Recovery Nutrition For Swimmers

Jacqueline R. Berning, PhD, RD, CSSD
Professor/Chair Health Science Department
University of Colorado-Colorado Springs
Sports Dietitian: UCCS Athletic Dept and US Lacrosse
jberning@uccs.edu

Olympic History

- It is all about the timing of food and fluid and rest
  - Food
    - A combination of both carbohydrates and protein
  - Fluid
    - Sports drinks help replace fluids and electrolytes lost during exercise
  - Sleep
    - 7-8 hours of sleep for full recovery
- Recovery Nutrition can benefit any athlete

Why Is Recovery Nutrition Important?

- Increases the energy stores in the body for the next workout (train longer and harder)
- Helps the muscle recover faster after a workout or practice (more power and strength)
- Helps reduce the chances of injury
- The game or workout may have ended but your body is working to refuel for the next performance

Recovery Nutrition

- Not all athletes need to practice recovery nutrition
  - Examples:
  - HS student in the off season is refining his soccer skills in a 2 hour practice session and then takes the next 2 days off
  - Cross country runner completes an easy run before a tapering week
  - Marathon runner completes a marathon and is taking a week off
- For all these athletes, a meal consumed a few hours after exercise, along with regular eating/ hydration practices will be sufficient to prepare for the next training cycle

Position Statements on Nutrition and Recovery

ADA/ACSM/DC Position Statement on Nutrition and Performance 2015

- Replace fluids and electrolytes that are lost during exercise.
  - Consuming16-24 ounces of fluid for each pound lost during exercise.
- Timing of post-exercise carbohydrate intake affects glycogen synthesis.
  - Consumption of 1.0 to 1.5 g CHO/kg at 2-hour intervals up to 6 hours and within 30 minutes after exercise results in higher glycogen levels than when ingestion is delayed for 2 hours
- The combined ingestion of a small amount of protein (20-25 g Pro)) with CHO (1.2g/kg) stimulates glycogen recovery and muscle protein synthesis

IOC Consensus Conference on Sports Nutrition 2010

- Replacement of lost fluids should aim to match amounts lost during training and competition
- if less than 8 hours between two fuel demanding sessions then consume
  - 1.0–1.2 g kg/ h for first 4 h then resume daily fuel needs
- Protein Ingestion of 20–25 g of protein after each training session will maximize the synthesis of proteins
- Co-ingestion of a small amount of protein with 1.2g/kg CHO as soon as possible after the match has been shown to accelerate protein synthesis

Position of the American Dietetic Association, Dietitians of Canada and the American College of Sports Medicine. Nutrition and Athletic Performance *J Am Diet Assoc*. March 2015

IOC Consensus Conference on Nutrition in Sport, 25–27 October 2010, International Olympic Committee, Lausanne, Switzerland Journal of Sport Science. Vol29, 2011

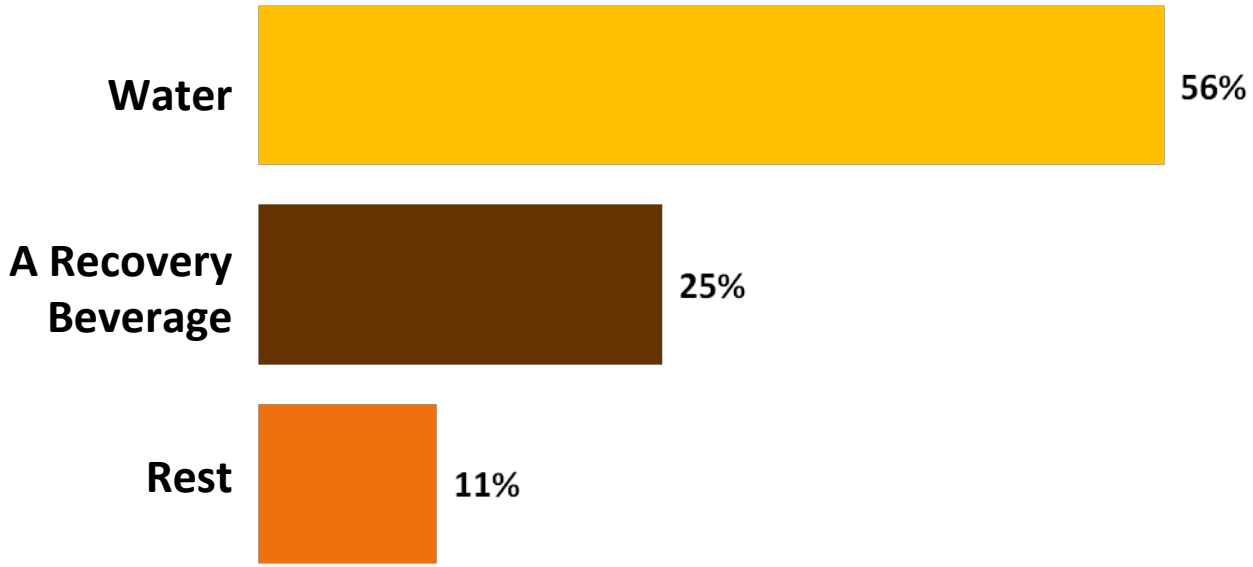
What do Athletes Know about Recovery?

