

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The synthesis of docosahexaenoyl coenzyme A (22:6-CoA) was studied in a long-chain fatty acid: CoASH ligase (AMP)-enriched fraction from human spermatozoa and was compared to palmitoyl CoA (16:0-CoA) synthesis. The pH optimum for 22:6 activation was 8.4, which was identical to the value obtained with 16:0. The K_m for ATP was 0.5 mM when 22:6 was the acyl substrate; however, when 16:0 was incubated with the ligase preparation, the K_m for ATP was 2.9 mM. When CoASH was varied and 22:6 was the fatty acyl acceptor, a pattern of negative cooperativity was observed. This was confirmed by a downwardly concave double-reciprocal plot, a Hill coefficient of 0.63, and an R_s in excess of 150. The Hill coefficient with 16:0 and CoASH was 0.94. Palmitic acid was demonstrated to be a competitive inhibitor of 22:6-CoA synthesis. Based upon these data, we conclude that the kinetics of spermatozoan ligase are complex, and, in addition, these data support the hypothesis that 22:6 may regulate ligase activity, and therefore free fatty acid utilization, in sperm.

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