Surgical nutrition

Optimising patient recovery through diet.

Dr Doron Sher
Knee and Shoulder Surgeon

Doron Sher

MBBS, MBiomedE, FRACS FAOrthA

Surgical Nutrition

160 Belmore Rd, Randwick

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www.kneedoctor.com.au

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Post Surgery

- No Infection
- Wound Healing
- Restore Muscle Bulk

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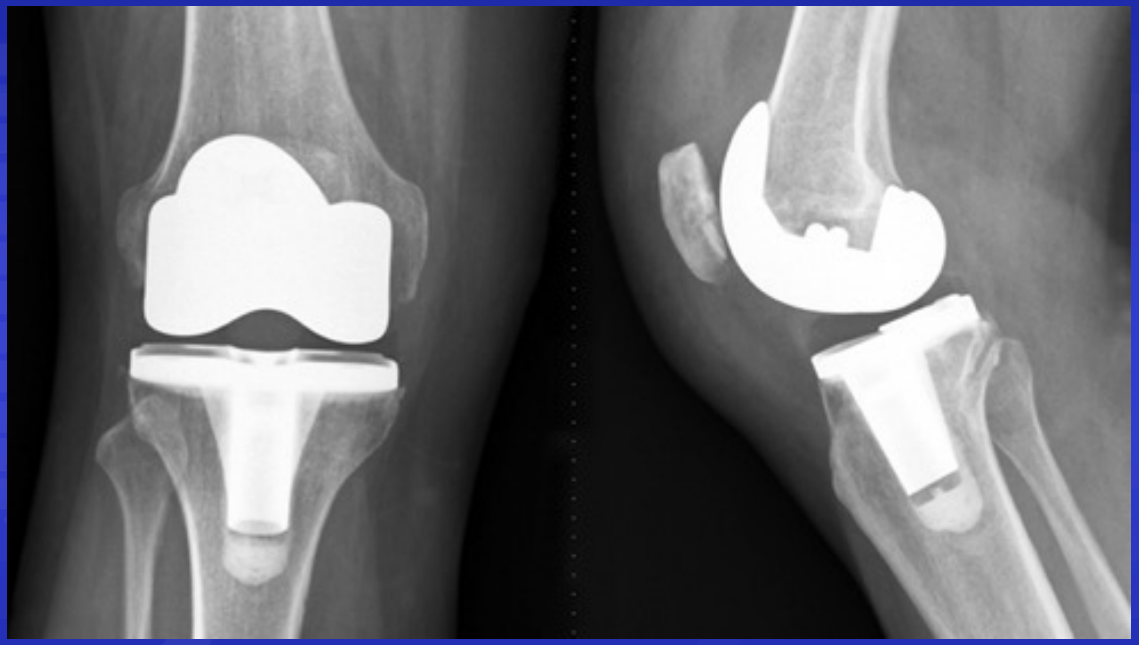

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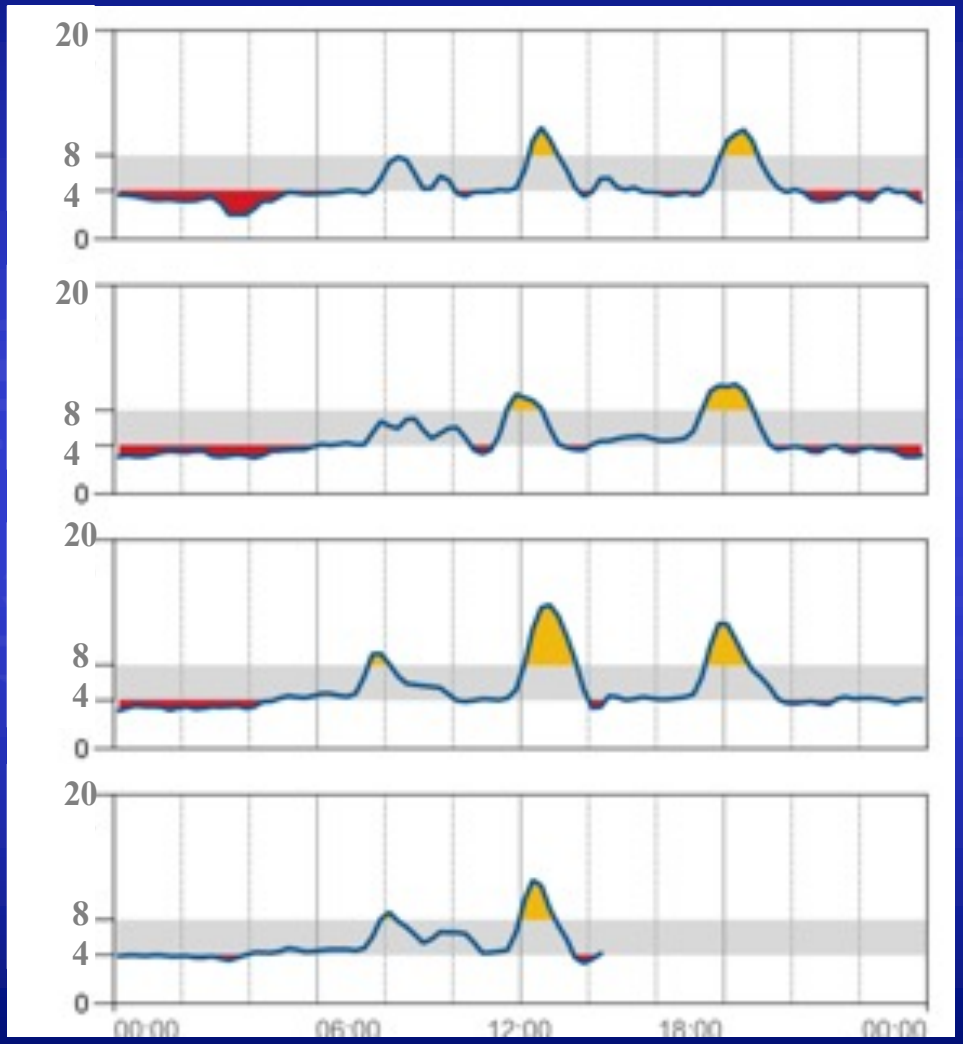

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What are the problem foods?

