



**THE NOAKES
FOUNDATION**

DISCOVERING BANTING AND HARVEY: UNEXPECTED CONSEQUENCES

**FRONT LINE COVID-19 CRITICAL CARE ALLIANCE • JUNE 21ST 2023 •
CAPE TOWN, SOUTH AFRICA**

Timothy David Noakes

OMS, MBChB, MD, DSc, PhD (hc), FACSM, (hon) FFSEM (UK), (hon) FFSEM (Ire)

@ProfTimNoakes

Cape Peninsula University of Technology

LETTER
ON
CORPULENCE,

Addressed to the Public

BY WILLIAM BANTING.

REPRINTED FROM THE THIRD LONDON EDITION.

WITH A REVIEW OF THE WORK FROM
BLACKWOOD'S MAGAZINE,

AND AN ARTICLE ON

CORPULENCY & LEANNESS

FROM HARPER'S WEEKLY.

A. ROMAN & COMPANY,
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1865.

246073

Letter on corpulence,
addressed to the public
... Reprinted from the
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review of the work
from Blackwood's...

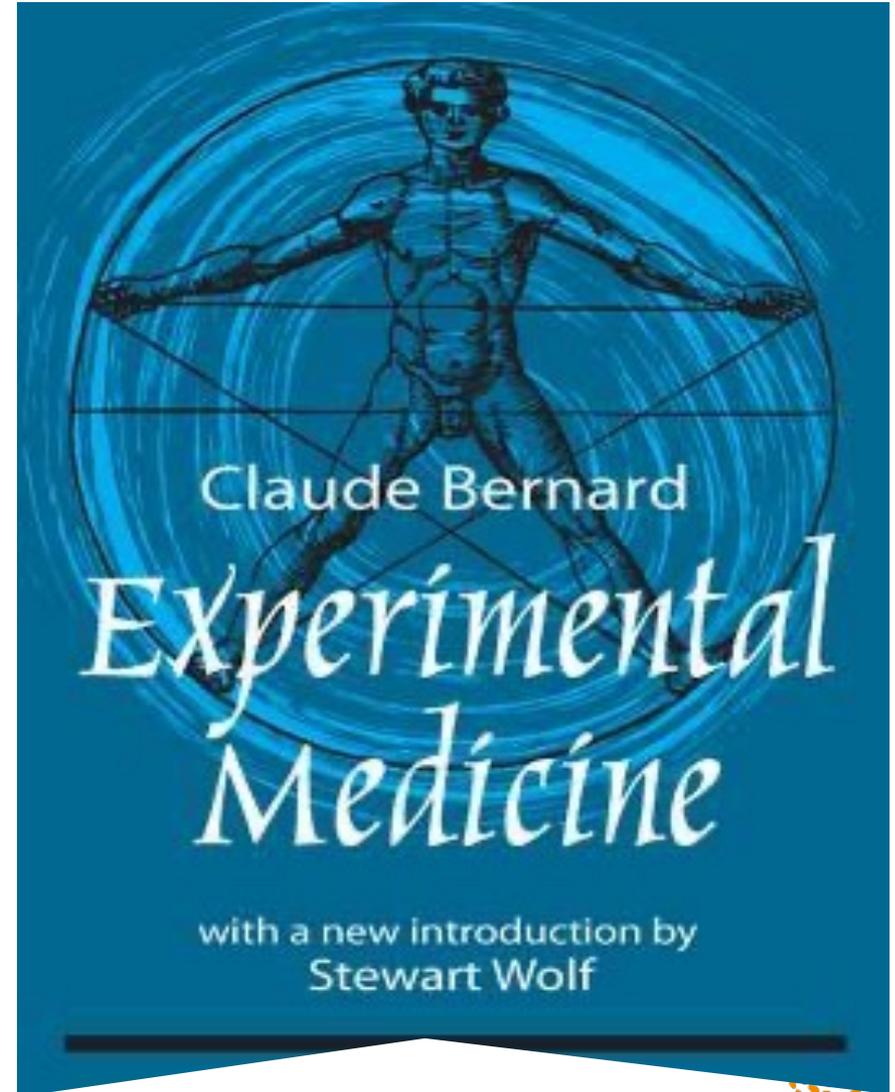
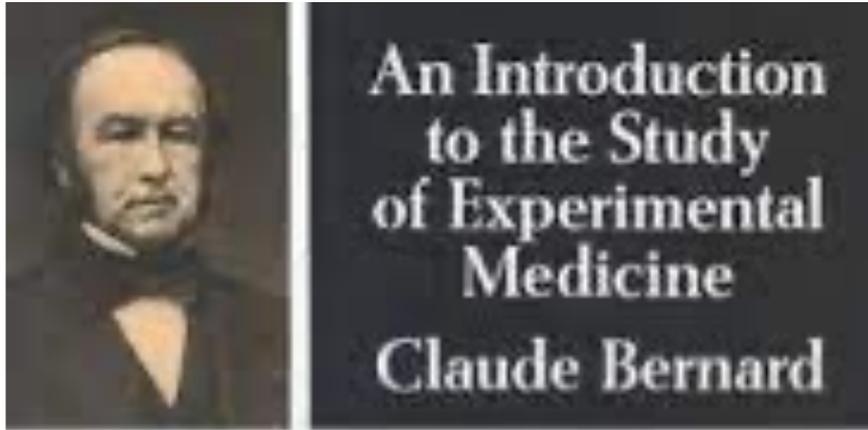
BANTING, WILLIAM, 1797-1878, ROMAN,
ANTON, 1828-1903

