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# **Fueling for Performance:** *Optimizing Health & Training During the Competitive Swimming Season*

**Prepared for:**



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**MYTH:**

**All training occurs during exercise.**

**FACT:**

**Training effects occur during rest/recovery.**

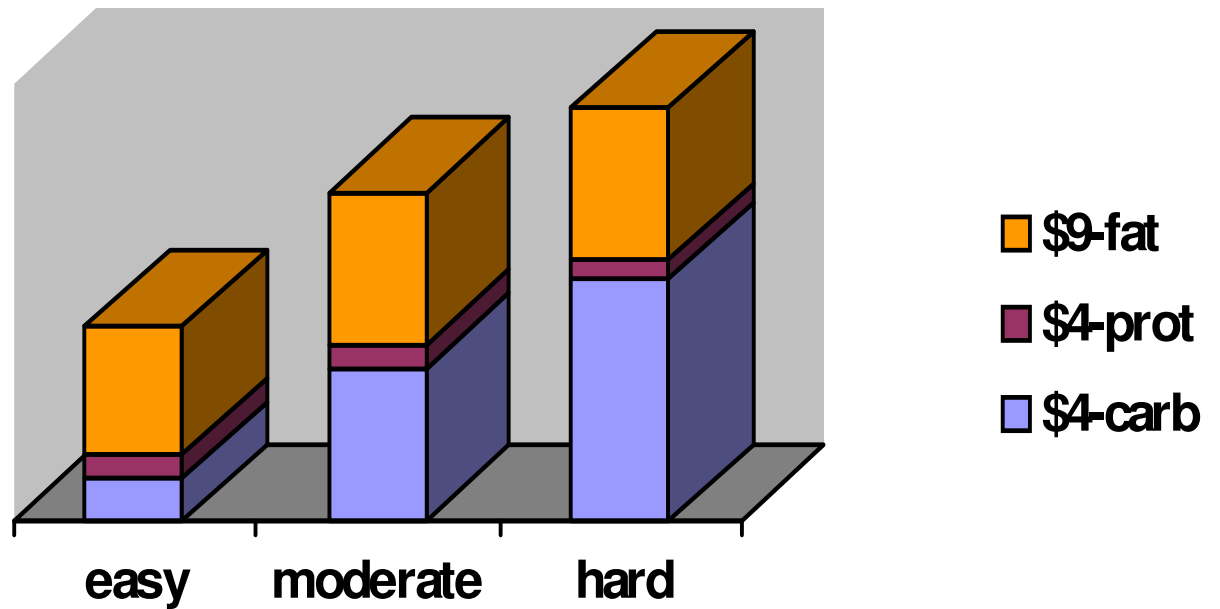
***Foundations of Performance Nutrition:***

- 1. Eat a variety of foods.**
- 2. Eat colorful foods.**
- 3. Don't let yourself get hungry.**
- 4. Don't let yourself get thirsty.**