- Fruit Juice - Same sugar as Coke
- 2 Slices of bread - 6 Teaspoons of Sugar
- Muffin - 11
- Flavoured Yoghurt - 4-6
- Breakfast Cereal - 14
- 1 cup of rice - 10
- 1 bowl of pasta - 8

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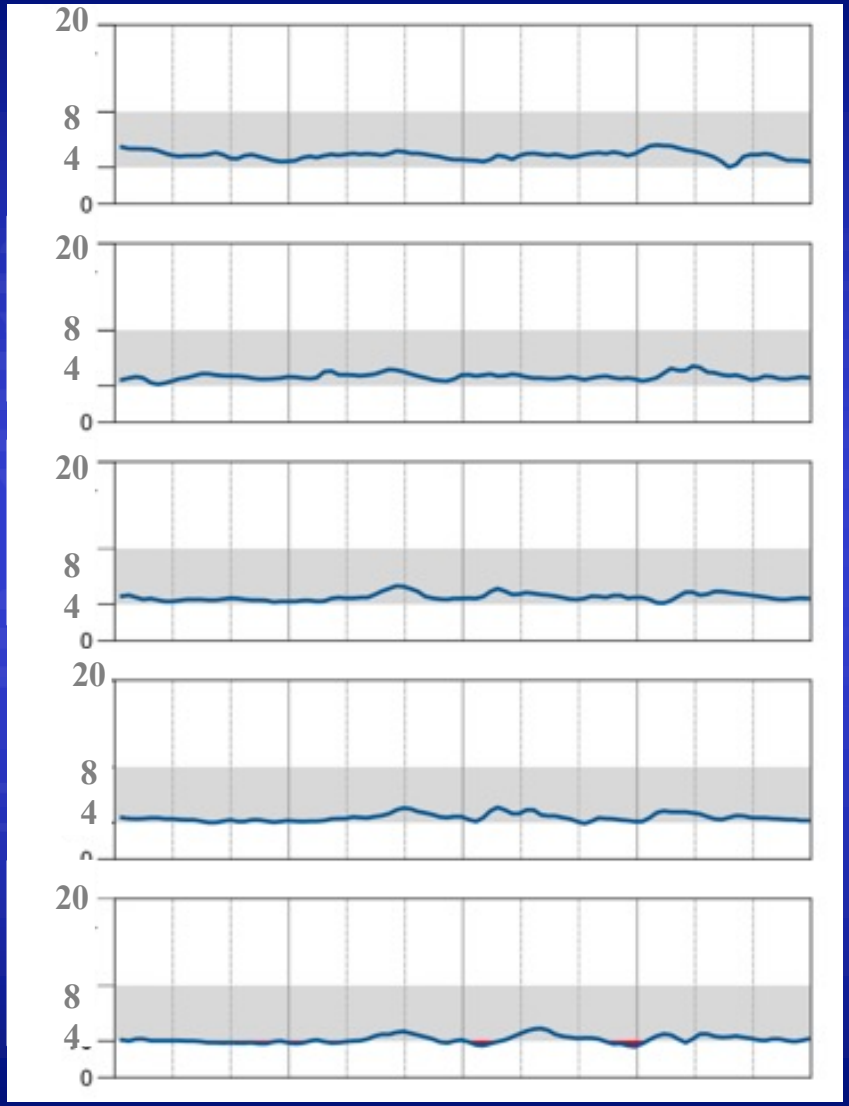

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Fawcett, W. J., & Ljungqvist, O. (2017). Starvation, carbohydrate loading, and outcome after major surgery. BJA Education, 17(9), 312–316. doi:10.1093/bjaed/mkx015

Frisch A, Chandra P, Smiley D et al. Prevalence and clinical outcome of hyperglycemia in the perioperative period in noncardiac surgery. Diabetes Care 2010; 33: 1783–8

Kwon S, Thompson R, Dellinger P, Yanez D, Farrohki E, Flum D. Importance of perioperative glycemic control in general surgery: a report from the Surgical Care and Outcomes Assessment Program. Ann Surg 2013; 257: 8

BJA Education, 17 (9): 312–316 (2017)
doi: 10.1093/bjaed/mkx015
Advance Access Publication Date: 15 May 2017

Starvation, carbohydrate loading, and outcome after major surgery

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Key points

- Major surgery induces a number of metabolic changes, with insulin resistance fundamental within these processes, often causing hyperglycaemia.
- Perioperative hyperglycaemia should be avoided in patients undergoing major surgery, whether they have previously diagnosed diabetes or not.
- Preoperative carbohydrate loading modifies insulin resistance, improves patient comfort and well-being, minimizes protein losses, and improves postoperative muscle function. It is a key aspect of 'enhanced recovery' protocols.
- Preoperative carbohydrate loading does not increase the risk of pulmonary aspiration, but its place in patients with diabetes is uncertain.
- Preoperative carbohydrate loading reduces length of stay and may reduce complications for some surgery.

The concept of a period of preoperative starvation prior to elective surgery to avoid regurgitation and aspiration of gastric contents is so deeply enshrined in anaesthetic practice that it has taken many years to revisit this area. However, in the last quarter of a century, patients have experienced and benefited from a number of significant changes in this area.

While the perceived benefit of preoperative fasting may be self-evident, what are the disadvantages? One area is dehydration, with a number of articles from the 1980s highlighting that withholding water for excessive periods was not only unnecessary[1] but also had no deleterious effect on both the volume and the pH of gastric contents when administered up to 2 h prior to surgery.

Stress response

The major issue surrounding a period of starvation needs to be viewed within the context of the pathophysiological changes that accompany major surgery. The stress response describes the process whereby pituitary and sympathetic nervous system activation leads to a number of predictable metabolic changes such as hyperglycaemia, nitrogen loss, and lipolysis. A secondary area is a systemic inflammatory response mediated by various cytokines (e.g. interleukins and tumour necrosis factor). A key area of interest has been surgical stress response modification, for while its evolutionary benefits are evident—substrate mobilization and water conservation when access to food and water is restricted—there is little benefit and indeed much potential harm due to this unmodified pathophysiological upset. Indeed, it has been this approach that has formed the basis for modern enhanced recovery (ER) pathways. In addition, it is now recognized that anaesthetic and surgical complications (such as hypovolaemia, infection, and hypothermia) can magnify these changes further.

There are many ways of assessing the magnitude of the stress response. These principally include the neuroendocrine sequelae, measuring the hormones themselves—plasma concentration of cortisol, growth hormone, catecholamines, insulin, and so on—or some of the other metabolic changes, in

Editorial decision: March 2, 2017; Accepted: March 8, 2017

Relationship of Perioperative Hyperglycemia and Postoperative Infections in Patients Who Undergo General and Vascular Surgery

Margarita Ramos, MD, MPH, Zain Khalpey, MD, PhD,* Stuart Lipsitz, PhD,† Jill Steinberg, RN, MPH,† Maria Theresa Panizales, RN, MSN,† Michael Zinner, MD, PhD,* and Selwyn O. Rogers, MD, MPH†*

posed by postoperative hyperglycemia is independent of diabetic status and needs further evaluation to assess for possible benefits of postoperative glycemic control in patients who have undergone general surgery.

