Aunt Cathy's Guide to:

Fatty Acid Chain Length and GI Absorption Site Mnemonics

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MCT (Medium-Chain Triglyceride) (fatty acids are 10-12 carbons long)
May **C**ross **T**hrough a small port-hole (pass directly into the "Portal" (liver) circulation)

LCT Long-Chain Triglyceride (fatty acids are > 12 carbons long)
Lymph **C**an **T**ransport after micelles are made (does not pass directly into the "Portal" (liver) circulation; it must first be solubilized into a micelle and taken into the lymph. It enters the blood stream when the lymph system dumps it into the superior vena cava.)

SCF **S**hort **C**hain **F**ats are smaller than 10 carbons in length.
Synthesized from **C**olonic **F**iber. They serve as **S**pecial **C**olon **F**ood.

Clinical Applications and Issues:

People with **bile acid problems** (as in cystic fibrosis, certain types of liver disease, or failure to recycle bile due to a short bowel or prematurity) may benefit from receiving some of their fat calories as **MCT, which does not require bile** for absorption.

Note that only LCT will contain essential fatty acids (EFA) because of their chain length, so providing only MCT for a long time would not be good. Infants on special formulas that provide 15% of the fat as LCT and the rest as MCT (e.g. "Portagen" by Mead Johnson, which is designed for infants with conditions like biliary atresia) have been shown to become deficient in essential fatty acids over time. If LCT simply cannot be absorbed adequately, regular i.v. lipids may be needed to provide EFAs.

Accidental surgical injury to lymph vessels during chest surgery can result in "**chylothorax**", in which the chylomicrons ("Kyle – the lipoprotein importer of fat and cholesterol") are dumped into the thoracic cavity instead of the vena cava. This requires a temporary **strict avoidance of LCT** fat to allow the injury to heal. Even Portagen has too much LCT at 15%. For this condition in adults or children, use "ProViMin" (Ross Labs), adding the carbohydrate of your choice and adding only MCT oil as the fat. It contains protein, vitamins and minerals, and is much cheaper than TPN. Making an individual mixture of protein (e.g. egg whites), vitamins and minerals for adult use is also possible since it is a short-term condition. There is no danger of EFA deficiency in this brief period, since (unless emaciated) the person will have adequate stores of EFAs for many weeks, and the MCT and carbohydrate can be used for fuel. **MCT is quite expensive** (e.g. $60/quart), so it is not an appropriate form of fat to use simply to add calories to a person's diet unless there is a GI or chylothorax issue that makes it especially beneficial. It provides 7.7 kcals/cc, compared with 8.8 kcal/cc for LCT.

Short chain fatty acids are usually produced by the action of colonic bacteria on dietary fiber. Provision of pre-formed SCF may have some benefit in **colonic disease** because it serves as a fuel source for the colon cells themselves, and it is being added to some tube-feeding products designed for use with GI problems. Chronic antibiotic use may also limit access of colonic cells to this fuel source (by killing the friendly bacteria), as would chronic consumption of a fiber-free or very-low-fiber diet (e.g. chronic use of a tube feeding without fiber or SFA.)