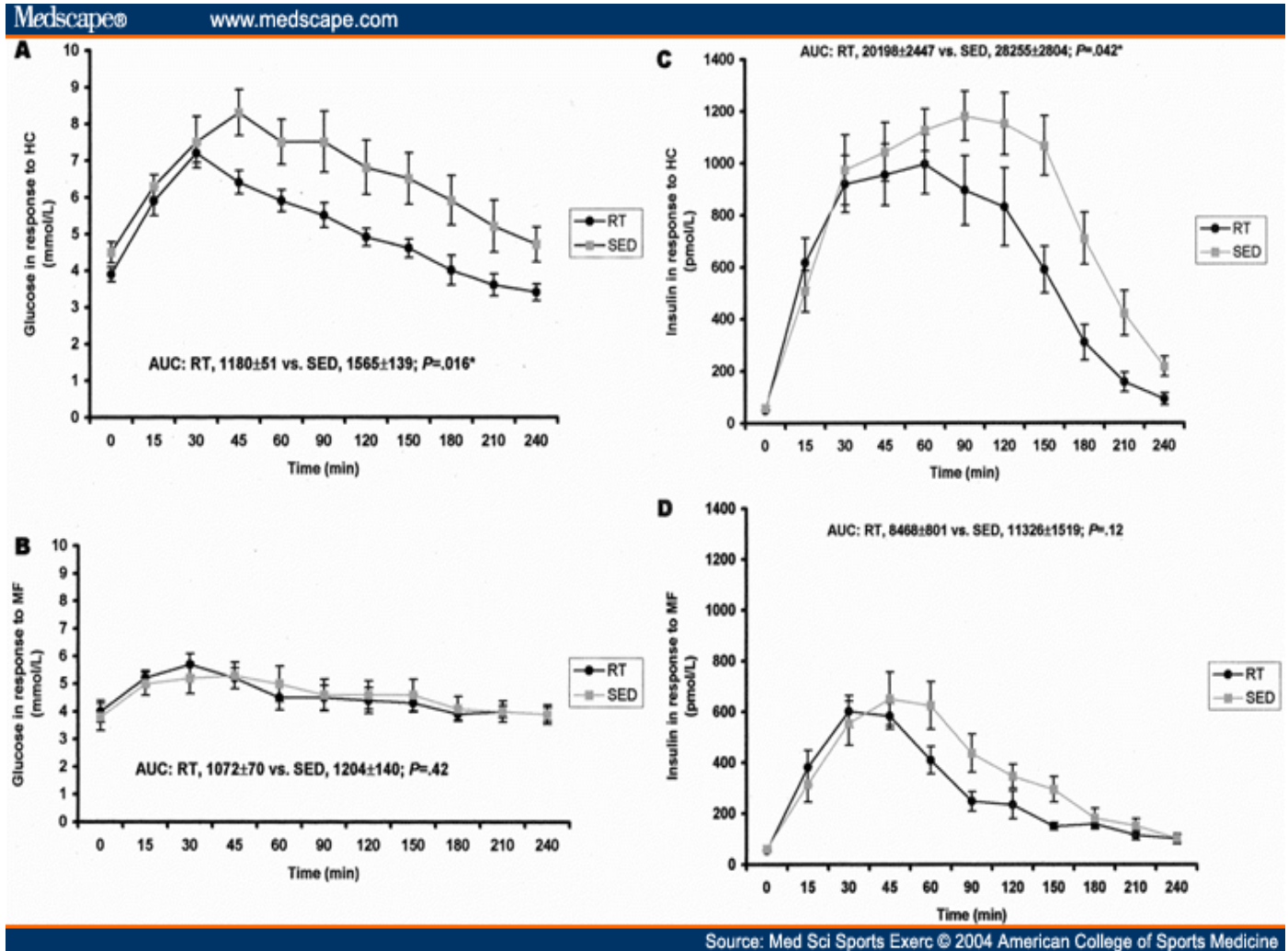
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## The Energy “CO\$T” of Exercise



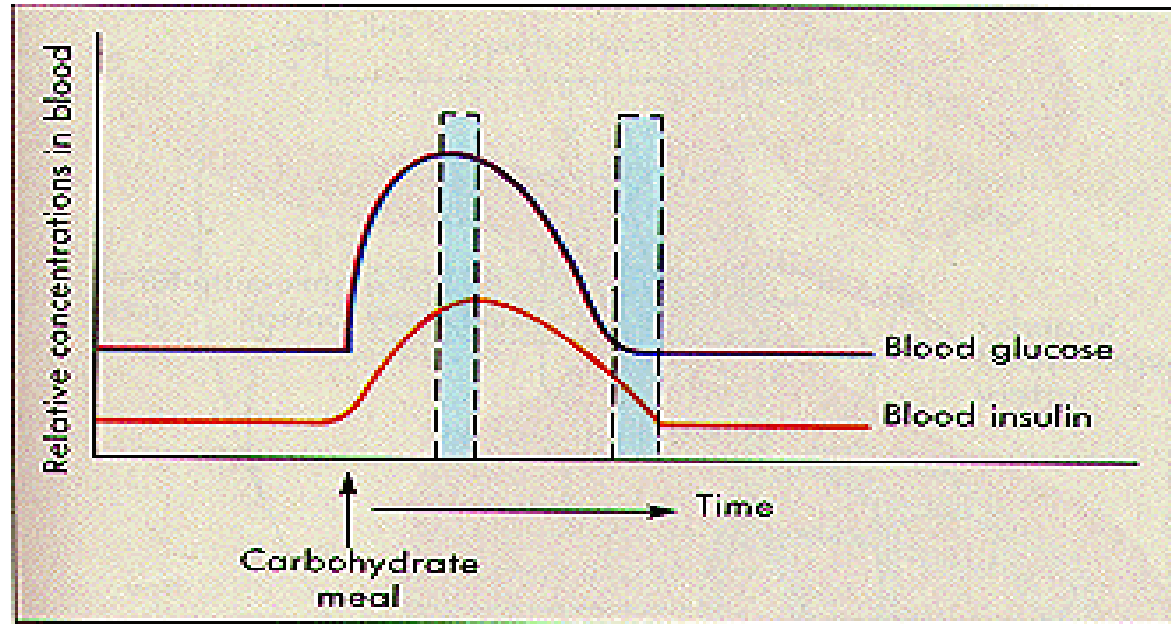
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## What happens when we eat?