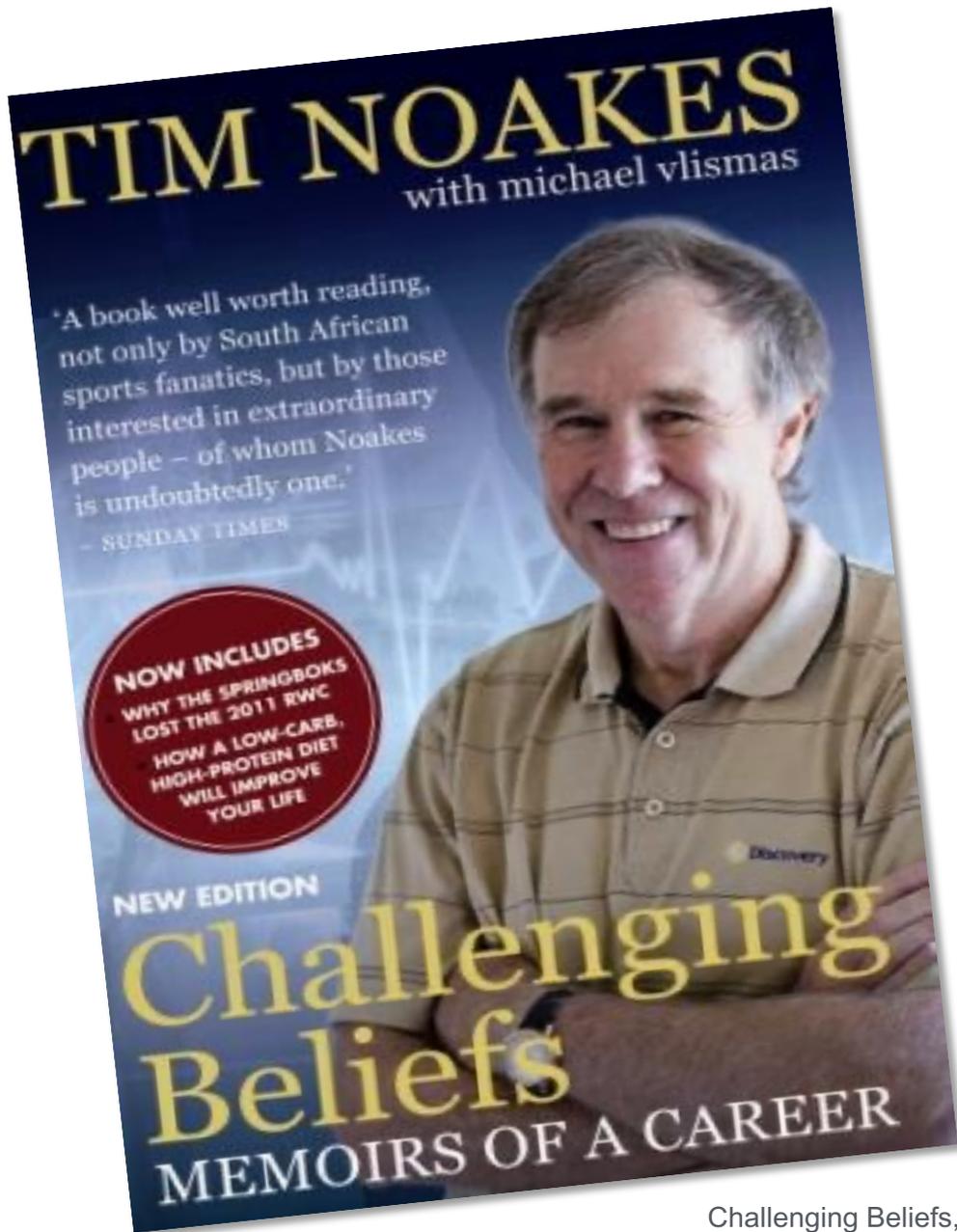
a PRANAVA BOOKS edition (173687)