(*Ann Surg* 2008;248: 585–591)

Acute Glucose Elevation Is Highly Predictive of Infection and Outcome in Critically Injured Trauma Patients

Grant V. Bochicchio, MD, MPH, Kelly M. Bochicchio, RN, BSN, MS, Manjari Joshi, MD, Obeid Ilahi, MD, and Thomas M. Scalea, MD

Conclusions: AGE is a highly accurate predictor of infection and should stimulate clinicians to identify a new source of infection.

DIABETES/METABOLISM RESEARCH AND REVIEWS
Diabetes Metab Res Rev 2007; **23**: 3–13.
Published online 8 September 2006 in Wiley InterScience (www.interscience.wiley.com) **DOI:** 10.1002/dmrr.682

REVIEW ARTICLE

Relationship of Hyp Infection in

Justin E. Richards, MD, Rond
William T. Obrem

Conclusions: Hyperglycemia was an independent risk fa patients without a history of diabetes.

Glucose Variability Based on Continuous Glucose Monitoring Assessment Is Associated with Postoperative Complications after Cardiovascular Surgery

Hiroki Sato, MD, PhD,[1] Michihiro Hosojima, MD, PhD,[2] Tomomi Ishikawa, MD,[3] Kenji Aoki, MD, PhD,[1] Takeshi Okamoto, MD, PhD,[1] Akihiko Saito, MD, PhD,[4] and Masanori Tsuchida MD, PhD[1]

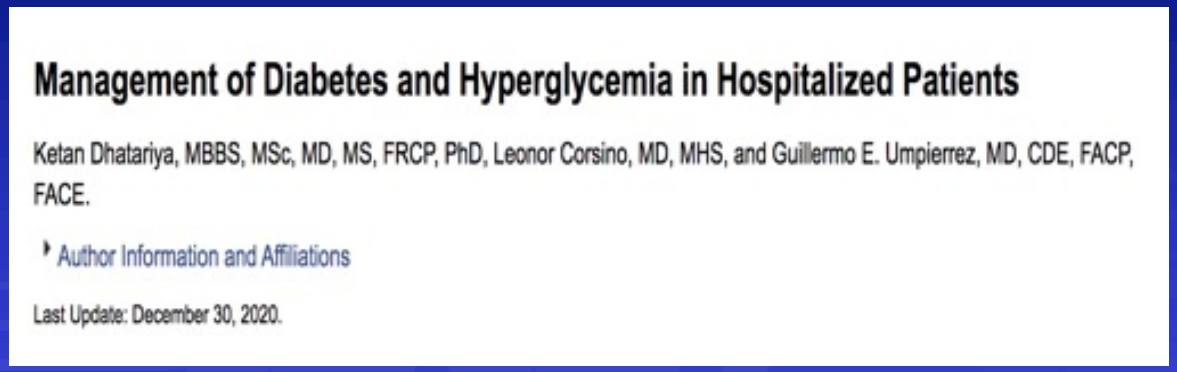
ons in diabetes: pathogenesis, d relationship to glycaemic control

erative body temperature < 36.4°C. Three of nical indexes, namely GLU > 100 mg/dL, 10^9, and WBC > 9.4×10^9, were demon- independent risk factor of infection. These studies were available. The relationship between hospital-acquired infections and diabetes is well recognized, particularly among post-operative cardiac and critically ill surgical patients in whom intensive insulin therapy improves clinical outcome independent of glycaemia. Nevertheless, further research is needed to improve our understanding of the role of diabetes and glycaemic control in the pathogenesis and management of community- and hospital-acquired infections.

Surgical site infection following operative treatment of open fracture: Incidence and prognostic risk factors

Qifeng Hu[1] | Yanhui Zhao[2] | Baishan Sun[1] | Wei Qi[1] | Pengju Shi[1]

tively. Major postoperative complications were surgical site infections, found in 6.6% of total patients, and atrial fibrillation, found in 44% of patients with off-pump coronary artery bypass grafting. High glycemic variability during SQII was associated with



Management of Diabetes and Hyperglycemia in Hospitalized Patients

Ketan Dhatariya, MBBS, MSc, MD, MS, FRCP, PhD, Leonor Corsino, MD, MHS, and Guillermo E. Umpierrez, MD, CDE, FACP, FACE.

Author Information and Affiliations

Last Update: December 30, 2020.

Umpierrez GE, Isaacs SD, Bazargan N, You X, Thaler LM, Kitabchi AE. Hyperglycemia: An independent marker of in-hospital mortality in patients with undiagnosed diabetes. Journal of Clinical Endocrinology Metabolism. 2002;87:978–982. [PubMed]

Dhatariya K, Mustafa OG, Rayman G. Safe care for people with diabetes in hospital. Clinical Medicine. 2020;20:21–27. [PMC free article] [PubMed]

18.Sampson M. A good inpatient diabetes service.

Dhatariya K, Corsino L, Umpierrez GE. Management of Diabetes and Hyperglycemia in Hospitalized Patients. [Updated 2020 Dec 30]. In: Feingold KR, Anawalt B, Blackman MR, et al., editors. Endotext [Internet]. South Dartmouth (MA): MDText.com, Inc.; 2000-.

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Muscle

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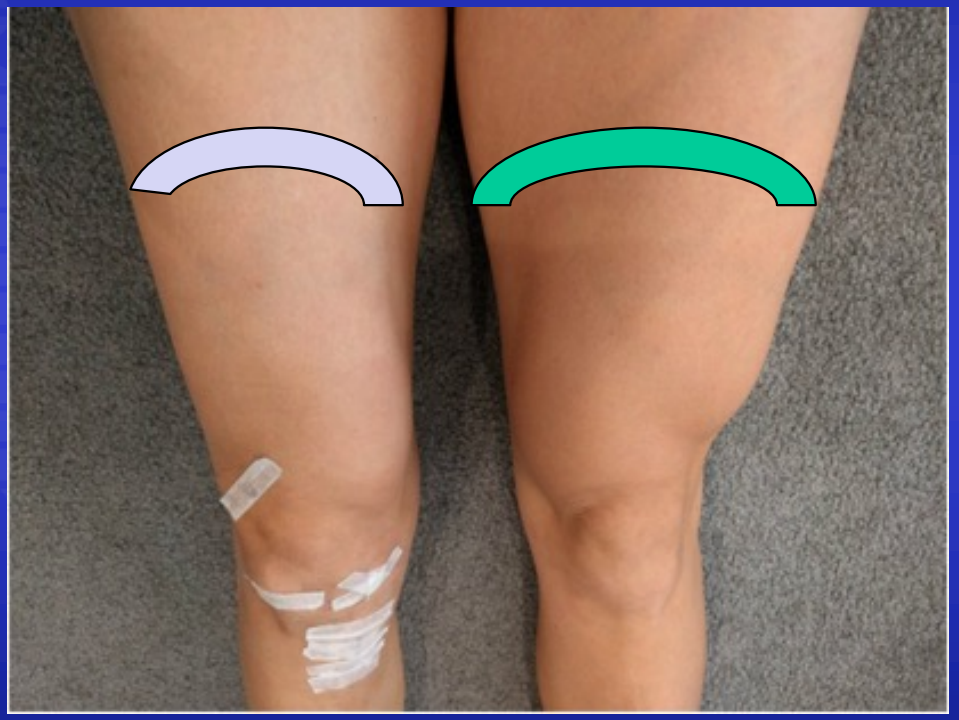