- 88% of endurance athletes say that recovery nutrition is a part of their training

- However, only 1 out of 3 athletes know the importance of the 2 hour window for recovery

Laymon AS, et al. *MSSE (Abstract).* 2008;40:S399.

How Do Athletes Recover?



Laymon AS, et al. MSSE (Abstract). 2008;40:S399.

Protein and Muscle Protein Synthesis (MPS)

- **Pre exercise consumption of protein**
  - Resistance exercise data is mixed, but more studies have found that protein consumption immediately before exercise is unlikely to increase MPS
- **Consumption of Protein during exercise**
  - "Prime the Pump" does increase whole body protein balance but the effect on MPS is not known; thus little reason to recommend protein during aerobic exercise for performance benefits

(Burke et al., 2012).

Protein Consumption Post Exercise

- Study fed isolated egg white protein in graded doses from 10-40g after resistance exercise
- MPS showed a graded increase from 10-20g and despite doubling the protein intake to 40g there was no difference in MPS
  - Consuming 10-20 grams of protein is sufficient to stimulate muscle protein (excess protein is oxidized)
    - 3 ounces of chicken, beef, pork, fish
  - Need to consume the protein 5-6 times throughout the day to maximize muscle protein synthesis
  - **Chronic protein consumption in excess of this rate could actually lead to shutting down the body's ability to make new muscle protein**
- Consumption should begin as soon as possible after exercise to enhance the rate

Moore DR, et al., Ingested protein dose response of muscle and albumin protein synthesis after resistance exercise in young men. *Am J Clin Nutr* 2009;89:161-8

20 Amino Acids

- All the proteins in the body are made by linking amino acids together (protein synthesis)
- These 20 amino acids are put into two classifications
  - Essential Amino Acids (EAA)-body cannot make or cannot make enough to sustain life; therefore they must be obtained through the diet
  - Non-essential Amino Acids (NEAA)-amino acids that the body can make in sufficient quantities

Two Types of AA

- Essential AA- Amino acids the body cannot make and must be obtained in the diet
- 9 essential AA

Tryptophan	Lysine
Valine*	Phenlyalanine
Threonine	Methionine
Isoleucine*	Histadine
Leucine*	

