This is intended as a study guide to my material on the third exam. FIRST you are responsible for the Study Guide to Chapter 15, and to PRIOR material especially concerning glycogen and glucose metabolism. As I have said many times there is a “shaggy” interface between chapters 14 and 15. SECOND I gave you exactly five steps of the Citric Acid Cycle and I have mentioned many times that that is ALL I am asking you to know right now from Chapter 16. You need to know the names, structures, cofactors, and enzymes for the sequence from Succinate to Citrate. THAT IS ALL. Please don’t email me asking if you have to study “all of Chapter 16.” You will but not now.

On November 11, 2008 I gave an impromptu lecture on fatty acid metabolism. Here is what I expect you to know about it. Working through the sequence of Chapter 17 – I showed the chylomicron (Fig 17-2) and talked a little about the structure of LDL and HDL, as a protein “bag” around a ball of lipid. I said it is difficult to lose weight because Lipase is under hormonal control (Fig 17-3, Protein Kinase A and cAMP just like glycogen). I said that the mitochondrial matrix is a “furnace” where “fatty acids go to die” and access is controlled by the Carnitine Acyl-Transferase system (Fig 17-6). Know the structure of Carnitine. Free fatty acids can act as mitochondrial uncouplers, so fatty acids are generally attached to Coenzyme A. Know the structures, names, cofactors, and enzymes for β-oxidation (Fig 17-8) and know that it occurs in the mitochondrial matrix.

I said that the Hydroxyacyl CoA was “D” but it is really “L”. Understand how cis-delta-odd double bonds are handled (Fig 17-9) using an Isomerase, and how cis-delta-even double bonds are dealt with (Fig 17-10). Understand how odd chain fatty acids lead to Propionyl CoA and how that is converted into Succinyl CoA (Fig 17-11).

Then we moved to Chapter 21. The material I covered is on the first pages of section 21.1. I said that carboxylation of Acetyl CoA yielding Malonyl CoA is the committed step of fatty acid synthesis, and the synthesis occurs in the cytoplasm. Biotin and ATP are used for the carboxylation (Fig 21-1). Decarboxylation of Malonate to Acetate provides energy for Condensing Enzyme. Know the steps for Fatty Acid Synthesis with structures, cofactors, and generic enzyme names (Fig 21-2). Understand the “big picture” summary in Fig 21-3. And be able to compare the structure of ACP (21-4) with the structure of Coenzyme A. Look carefully at Figures 21-5 and 6.