Banting's physician, ENT specialist William Harvey had concluded that a diet of purely animal foods helped cure diabetes and would likely help obesity as well. (More later in the lecture)



DR HARVEY ATTENDS A LECTURE IN WHICH CLAUDE BERNARD
DESCRIBES HIS DISCOVERY THAT THE LIVER "SECRETES"
GLUCOSE

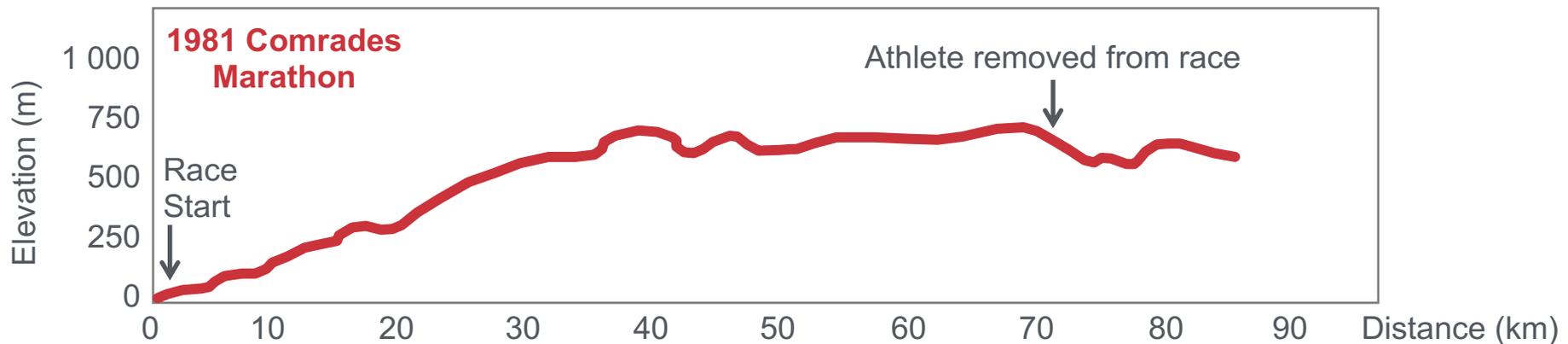
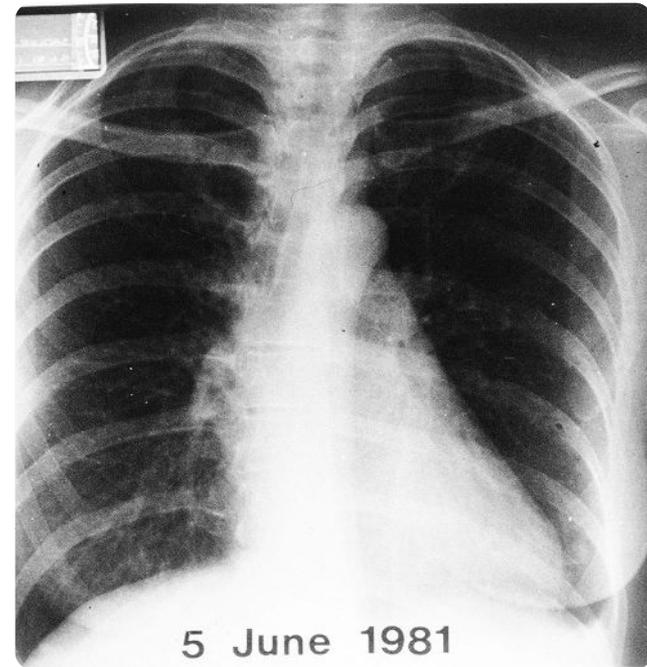
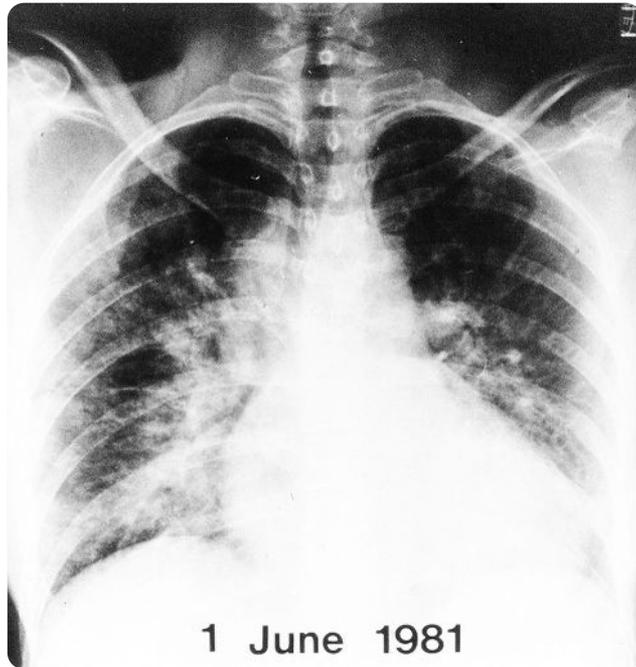