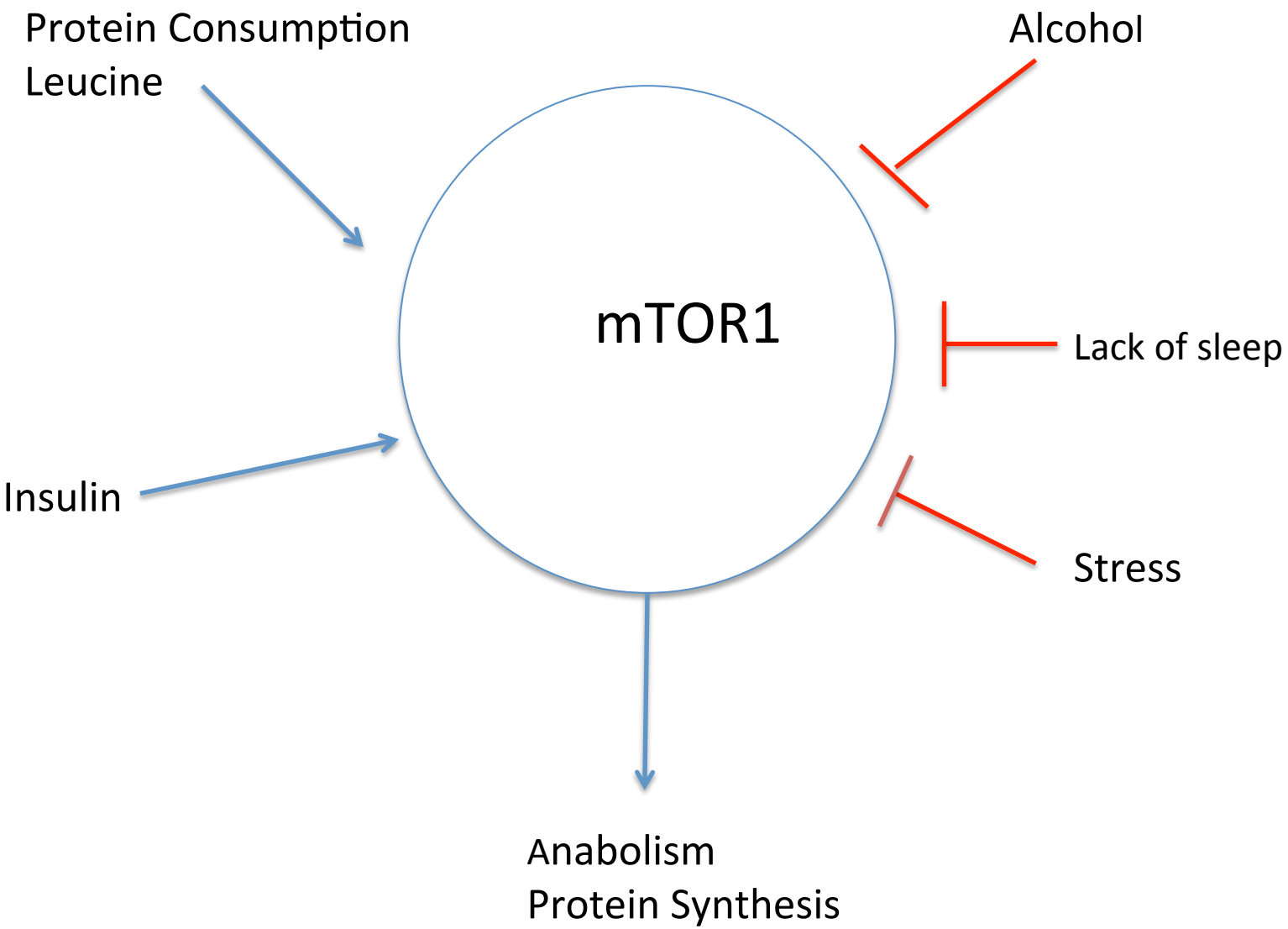
- If diet does not supply the 9 EAA, then the proteins needed by the body can not be made

Type of Protein

- The amino acid profile (EAA vs. NEAA) determines digestibility and absorption
- Milk proteins result in greater MPS when compared with isolated soy protein
- When comparing quantities of soy, casein and whey protein
  - whey protein stimulated greater MPS following resistance exercise
- Appears that the AA Leucine in combination with other BCAA could be critically important to stimulating MPS
  - Leucine can activate key signaling of mTOR pathway

