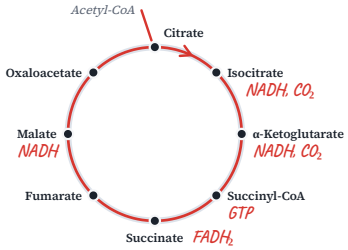
Every MCAT cycle

The Krebs cycle

Speedrun #1

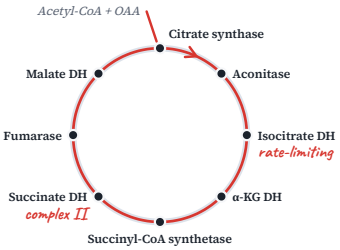


Per turn: 3 NADH, 1 $FADH_2$, 1 GTP, 2 CO_2.

MCAT trap No step uses O_2, yet the cycle stops without it: NADH and $FADH_2$ must be reoxidized by the electron transport chain.

The Krebs cycle enzymes

Speedrun #10

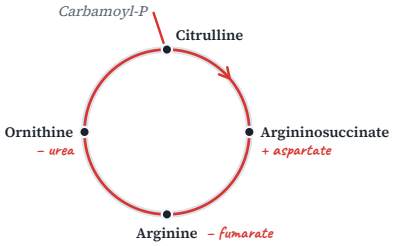


Dehydrogenases (DH) make the NADH and $FADH_2$; succinyl-CoA synthetase makes the GTP.

MCAT trap Succinate dehydrogenase is the only Krebs enzyme bound to the inner membrane: it is also complex II of the chain.

The urea cycle

Speedrun #4

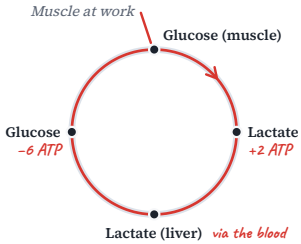


Per urea: 3 ATP (4 high-energy bonds); starts in the mitochondrion, ends in the cytosol.

MCAT trap Urea's two N come from different places: one from NH_4^+, one from aspartate. Fumarate links it to the Krebs cycle.

The Cori cycle

Speedrun #5

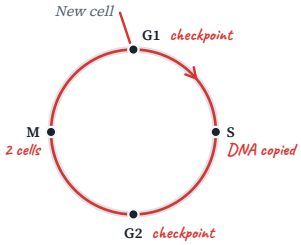


Net cost: 4 ATP per lap (glycolysis +2, gluconeogenesis −6).

MCAT trap The Cori cycle loses energy overall: the liver pays 6 ATP for the muscle's 2. It buys time, not energy.

The cell cycle

Speedrun #6

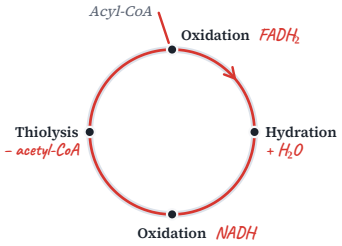


S doubles the DNA; M halves it again into two diploid daughter cells.

MCAT trap After S phase a human cell still has 46 chromosomes, now as 92 chromatids.

Beta-oxidation

Speedrun #7

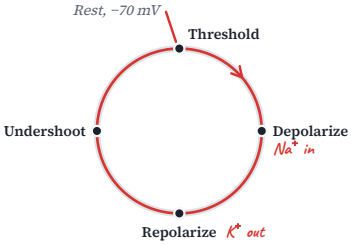


Palmitate (16 C): 7 laps → 8 acetyl-CoA, 7 $FADH_2$, 7 NADH.

MCAT trap 7 laps give 8 acetyl-CoA, not 7: the last lap splits a 4-carbon piece into two.

The action potential

Speedrun #8

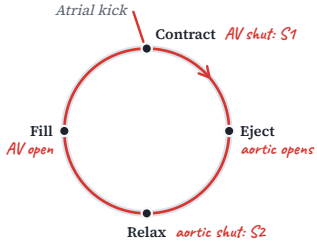


Threshold about −55 mV, peak about +35 mV, then a dip below rest.

MCAT trap The Na^+/K^+ pump does not repolarize the neuron: K^+ leaving through its channels does.

The cardiac cycle

Speedrun #9

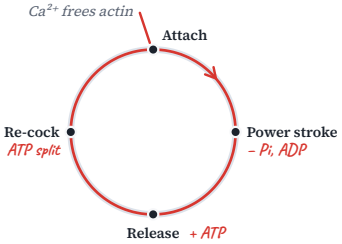


Isovolumetric contraction → ejection → isovolumetric relaxation → filling.

MCAT trap Heart sounds are valves closing, never opening: S1 the AV valves, S2 the semilunar valves.

Muscle contraction

Speedrun #13

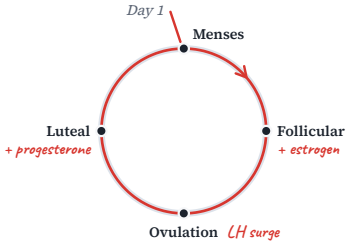


One ATP per cross-bridge cycle; Ca^{2+} on troponin moves tropomyosin off actin.

MCAT trap ATP is needed to let go, not only to pull: without ATP, myosin stays bound (rigor mortis).

The menstrual cycle

Speedrun #11

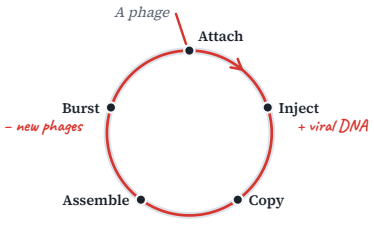


FSH grows the follicle; the corpus luteum makes progesterone; no hCG, day 1 again.

MCAT trap Estrogen usually feeds back negatively; at its peak it turns positive and triggers the LH surge.

The lytic cycle

Speedrun #12



The host's own enzymes and ribosomes copy the virus; the cell lyses.

MCAT trap Lysogenic is different: the viral DNA joins the host genome as a prophage and is copied with it until induced.

Which trap catches you?

The MCAT rarely asks you to recite a cycle. It asks what happens when one step is blocked, and it hides a trap in the answer choices.

Try 3 real questions, about a minute.

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