Challenging Beliefs, Memoirs of a career



FIRST REPORTED CASE OF EXERCISE-ASSOCIATED HYPONATRAEMIC ENCEPHALOPATHY (EAHE)



WATERLOGGED

The Serious Problem of Overhydration in Endurance Sports

What athletes really need to drink to train and perform their best



Tim Noakes, MD

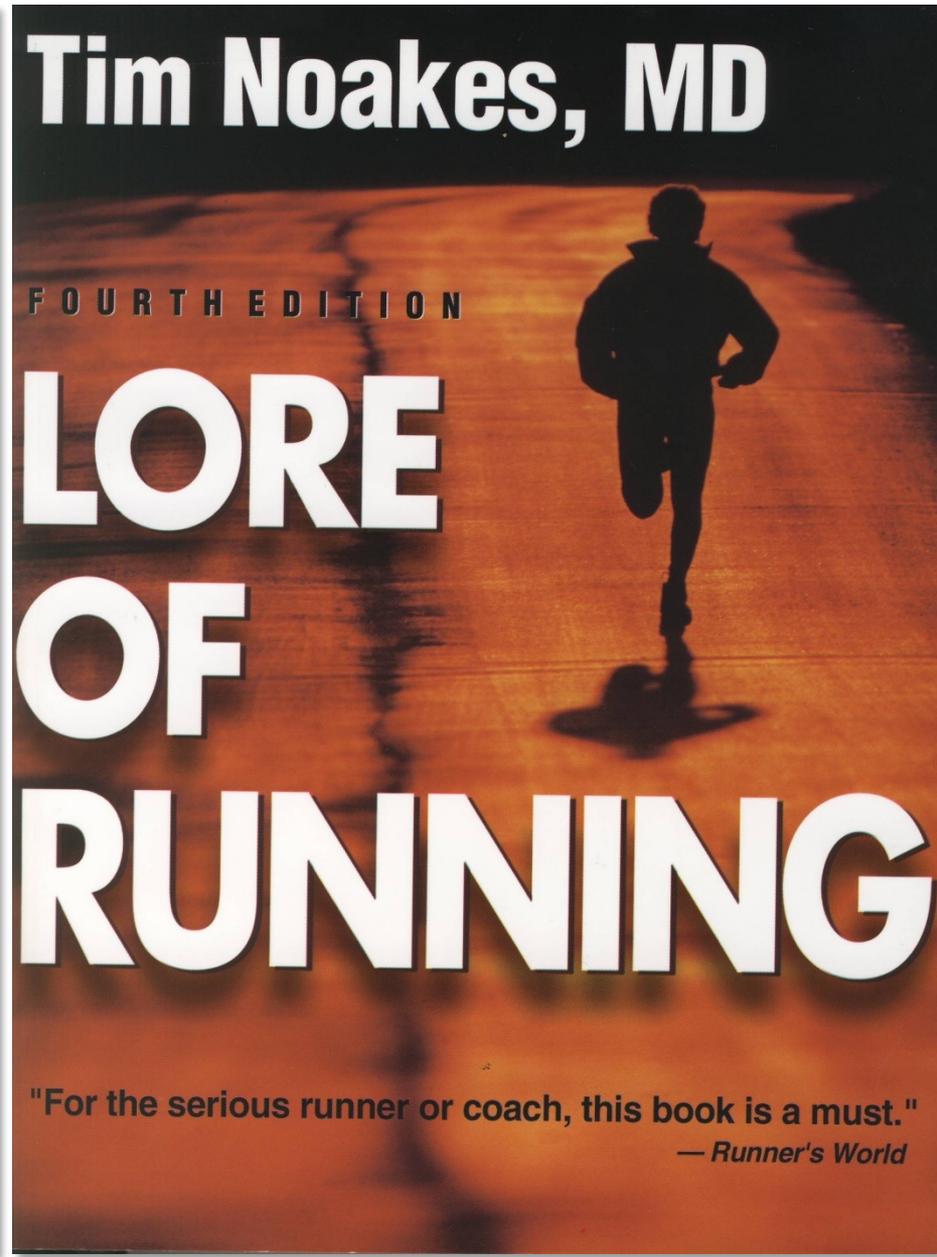
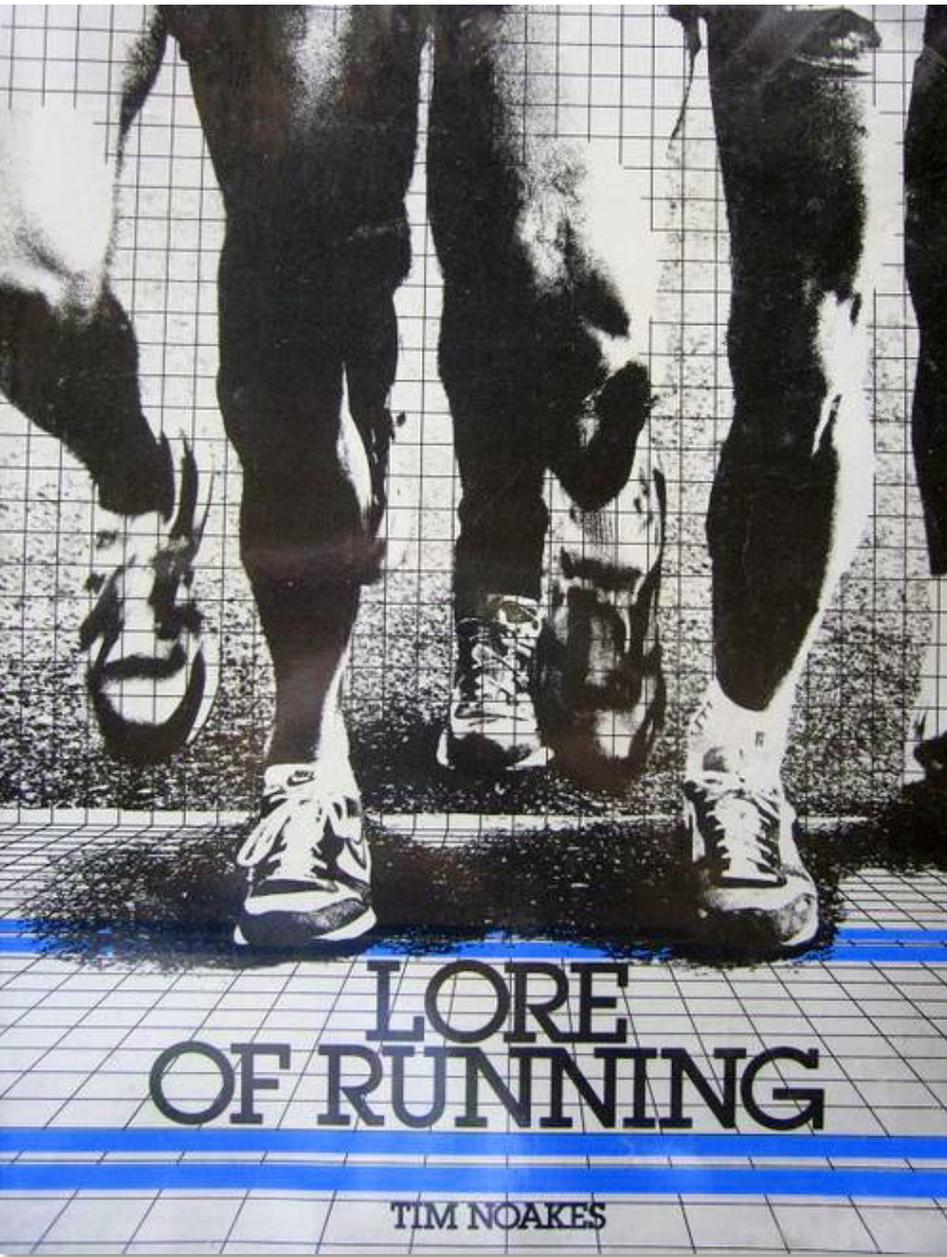
WATERLOGGED