Tang, Moore, Kujbida,Tarnopolsky and Phillips, 2009 and Atherton et al, 2010

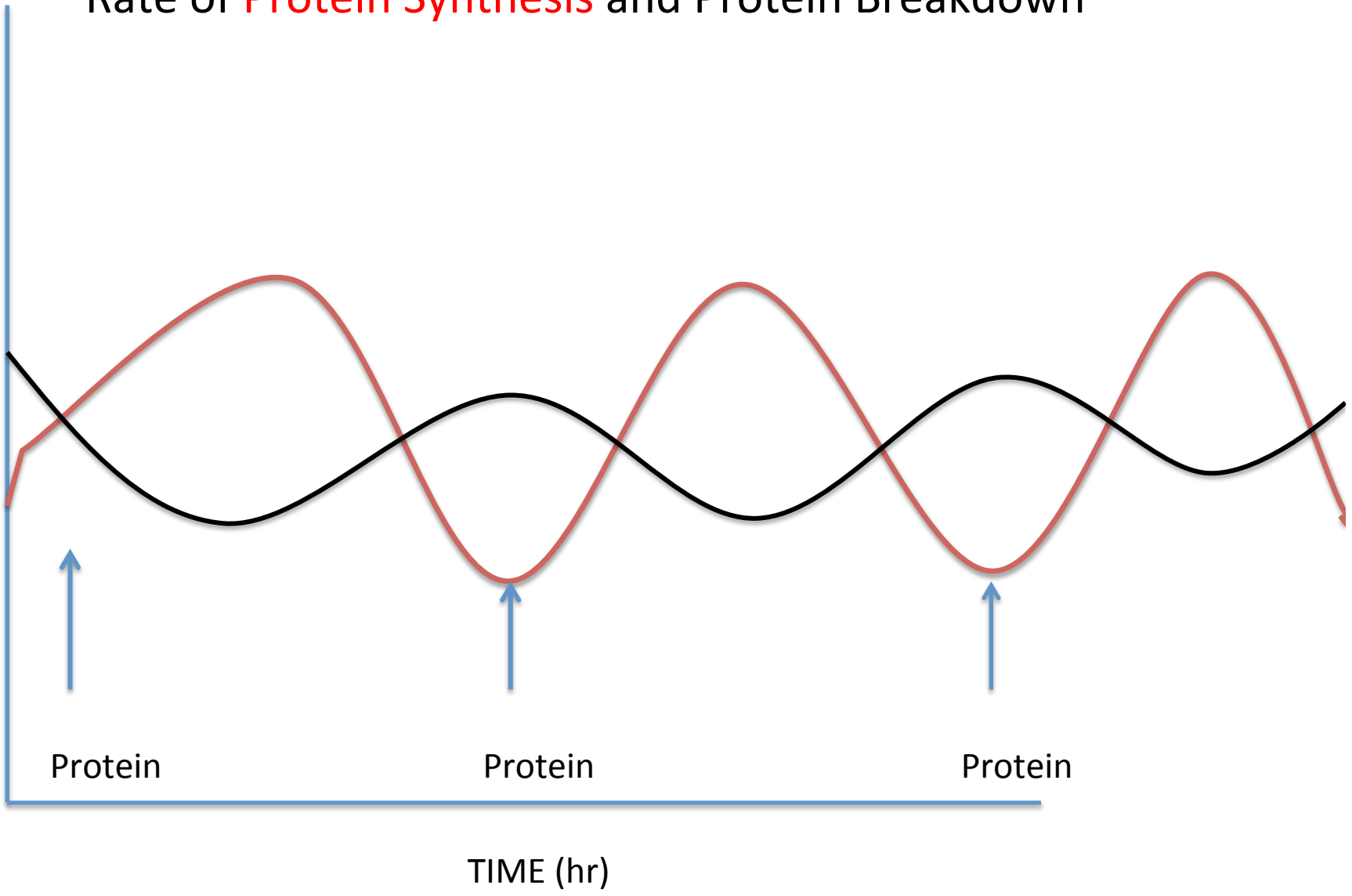
Mammalian Target of Rapamyacin (mTOR)



