













Fatty Acid Degradation Energy from Fatty Acid Catabolism				
TABLE 17-1 Yield of ATP during Oxidation and H ₂ O Enzyme catalyzing the oxidation step	n of One Molecule of Pali Number of NADH or FADH ₂ formed	mitoyl-CoA to CO ₂ Number of ATP ultimately formed ^a		
β Oxidation				
Acyl-CoA dehydrogenase	7 FADH ₂	10.5		
β-Hydroxyacyl-CoA dehydrogenase	7 NADH	17.5		
Citric acid cycle	31	→77.5 ATP		
Isocitrate dehydrogenase	8 NADH	20		
α-Ketoglutarate dehydrogenase	8 NADH	20		
Succinyl-CoA synthetase 15		– 8 ^b		
Succinate dehydrogenase →22.5 ATP	8 FADH ₂	12		
Malate dehydrogenase	8 NADH	20		
Total		108 - 2 = 106*		
^a These calculations assume that mitochondrial oxidative phosphor per NADH oxidized. ^b GTP produced directly in this step yields ATP in the reaction cata	ylation produces 1.5 ATP per FAD	H ₂ oxidized and 2.5 ATP inase (p. 516).		











Fatty Acid Degradation Energy from Fatty Acid Catabolism TABLE 17-1a Yield of ATP during Oxidation of One Molecule of Oleoyl-CoAto CO and H-O				
β Oxidation				
Acyl-CoA dehydrogenase	(8-1=7; 1 lost due to isome	erase) 7 FADH2	10.5	
β-Hydroxyacyl-CoA dehydrogenas	e	8 NADH	20	
Citric acid cycle			35 →87.5 ATF	
Isocitrate dehydrogenase	/	9 NADH	22.5	
α-Ketoglutarate dehydrogenase	/	9 NADH	22.5	
Succinyl-CoA synthetase	16		9 ^b	
Succinate dehydrogenase	→24 ATP	9 FADH2	13.5	
Malate dehydrogenase		9 NADH	22.5	
Total			120.5-2 = 118.	
^a These calculations assume that mito per NADH oxidized. ^b GTP produced directly in this step vi	chondrial oxidative phosphor	ylation produces 1.5 ATP per	FADH ₂ oxidized and 2.5 ATP	







Fatty Acid Degradation Energy from Fatty Acid Catabolism				
Enzyme catalyzing the oxidation step	Number of NADH or FADH₂ formed	Number of ATP ultimately formed ^a		
β Oxidation				
Acyl-CoA dehydrogenase (8-1=7; 1 lost due to isomerase	7 FADH ₂	10.5		
β-Hydroxyacyl-CoA dehydrogenase (8-1=7; 1 used for reductase)	7 NADH	17.5		
Citric acid cycle	34	→85 ATP		
Isocitrate dehydrogenase	9 NADH	22.5		
α-Ketoglutarate dehydrogenase	9 NADH	22.5		
Succinyl-CoA synthetase 16		9 ^b		
Succinate dehydrogenase →24 ATP	9 FADH ₂	13.5		
Malate dehydrogenase	9 NADH	22.5		
Total	\longrightarrow	118 - 2 = 116*		
^a These calculations assume that mitochondrial oxidative phosphorylation per NADH oxidized. ^b GTP produced directly in this step yields ATP in the reaction catalyzed by	produces 1.5 ATP per FADH2 y nucleoside diphosphate kina	e oxidized and 2.5 ATP ase (p. 516).		
These 2 "ATP" equivalents were expended in the activation	tion by Fatty acyl-Co.	A synthetase.		
What would it be for γ-linolenic (C18: Δ^6 , Δ^9 , Δ^{12})?				









Fatty Acid Degradation

Oxidation of Odd-Numbered Fatty Acids

- •Most dietary fatty acids are even-numbered.
- •Many plants and some marine organisms also synthesize odd-numbered fatty acids.
- •The metabolism of oxidation of odd-chain fatty acids CONVERGES with that of some amino acids
- · Details will be discussed with amino acids