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## Eat Early and Often!



**FIGURE 5-15**

Blood levels of glucose and insulin after a carbohydrate meal. Note that the peak of blood insulin is reached shortly after the peak of blood glucose, and that insulin levels remain elevated for some time after the glucose has returned to within the normal range. These are indications of the time lag in this feedback system.

Smaller Mixed Meals  
(5-6 per day)  
**Insulin Steady**

**Preferable during day**

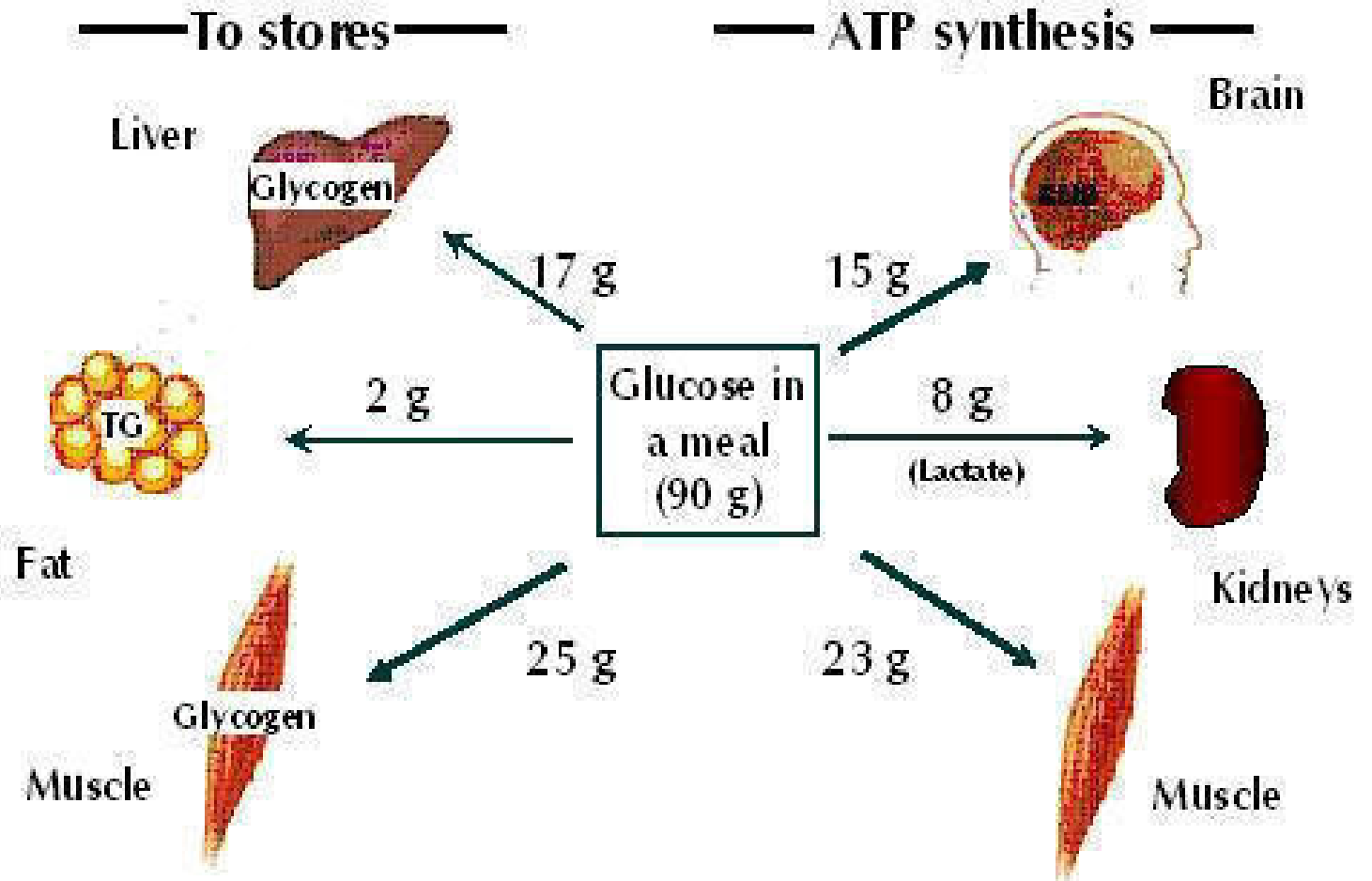
Large HC Meals  
(3 per day)  
**Insulin Spikes**