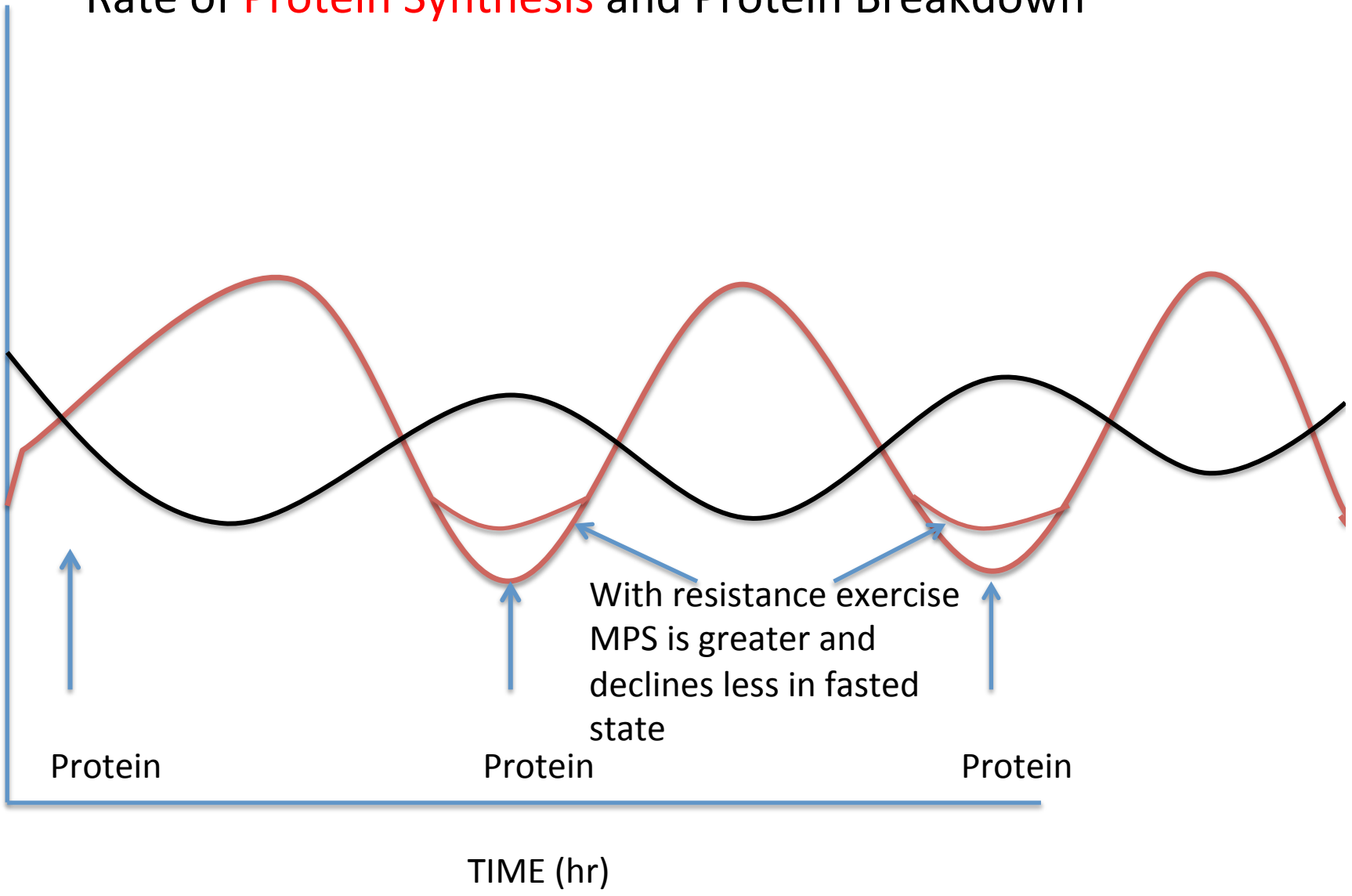
Food Sources of Leucine, isoleucine and Valine (BCAA)