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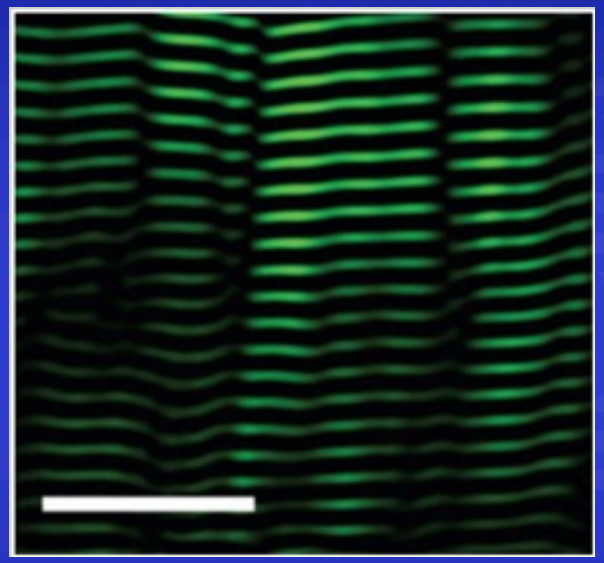

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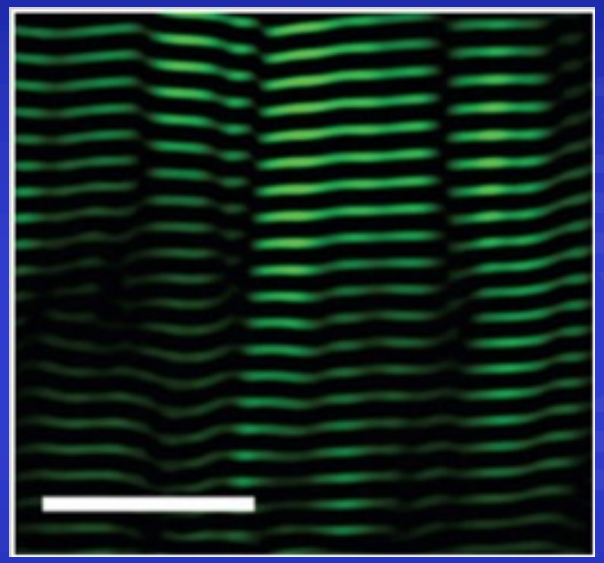

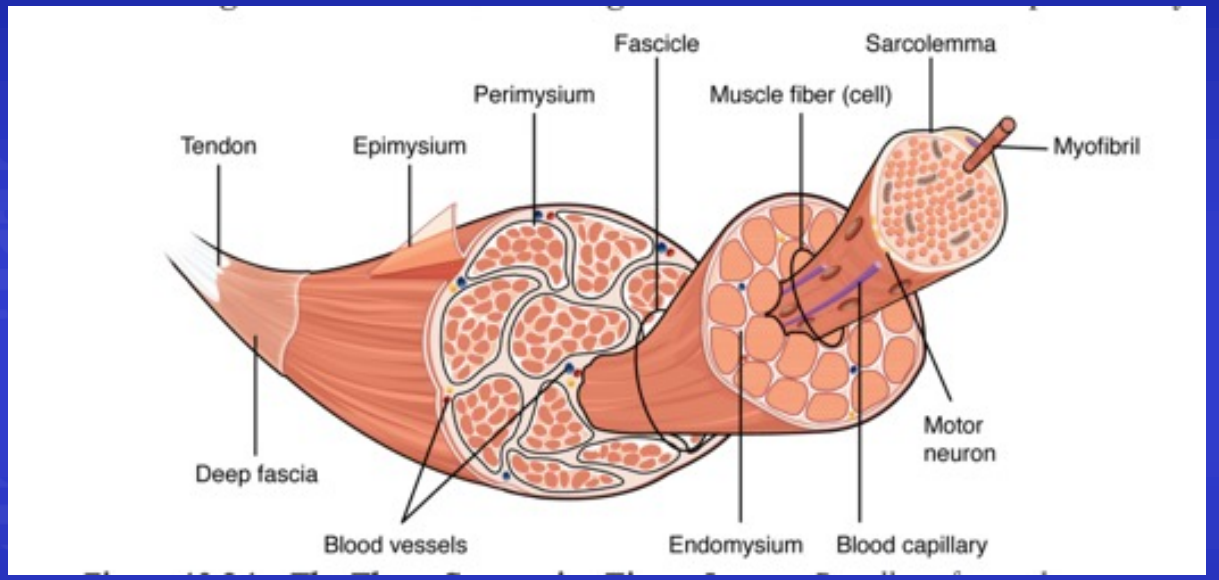

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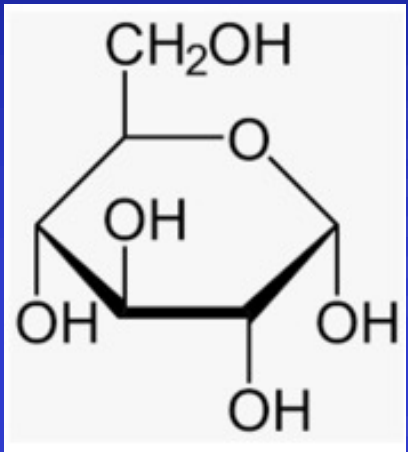
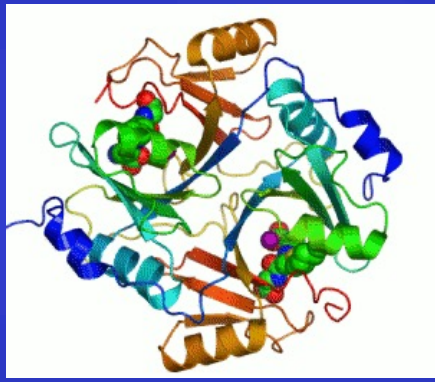
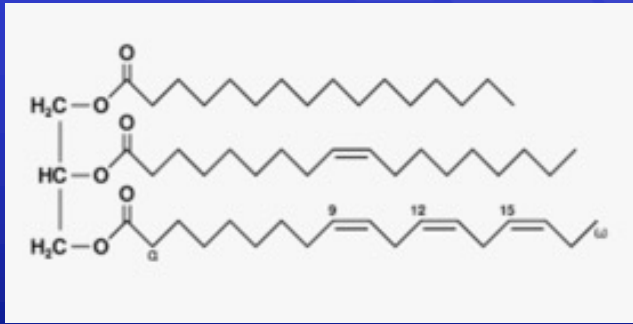
Understanding Protein







