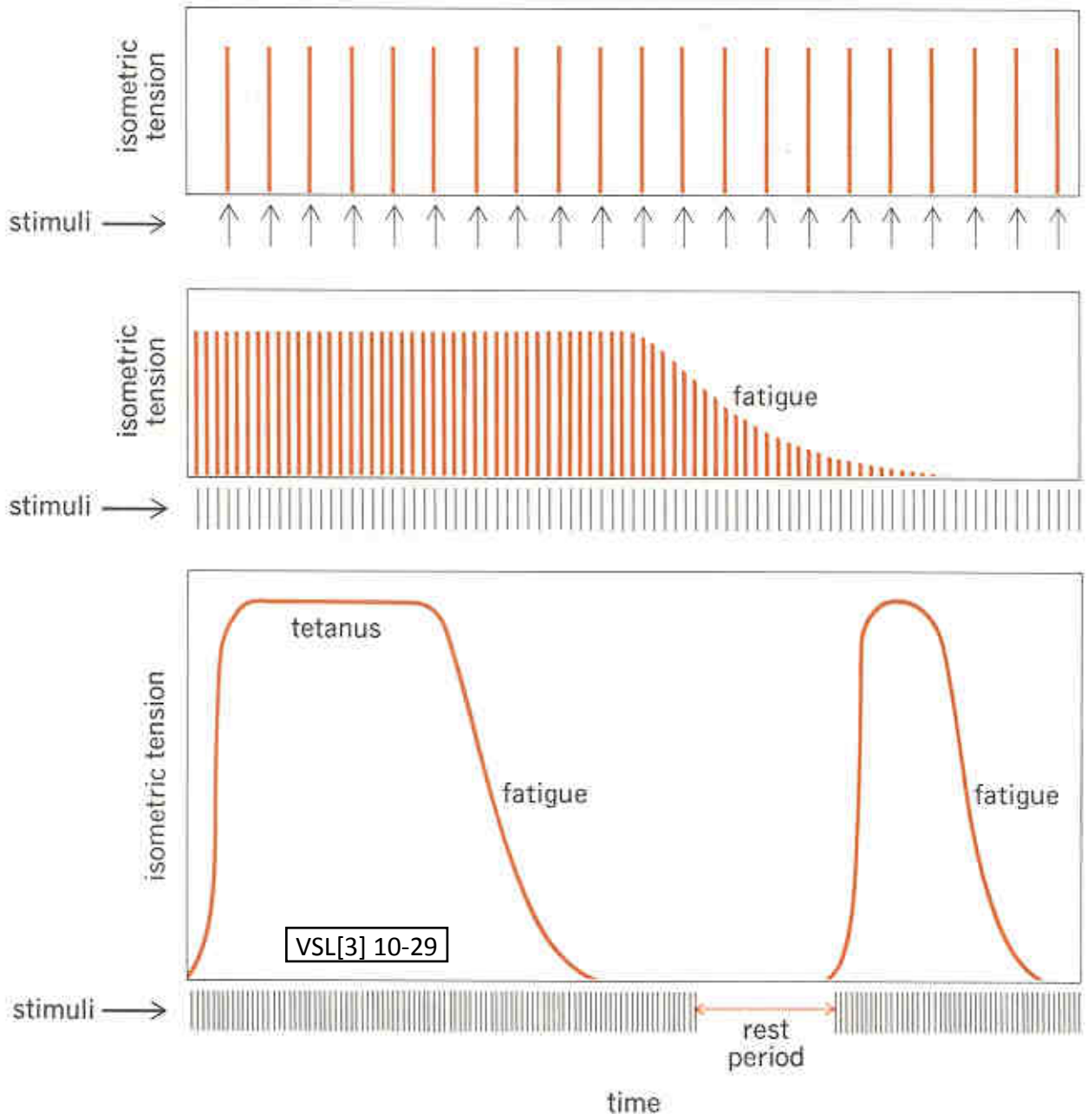
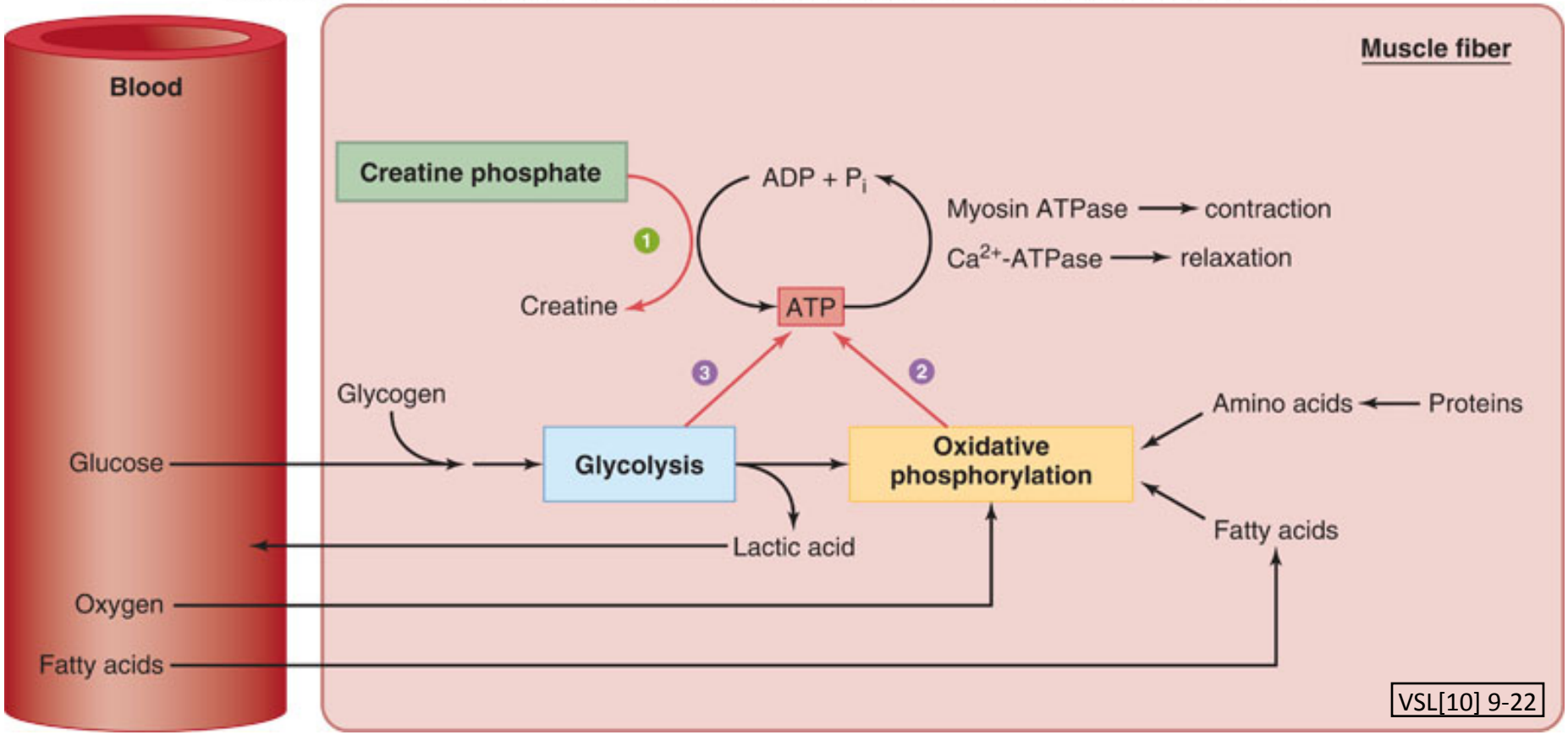
Muscle contraction/relaxation requires energy