**OK post-workout**



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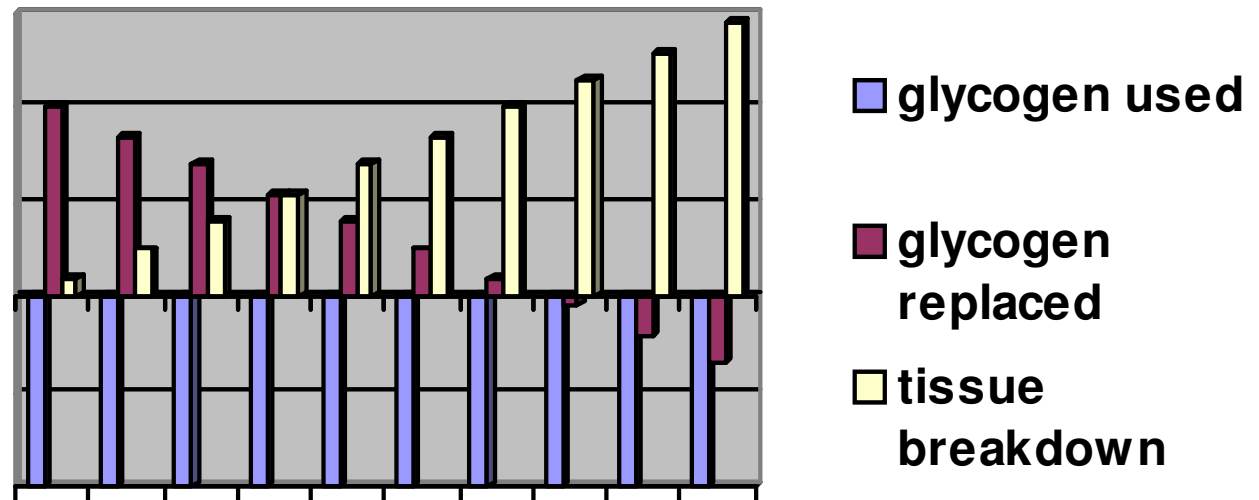
## Distribution of glucose after a meal



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***There is a direct link between fatigue  
and muscle glycogen depletion.***

**Figure 2. Long-term failure to replace  
glycogen leads to tissue breakdown.**



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Over time, if the glycogen spent during one workout is not replenished prior to the next, the net effect is a reduction in the amount of glycogen available to fuel the tough routines. Should the intensity of the work remain too high for the body to rely on fat as the primary fuel source (which it will!), the body will turn to protein. Generally this translates into tissue breakdown or damage.

Although some tissue damage is normal with training, this series of events demonstrates the importance of replenishing glycogen stores after every workout.

Replenishing stores after every workout, not only maintains energy reserves from workout to workout, but also limits the amount of tissue damage per workout and over time.

**A quality workout or practice relies upon the replenishment of fuel stores used/spent during previous sessions.**



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Compounded by the common eating pattern among athletes:  
infrequent meals with a heavy emphasis on a large end-of-day meal.

NOT useful for meeting athletic goals because it is guaranteed to  
create large energy deficits during the day.

### Fueling “Challenges”

Inadequate calories.

Over-reliance on  
protein and fat.

Under-reliance on  
carbohydrate.

Substitutes (supplements, ergogenic aids).

Poor recovery.

Failure to practice  
eating/drinking.

Failure to plan  
daily food intake.

Energy deficits cause:  
-low glycogen  
-muscle *catabolism*  
-*hyperinsulinemia*

Hyperinsulinemia  
encourages the  
manufacture of fat.

Fat is almost exclusively used or  
stored in response to day-to-day  
fluctuations in energy balance.