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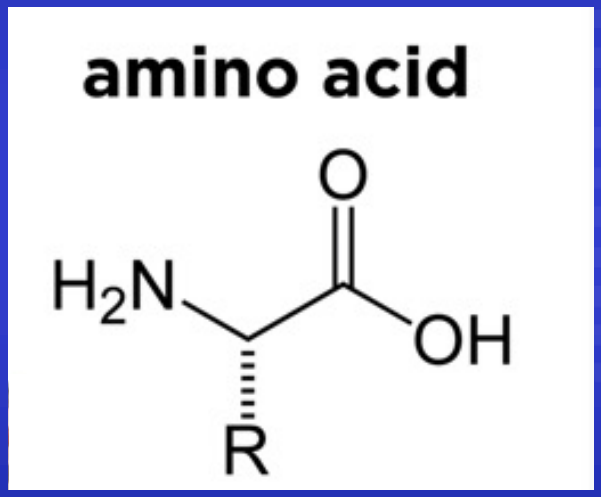

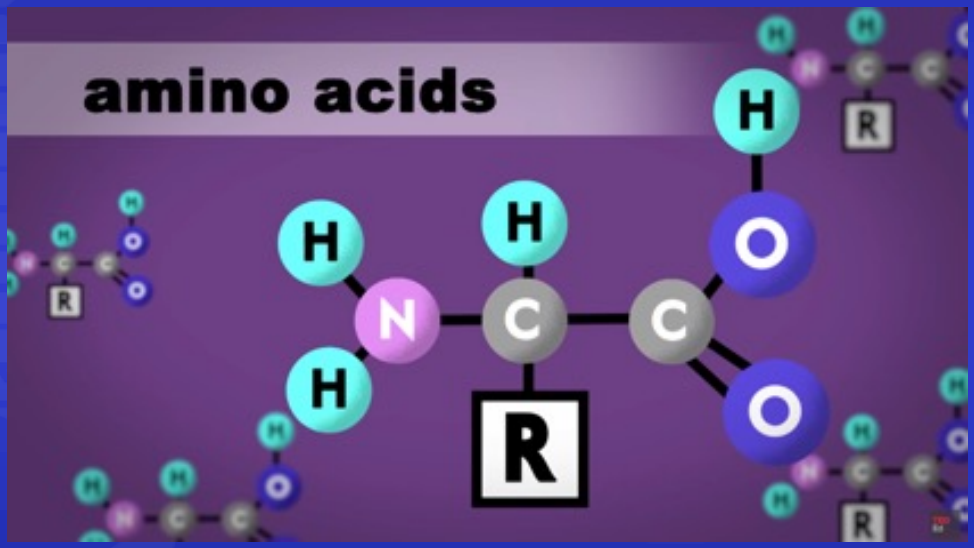

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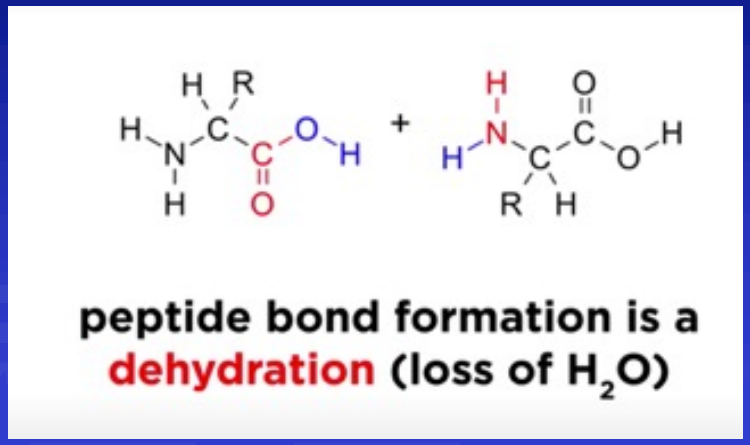

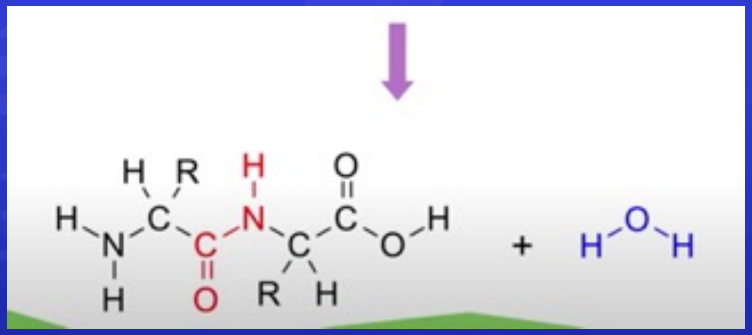

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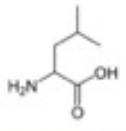
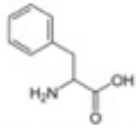
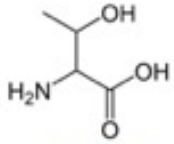
essential amino acids



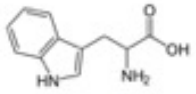
leucine



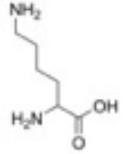
phenylalanine



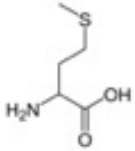
threonine



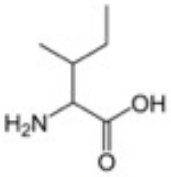
tryptophan



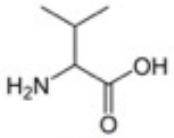
lysine



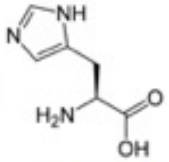
methionine



isoleucine

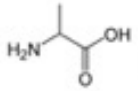


valine

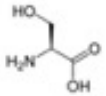


histidine

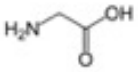
nonessential amino acids



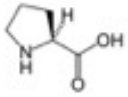
alanine



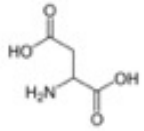
serine



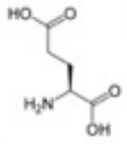
glycine



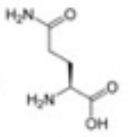
proline



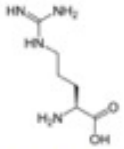
aspartic acid



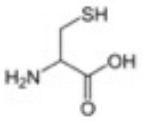
glutamic acid



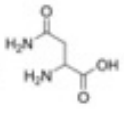
glutamine



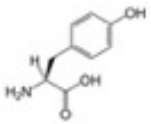
arginine



cysteine



asparagine



tyrosine

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Amino Acids as Metabolic Signals

