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Fat metabolism in higher plants [*1]. II. Palmitic and stearic synthesis by an avocado supernatant system

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Abstract

The synthesis of palmitic and stearic acids by soluble proteins from avocado mesocarp has been examined. Evidence suggests that palmitate is made *de novo* and stearate by elongation of a C_{16} precursor. While the synthesis of palmitate from malonyl CoA is arsenite insensitive, the elongation reaction from palmitate to stearate is arsenite sensitive. The pattern of synthesis of the two acids is neither dependent on the malonyl CoA/acetyl CoA ratio nor is altered by the addition of exogenous lipids and detergents. The reaction products are 20% thiol esters and 80% free fatty acids. When the incubation system was separated by gel filtration on Sephadex G-75 or G-150 columns two protein peaks were rapidly eluted. Over 60% of the ^{14}C fatty acids were eluted with the protein peaks, the majority of the ^{14}C fatty acids being in the first peak which contained only 10% of the total protein. The predominant acid of the first peak was stearate with 85% as the free acid. The second peak contained 30% thiol esters, including shorter-chain acids. It also contained fatty acid synthetase activity and [^{3}H]ACP. When [^{14}C-malonyl] CoA is added to a reaction mixture containing protein from this peak, palmitate is found exclusively. Thus, the *de novo* system is associated with this peak. The elongation system is no longer demonstrable with peaks 1 or 2. Unspecific binding of free fatty acids was negligible.

[^{14}C]Palmityl-acyl carrier protein was elongated to stearate by an acetone powder of avocado supernatant fraction. It was a more effective precursor than [^{14}C]palmitic acid or [^{14}C-palmityl] CoA. From these results we conclude that avocado supernatant fraction contains a fatty acid synthetase-forming palmitate and an elongation system which forms stearate by malonyl CoA addition to a C_{16} precursor, possibly palmityl-ACP. The latter system is arsenite sensitive.

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