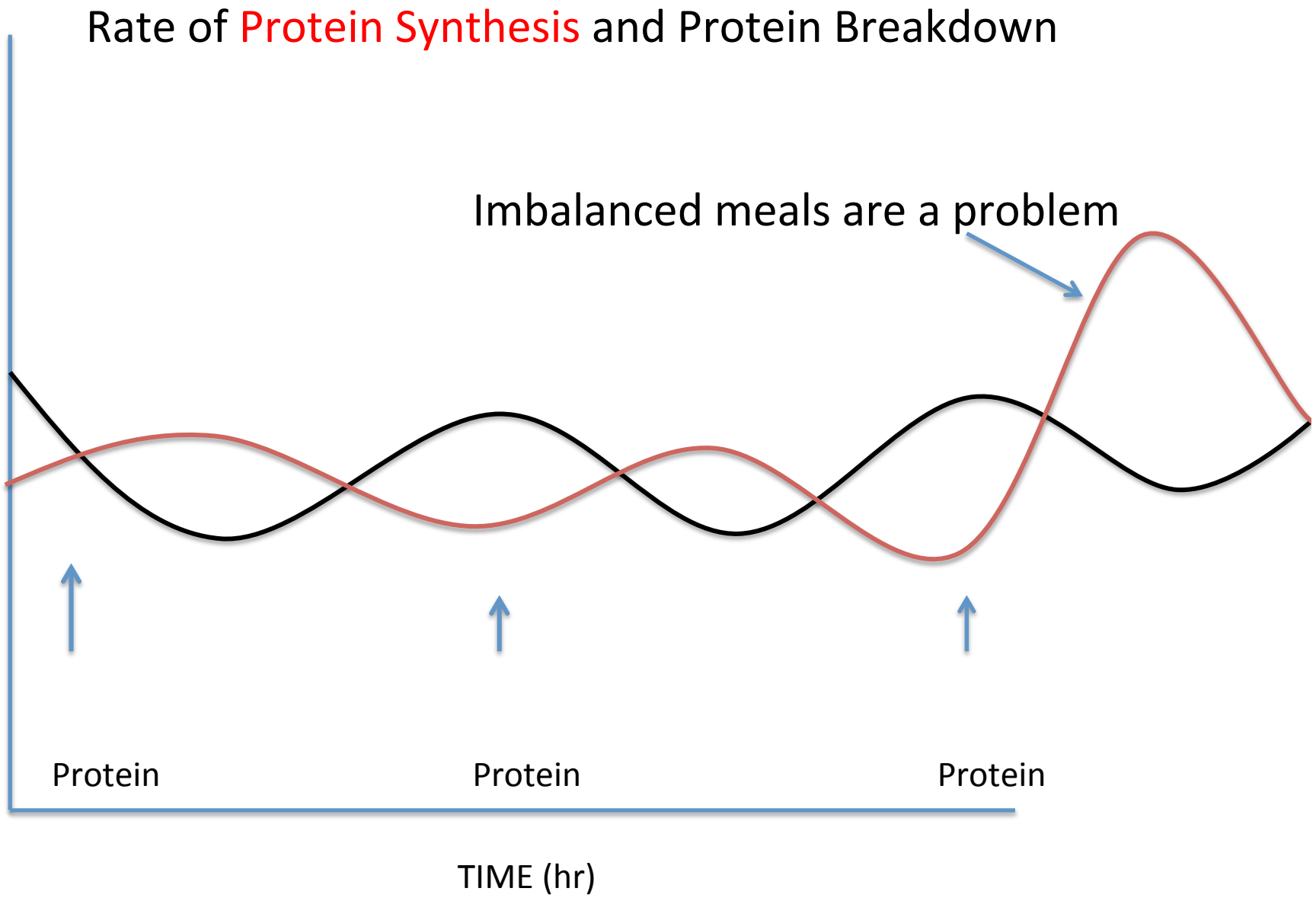
- Meats, fish, chicken, turkey, eggs and dairy products contain Leucine and the other BCAA
- Effective dose of Leucine is about 2-3g/d
  - 12 ounces of milk=2000mg leucine
  - 3 egg whites = 990mg leucine
  - 1 cup 1% cottage cheese = 2880mg leucine
  - 3oz tuna = 1740mg leucine
  - 3oz chicken breast = 3690mg leucine
  - 3oz beef=3005mg leucine

Rate of Protein Synthesis and Protein Breakdown



Rate of Protein Synthesis and Protein Breakdown




Rate of Protein Synthesis and Protein Breakdown
Imbalanced meals are a problem
Protein
Protein
Protein
TIME (hr)

SLEEP

While you sleep the body is actively recovering cellular components, consolidating memory and strengthening connections between nerve cells

http://www.nhlbi.nih.gov/health/public/sleep/healthy_sleep.pdf

Ideally need 7-8 (9) hours of sleep a night

Sleep deprivation:

- Increases risk diabetes
- Increases hunger and BMI
- Increases ad libitum eating, especially at night
- Increases risk taking/substance abuse
- Decreases cognitive function
- Decreases physical activity

Sleep debt is like credit card debt:
There is always interest to be paid