- Neurotransitters
- Gut Hormnes (GLP1, CCK, PYY)
- Vascular Health (Nitric Oxide)
- Mitochondrial Biogenesis (SIRT1, PCC1a)

- Leucine – mTOR (protein synthesis)

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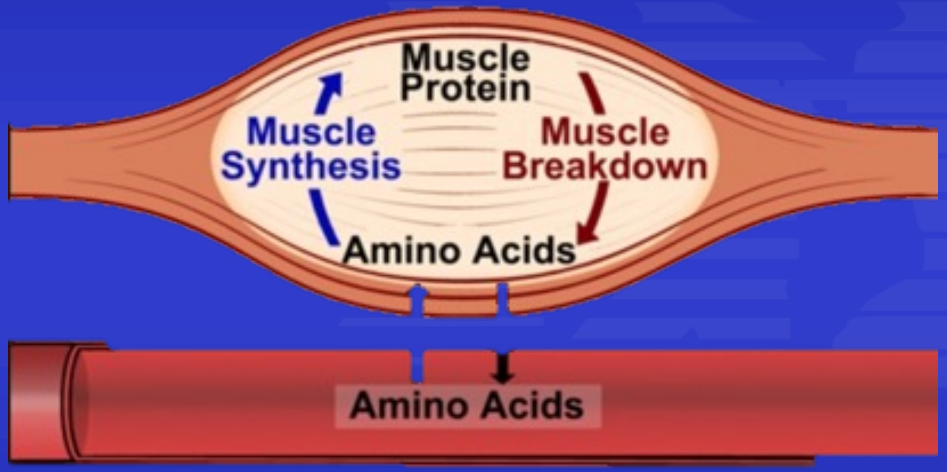

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Do we need carbs?

FC0039	Iron	19	mg/kg
FC0039	Phosphorus	170	mg/100 g
FC0039	Sodium	47	mg/100 g
FC0039	Zinc	36	mg/kg
FC0074	Selenium	<0.50	mg/kg
FC5055	Vitamin B3 - Niacin	5.8	mg/100g
FC5061	Vitamin B12 - Cobalamin	0.67	µg/100g
Nutritional	Omega 3 - Fatty Acids	1300	mg/kg
Nutritional	Omega 6 - Fatty Acids	4300	mg/kg
Nutritional	Omega 9 - Fatty acids	80100	mg/kg
Nutritional Panel	Energy		
Nutritional Panel	Protein (Dumas)	16.6	g/100g
Nutritional Panel	Total Fat		
Nutritional Panel	Monounsaturated Fatty Acids	8.7	g/100 g
Nutritional Panel	Polyunsaturated Fatty Acids	0.4	g/100 g
Nutritional Panel	Saturated Fatty Acid	7.0	g/100 g
Nutritional Panel	Trans Fatty Acids		
Nutritional Panel	Carbohydrates	12.2	g/100 g
Nutritional Panel	Total Sugars		
Nutritional Panel	Moisture (Air drying)	53.9	g/100g
Nutritional Panel	Ash	0.6	g/100 g

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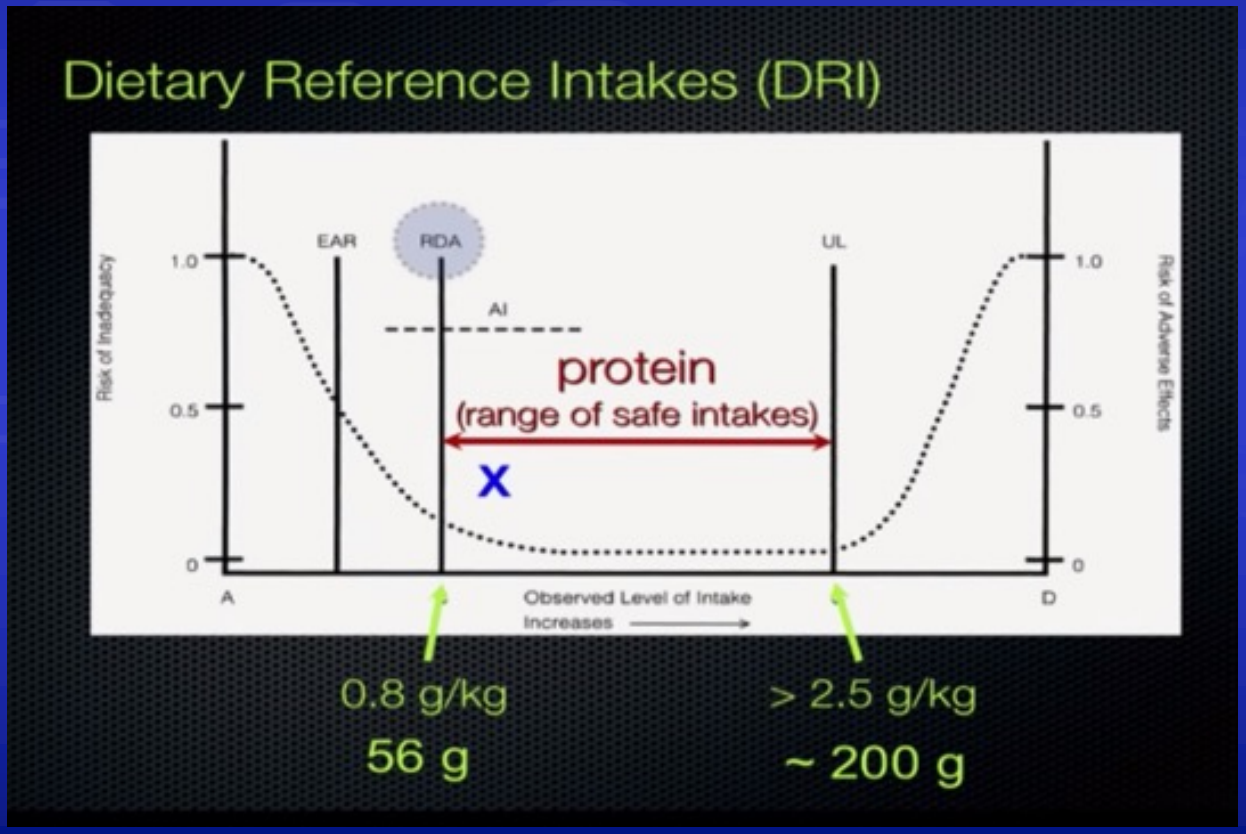
How much protein do we need?