- Maintain resting membrane potential
  - $Na^+/K+$ pump in SL
- Crossbridge power stroke
  - $M \bullet ATP \rightarrow M^* \bullet ADP \bullet P_i$
- Uptake of Ca^{2+} into SR
  - relaxation


isometric tension
stimuli
isometric tension
fatigue
stimuli
isometric tension
tetanus
fatigue
fatigue
VSL[3] 10-29
stimuli
rest period
time



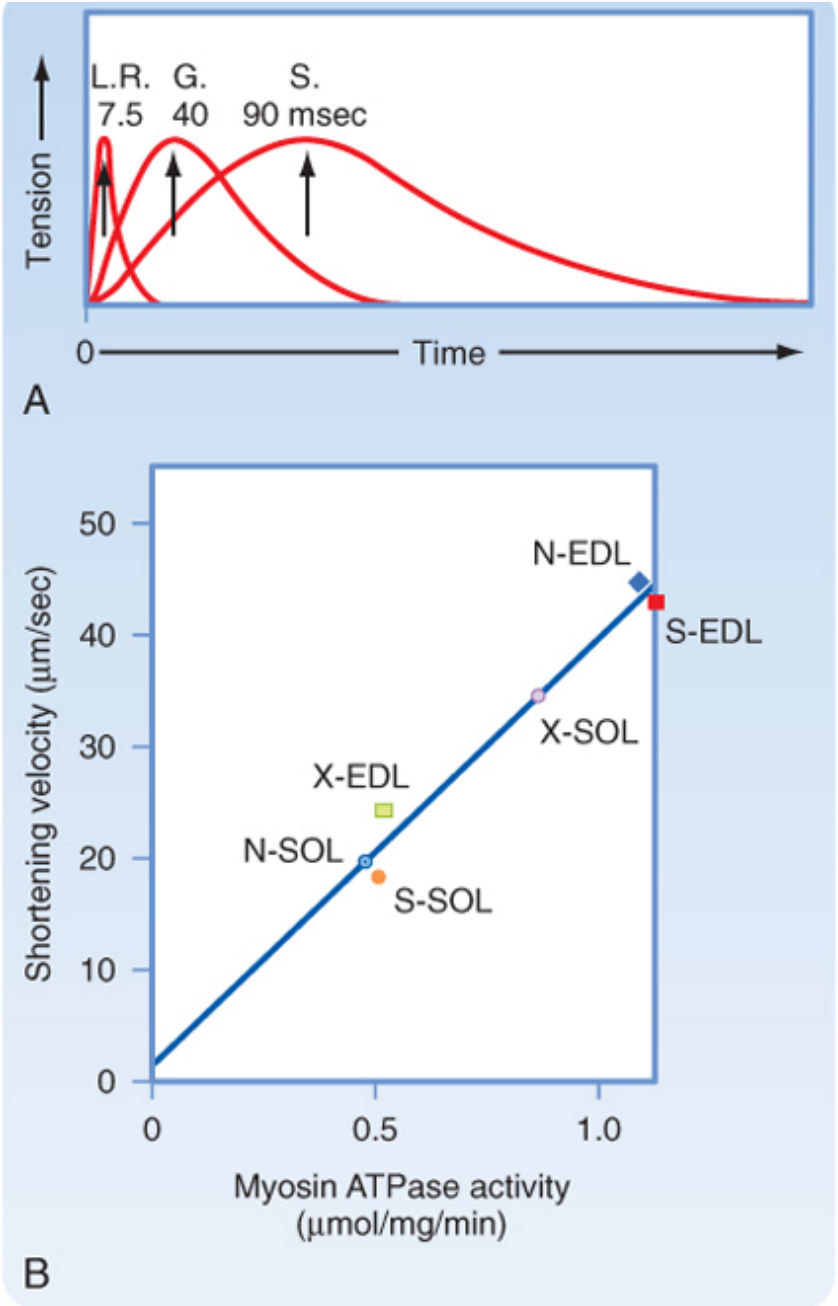


Figure 12-15 A, Muscles vary in terms of the speed of contraction. G, gastrocnemius of the leg; LR, lateral rectus muscle of the eye; S, soleus muscle of the leg. B, The speed of shortening is correlated with myosin ATPase activity. (A, From Montcastle V [ed]: Medical Physiology, 12th ed. St. Louis, Mosby, 1974; B, from Barany M, Close RI: J Physiol 213:455, 1971.) N-SOL, normal soleus (slow twitch); N-EDL, normal extensor digitorum longus (fast twitch); S-EDL, self-innervated EDL (EDL motor nerve transected and resutured); S-SOL, self-innervated soleus (soleus motor nerve transected and resutured); X-EDL, cross innervated EDL (EDL innervated by soleus motor nerve); X-SOL, cross innervated SOL (soleus innervated by EDL motor nerve).

