Summary

A fatty acid is one of the major components of a triglyceride, which is a form of lipid that is used in the body to store energy. A lipid is just a type of molecule that includes, among other things, fatty acids. Triglycerides are a secondary energy source that the body can use in the event that there is not enough sugar (our primary energy source) in the system. While fatty acids vary in terms of chemical characteristics, they all have some basic qualities in common.

The biosynthetic reaction pathway to a compound is usually not a simple opposite of its breakdown. In fatty acid synthesis, acetyl-CoA is the direct precursor only of the methyl end of the growing fatty acid chain. All the other carbons come from the acetyl group of acetyl-CoA but only after it is modified to provide the actual substrate for fatty acid synthase, malonyl-CoA. Formation of malonyl-CoA is the commitment step for fatty acid synthesis, because malonyl-CoA has no metabolic role other than serving as a precursor to fatty acids.

Fatty acid synthase (FAS) carries out the chain elongation steps of fatty acid biosynthesis. In mammals, FAS contains two subunits, each containing multiple enzyme activities. In bacteria and plants, individual proteins, which associate into a large complex, catalyze the individual steps of the synthesis scheme. Fatty acid synthesis starts with acetyl-CoA, and the chain grows from the "tail end" so that carbon 1 and the alpha-carbon of the complete fatty acid are added last. The first reaction is the transfer of the acetyl group to a pantothenate group of acyl carrier protein (ACP). Palmitate is the starting point for other fatty acids that use a set of related reactions to generate the modified chains and head groups of the lipid classes.