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Hormonal Drive to Build Muscle

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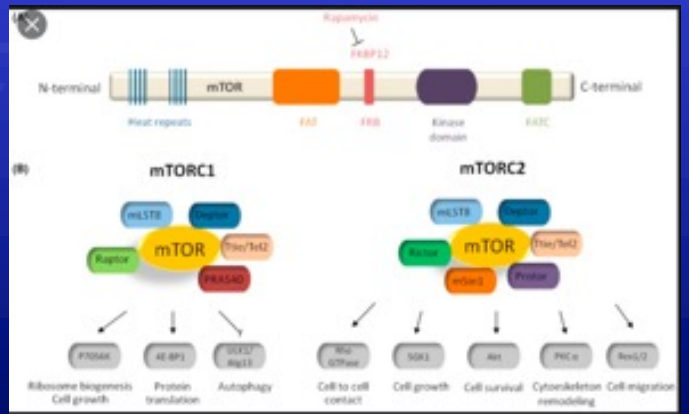
Knee and Shoulder Surgeon

mTOR

- The mechanistic Target of Rapamycin (mTOR) coordinates eukaryotic cell growth and metabolism with environmental inputs including nutrients and growth factors
- mTOR is a serine/threonine protein kinase in the PI3K-related kinase (PIKK) family that forms the catalytic subunit of two distinct protein complexes, known as mTOR Complex 1 (mTORC1) and 2 (mTORC2)
- mTORC1 is defined by its three core components: mTOR, Raptor (regulatory protein associated with mTOR), and mLST8



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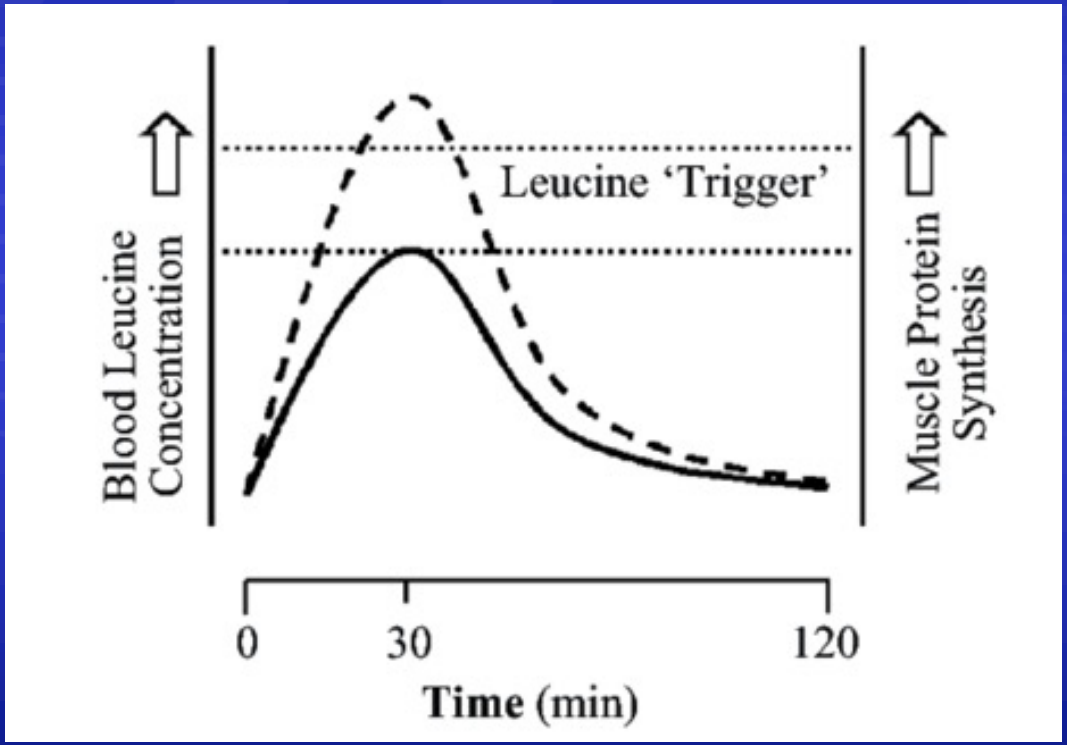
Leucine Trigger



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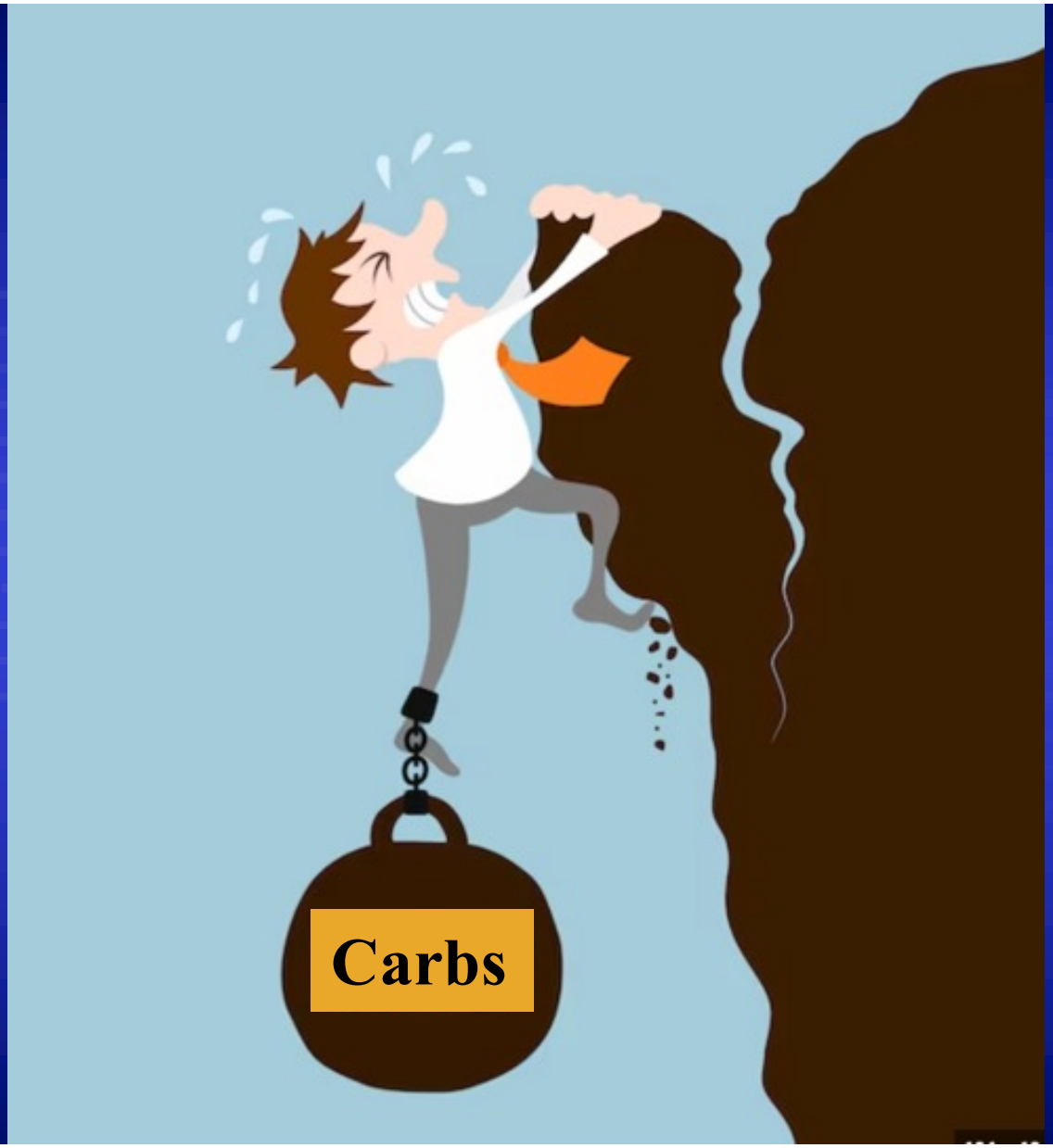