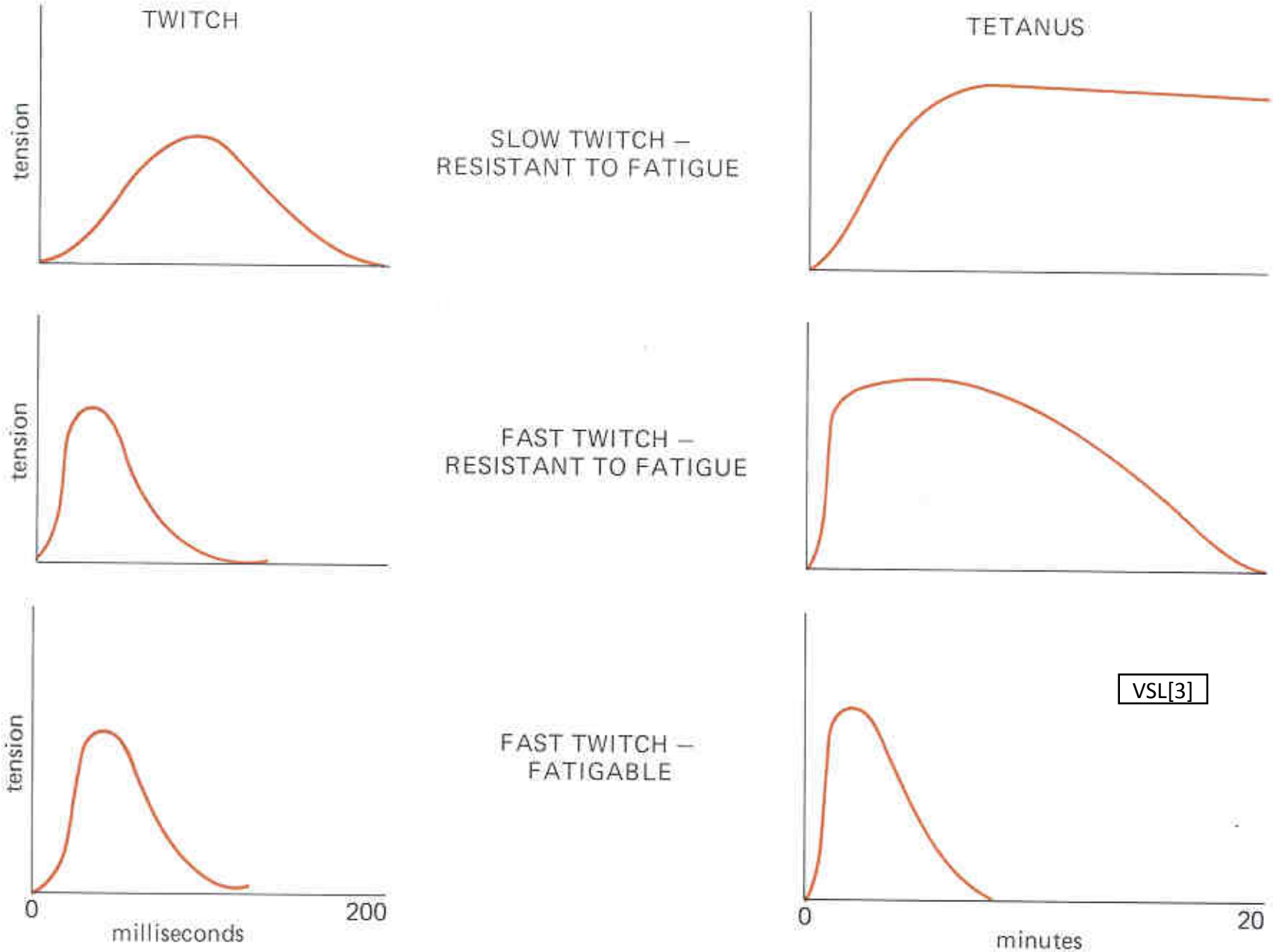


Figure 10-31. Twitch and fatigue characteristics of the three types of skeletal muscle fibers.

TABLE 9–3 *Characteristics of the Three Types of Skeletal Muscle Fibers*

	SLOW-OXIDATIVE FIBERS	FAST-OXIDATIVE FIBERS*	FAST-GLYCOLYTIC FIBERS
Primary source of ATP production	Oxidative phosphorylation	Oxidative phosphorylation	Glycolysis
Mitochondria	Many	Many	Few
Capillaries	Many	Many	Few
Myoglobin content	High (red muscle)	High (red muscle)	Low (white muscle)
Glycolytic enzyme activity	Low	Intermediate	High
Glycogen content	Low	Intermediate	High
Rate of fatigue	Slow	Intermediate	Fast
Myosin-ATPase activity	Low	High	High
Contraction velocity	Slow	Fast	Fast
Fiber diameter	Small	Intermediate	Large
Motor unit size	Small	Intermediate	Large
Size of motor neuron innervating fiber	Small	Intermediate	Large

VSL[10]

*Because these fibers have significant glycolytic capacity, they are sometimes called "fast oxidative-glycolytic" (FOG) fibers.

END

Video 8, Module 3