**The Serious Problem of
Overhydration in Endurance Sports**

*What athletes really
need to drink to train
and perform their best*

WATERLOGGED

Exposed the deviant behaviour of the US sports drink industry in overpromoting the use of their product producing a novel potentially fatal (iatrogenic) disease – Exercise-associated Hyponatraemic Encephalopathy (EAHE).

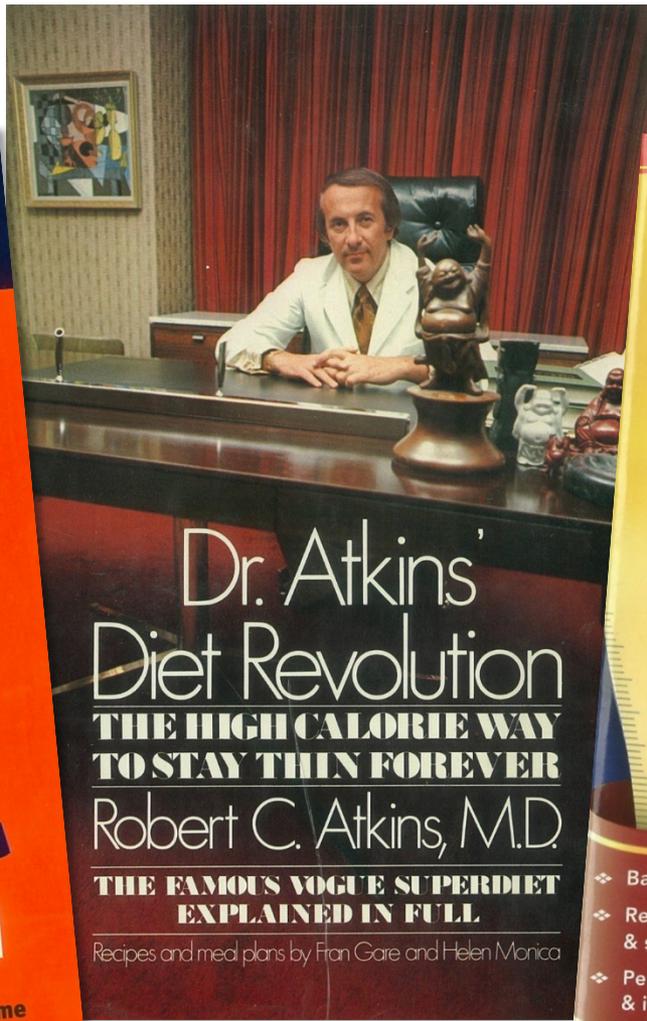


COMPLETELY UPDATED!
 The Must-Have NEW Edition
 Including the 'Lifetime Maintenance Plan'

Dr Atkins New Diet Revolution

The definitive controlled-carbohydrate programme
 for permanent weight loss and good health

'...the perfect diet for those
 who love food' Nigella Lawson



Dr. Atkins'
 Diet Revolution
**THE HIGH CALORIE WAY
 TO STAY THIN FOREVER**
 Robert C. Atkins, M.D.
**THE FAMOUS VOGUE SUPERDIET
 EXPLAINED IN FULL**
 Recipes and meal plans by Fran Gare and Helen Monica

THE NEW YORK TIMES BESTSELLER

THE NEW ATKINS FOR A NEW YOU

The ULTIMATE DIET for SHEDDING WEIGHT
 and FEELING GREAT

How Would You Like to
**LOSE up to
 15 POUNDS in
 2 WEEKS!**

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- ❖ Redesigned to help you lose weight fast & stay lean for life
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ATKINS

Eric C. Westman, M.D.,
 Stephen D. Phinney, M.D., and Jeff S. Volek, Ph.D.