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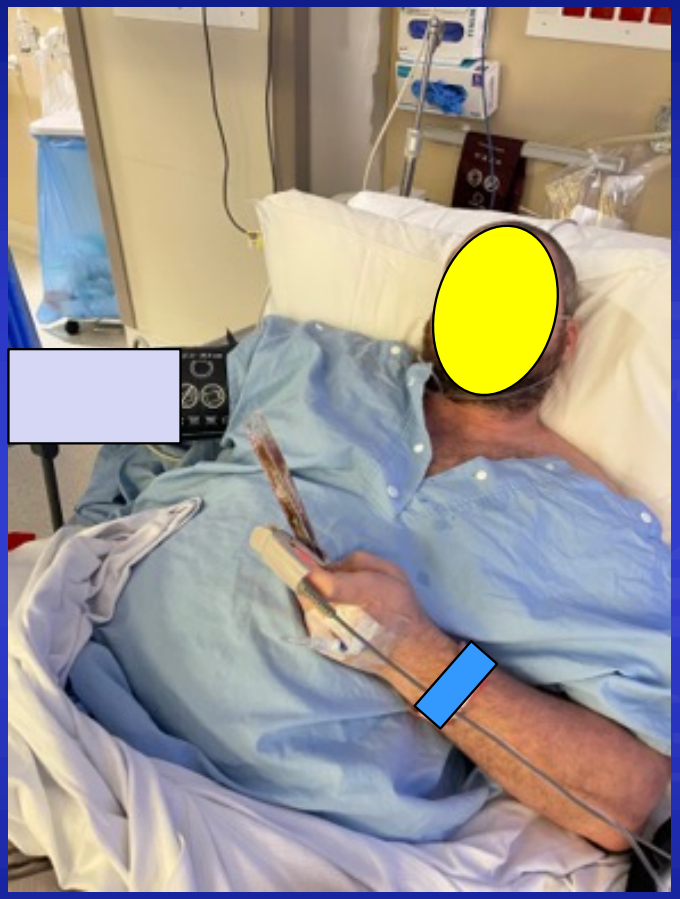

Zooper Dooper

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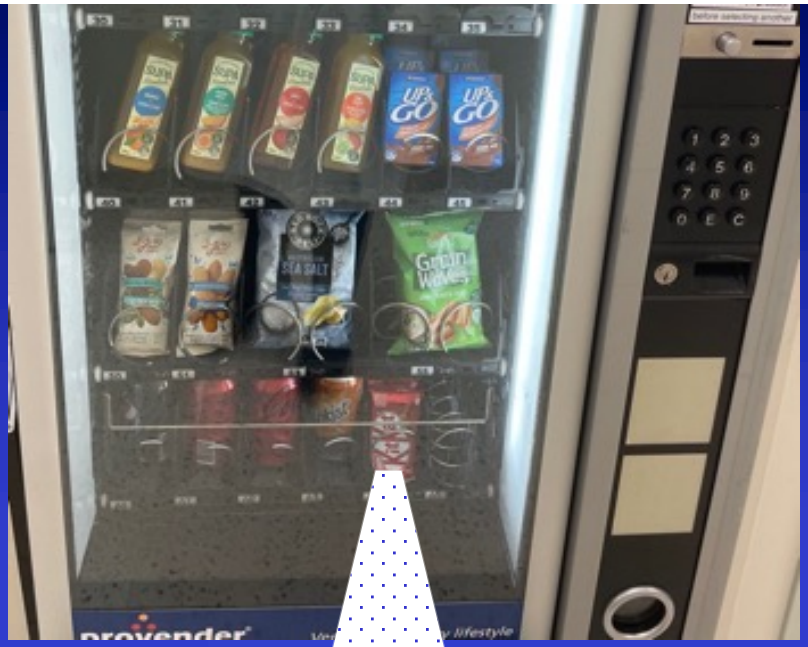

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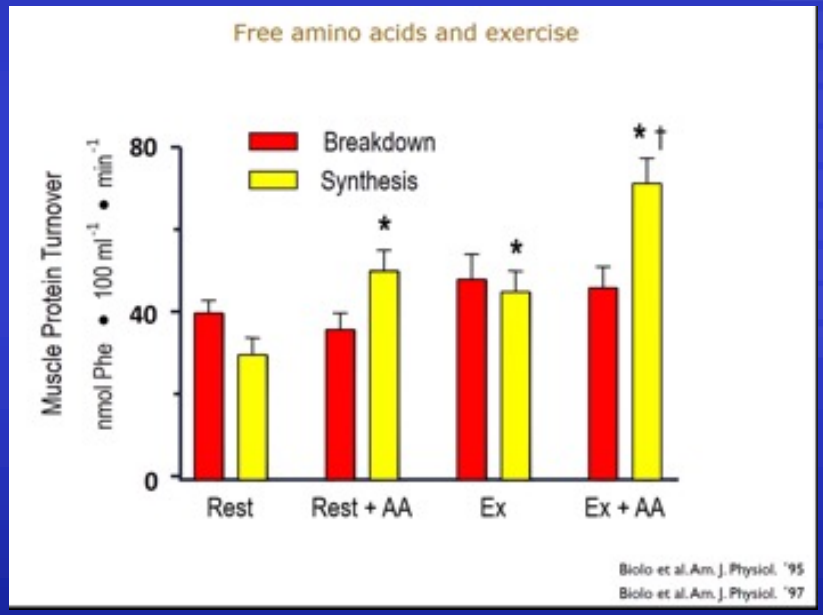
The Solution



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The Solution

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Summary

- Keeping blood sugars low and stable avoids infections for patients
  - Avoiding carbohydrates achieves this goal
- Eating protein is safe
- We need to eat a certain amount of protein each day to build our lean muscle mass
  - “High protein intake” is safe and beneficial in recovering from surgery
  - (100grams of fish/chicken/meat twice a day as a minimum)

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