

Medium Chain 3-Ketoacyl-CoA Thiolase Deficiency

[Medium chain 3-ketoacyl-CoA thiolase deficiency \(MCKAT\)](#) is the rarest of the many possible defects in the pathway for breaking down fats. When the body has exhausted its stores of available sugars during stress, illness, and fasting, it must turn to fats to make energy. In each cell in the body, this efficient breakdown of fats takes place in a special sac-like bodies called mitochondria. Generating energy from fats is both a multi-step and multi-round process. In MCKAT defects, the last step in the final round of the breakdown of fats is missing or reduced. Surprisingly, recent laboratory studies have shown that this step is an important controller of the rate of fat entry into the fat breakdown pathways (Plos, 2017).

Signs and symptoms

Because less a handful of cases of MCKAT have been identified to date, there is limited knowledge about the symptoms of this disorder. In the first reported case, an infant presented at 2 days of age with vomiting, dehydration, acidic blood (metabolic acidosis), liver disease, and severe muscle breakdown (rhabdomyolysis) resulting in reddish-brown urine (myoglobinuria) ([307](#)). Later patients presented with low blood sugar (hypoglycemia), vomiting, floppiness (poor muscle tone), and even coma whenever time between feedings are too long (fasting intolerance). Others have had heart malfunctions (cardiomyopathy), and, in one case, the first presentation was with sudden death (SIDS) ([308](#), [309](#)).

Diagnosis

The only extensive diagnostic reports are from the first MCKAT case. Organic acid analysis of urine revealed elevated lactic acids, ketones and significantly increased 6- to 12-carbon dicarboxylic acids, with strikingly elevated 10- and 12-carbon species. In skin cells, 8-carbon fats made little energy and there was little medium-chain 3-ketoacyl-CoA thiolase (MCKAT) activity and reduced MCKAT protein. Unfortunately, no additional functional or molecular information is available.

Treatment

Nothing is available because of the limited patient experience.