JONNO PROUDFOOT · DAVID GRIER · PROF TIM NOAKES ·



THE REAL MEAL REVOLUTION

CHANGING THE WORLD. ONE MEAL AT A TIME.

foreword by
Gary Player
Make no mistake,
this is a food revolution, and
you have no better guide on
this journey than
Tim Noakes.

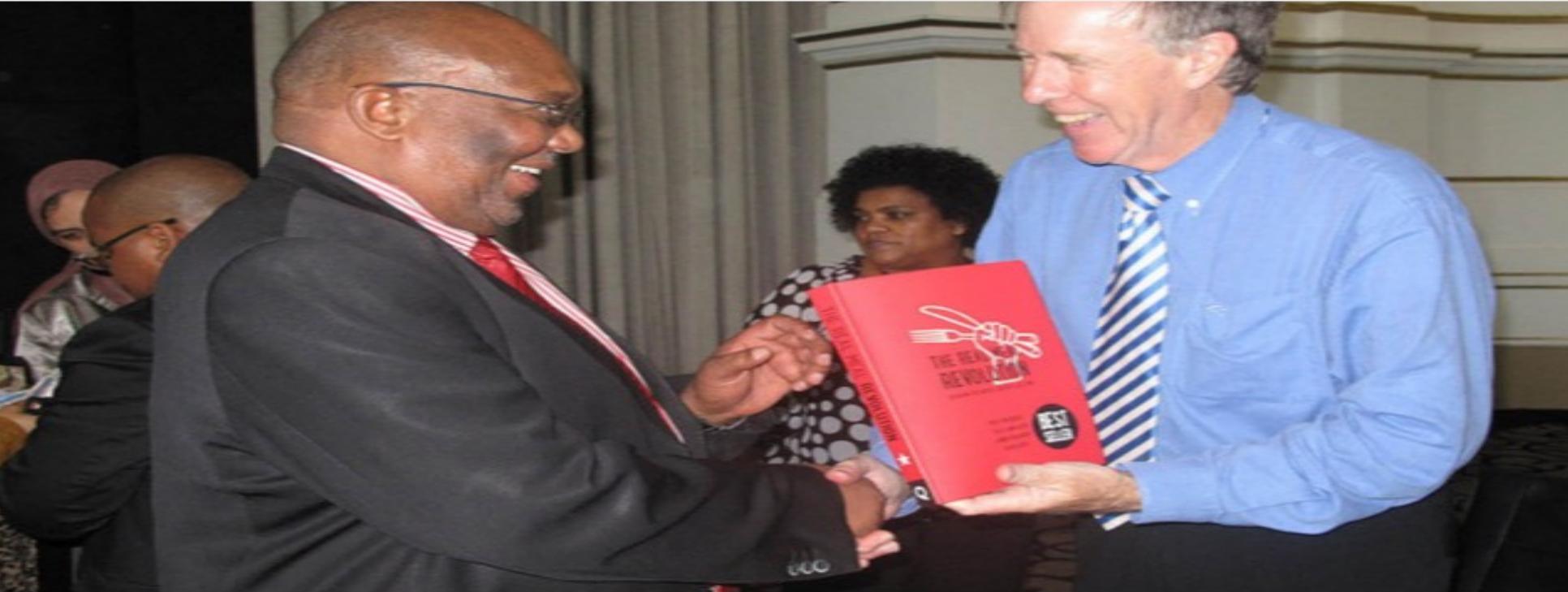
PROF TIM NOAKES
SALLY-ANN CREED
JONNO PROUDFOOT
DAVID GRIER



JONNO PROUDFOOT · DAVID GRIER · PROF TIM NOAKES ·



“This suggests that despite its remarkable effects in morbid obesity, Banting should be considered as a treatment option to cure T2DM, hypertension and ‘elevated’ blood cholesterol concentrations in some without the need for life-long medication. This is important since modern pharmacological agents can cure none of these conditions” (p.276)



SA's ticking time bomb

By Babalo Ndenze  Aug 19, 2014



Cape Town - Parliament will soon be introducing elements of nutritionist and sports scientist Tim Noakes's much-talked-about low-carbohydrate high-fat diet to the menu, as it joins forces with the professor in his crusade to fight the obesity and diabetes "epidemic" facing the country.

Noakes took to Parliament on Monday after receiving an invitation from its wellness unit. He said the country was sitting on a "time bomb" if diabetes and obesity were not addressed. The country ran the risk of becoming the "fattest" country in the world.