Am J Physiol Endocrinol Metab, 1988

Inadequate calories:  
↓ muscle mass)  
↓ metabolic rate  
↓ need for calories



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***“After exercise, the dietary goal is to provide adequate energy and carbohydrates to replace muscle glycogen and to ensure rapid recovery.***

***If an athlete is glycogen-depleted after exercise, a carbohydrate intake of 1.5 g/kg body weight during the first 30 min and again every 2h for 4 to 6h will be adequate to replace glycogen stores.***

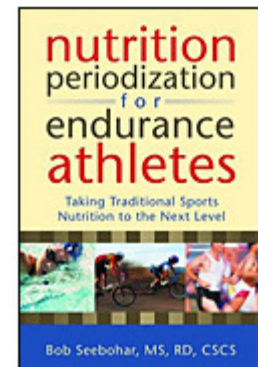
***Protein consumed after exercise will provide amino acids for the building and repair of muscle tissue.***

***Therefore, athletes should consume a mixed meal providing carbohydrates, protein, and fat soon after a strenuous competition or training session.”***

***(ACSM, ADA, Dietitians of Canada Joint Position Statement on Nutrition and Athletic Performance, 2000, p 2131)***

*The dynamics  
of energy and  
fluid intake  
should match  
the dynamics  
of energy and  
fluid usage.*

*~Dan Benardot  
author of:*





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## Top 30 Foods for Swimmers

Foods	Featured Nutrients				
	Carbohydrate	Protein	Antioxidants	Fiber	Other
1. Blueberries	✓		✓ Anthocyanins		
2. Blackberries	✓		✓ Anthocyanins		
3. Strawberries	✓		✓ Vitamin C		
4. Oranges	✓		✓ Vitamin C		Heperidin
5. Mango	✓		✓ Vitamin A, Vitamin C		
6. Broccoli			✓ Vitamin A, Vitamin C	✓	Vitamin K
7. Carrots			✓ Vitamin A, Vitamin C	✓	Vitamin K
8. Tomatoes			✓ Vitamin A, Vitamin C	✓	Lycopene
9. Sweet Potatoes	✓		✓ Vitamin A (beta-carotene), Vitamin C		Potassium, Iron, Copper, Manganese
10. Avocado				✓	Vitamin K, Folate
11. Spinach			✓ Vitamin A		Potassium
12. Mixed Greens			✓ Phytonutrients		Folate, Iron, Manganese, Magnesium
13. Potatoes	✓		✓ Vitamin C		Vitamin B6, Copper
14. Bananas	✓		✓ Vitamin C		Vitamin B6, Potassium
15. Almonds			✓ Vitamin E (gamma-tocopherol)		
16. Cranberries	✓				Hippuric acid
17. Oatmeal	✓	✓		✓	Manganese
18. Granola	✓	✓		✓	Manganese
19. Olive Oil			✓ Vitamin E		Oleic acid
20. Black beans	✓	✓		✓	Folate
21. Yogurt	✓	✓			Calcium, Phosphorus
22. Milk	✓	✓			Calcium
23. Orange juice	✓		✓ Vitamin C	✓	
24. Whole grain bread	✓	✓		✓	Manganese
25. Whole grain pasta	✓	✓		✓	Vitamin B
26. Eggs		✓			Vitamin K, Choline, Leutin
27. Beef		✓			Iron, Zinc, Vitamin B12
28. Salmon		✓			Omega-3 fats
29. Shrimp		✓			Selenium, Vitamin D, Vitamin B12
30. Chicken		✓			Selenium, Niacin



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Everything we do is focused on performance...

*Why not nutrition?*

**w.r.t. Training.**

- Eat foods that *support* daily training requirements in terms of total energy, fuel sources and metabolic catalysts.
- Cover the basics of variety, color, timing, carbs, protein, and fluids, and extend this to recovery.

**w.r.t Recovery.**

- Take advantage of the post-exercise insulin response to replenish glycogen, attenuate tissue breakdown and promote tissue accretion.
- 30-40 grams carb plus 10-20 grams protein within 20-30 min of workout; Followed by a mixed meal. Repeat snack after meal if tough session.

**w.r.t. Cortisol.**

- Insufficient carbohydrate can lead to elevated cortisol.
- 6-10 grams/kg body weight.  
130 lbs: 354-590 grams; 190 lbs: 516-860 grams.

**w.r.t. Physique.**

- Balance calorie intake with training expenditures.
- Time calorie intake to maximize use and storage.
- Obtain calories from sources that enhance metabolism and minimize waste and unnecessary hormonal responses.

**w.r.t. Mental stress.**

- Address / overcome nutrition and food related challenges that can increase mental stress.



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*“Success in competition should be  
the outcome of quality training, not  
chance or luck. It should be  
planned for and thus expected.”*

**GOOD LUCK!**