UCT doctors slam Noakes

August 25 2014 at 06:00am

Francesca Villette

SPORT scientist Tim Noakes is making "outrageous, unproven claims about disease prevention" in advocating a high-fat, low-carbohydrate diet, says UCT's Faculty of Health Sciences.

This comes after MPs and staff at Parliament expressed support for the diet after Noakes spoke to them and warned about South Africa's obesity "epidemic".

But academics in the health sciences are worried it has no real scientific evidence to back it up. Wim de Villiers, dean of the faculty at UCT, says in a letter to the Cape Times.

"The message it sends out to the public about healthy eating is cause for deep concern – not only regarding Parliament's support for it as an evidence-based 'diet revolution', but sadly, the long-term impact this may have on the health of the very people they have been elected to serve," says the letter, signed by De Villiers and three other academics.

De Villiers said that while the consumption of a low-carbohydrate, high-fat diet might lead to initial weight loss, there was "good reason" to believe it could result in nutritional deficiencies, and increase the risk of heart disease, diabetes, kidney problems, constipation and some cancers.

Noakes, a professor at UCT, says the university has continually misrepresented his message about the diet.

"An outline of the scientific evidence for my position is presented in about 20 000 words in our book *Real Meal Revolution*.

"That work includes references to the most important scientific works supporting my interpretation," he said.

De Villiers said that by promoting his diet as revolutionary, Noakes was vilifying the integrity and credibility of those who criticised the lack of evidence for the benefits of his diet. It was also contrary to UCT's principle of academic freedom.

De Villiers said yesterday he advocated a balanced diet of foods from all food groups. The human body needed a range of nutrients to survive.

"Diets like Banting are, however, typically 'one dimensional' in focus. They promote increased intake of protein- and fat-containing foods at the expense of healthy carbohydrate-containing foods, and focus on adherence to a limited food plan," De Villiers said.

Luzuko Jacobs, spokesman for Parliament, said Noakes had been invited on more than one occasion to speak about health and wellness. "We aim to offer a variety of speakers when it comes to the topic of wellness.... that he spoke in Parliament... does not mean we are entering into any kind of partnership with him."

Noakes said a high-carbohydrate diet was detrimental to the health of people with insulin resistance.

"If that message is without scientific support, then the faculty has every right to cross the civil divide as it has now chosen – an action which, I suspect, is unprecedented in the history of the faculty and perhaps also in the history of UCT."

He added: "Carbohydrate restriction in this group can be profoundly beneficial as it can reverse obesity and in some cases Type 2 diabetes mellitus – the two conditions that will ultimately bankrupt South African medical services unless we take appropriate preventive actions.



Professor Tim Noakes



The Editor
Cape Times
22 August 2014

Noakes' diet and health implications

The apparent endorsement by Members of Parliament of South Africa of the latest fashionable diet, 'Banting' ('SA's Ticking Time-bomb', Cape Times, 19 August 2014) and the message it sends out to the public about healthy eating, is cause for deep concern - not only regarding Parliament's support for it as an evidenced-based 'diet revolution', but sadly, the long-term impact this may have on the health of the very people they have been elected to serve.

Any diet for weight loss and maintenance should be safe and promote health in the long-term. Currently the long term safety and health benefits of low carbohydrate, high fat diets – such as Atkins, Paleo and South Beach, and in which Banting falls - are unproven, and in particular whether it is safe in pregnancy and childhood.

Importantly, while the consumption of a low carbohydrate, high fat diet may lead to initial weight loss and associated health benefits - as indeed would a balanced weight loss diet - there is good reason for concern that this diet may rather result in nutritional deficiencies, increased risk for heart disease, diabetes mellitus, kidney problems, constipation, certain cancers and excessive iron stores in some individuals in the long term. Research leaves no doubt that healthy balanced eating is very important in reducing disease risk (see web page below dedicated to this debate).

It is therefore a serious concern that Professor Timothy Noakes, a colleague respected for his research in Sports Science, is aggressively promoting this diet as a 'revolution', making outrageous unproven claims about disease prevention, and maligning the integrity and credibility of peers who criticize his diet for being evidence-deficient and not conforming to the tenets of good and responsible science. This goes against the University of Cape Town's commitment to academic freedom as the prerequisite to fostering responsible and respectful intellectual debate and free enquiry.

This is not the forum to debate details of diets, but to draw attention to the need for us to be pragmatic. Research in this field has proven time and again that the quest for lean and healthy bodies cannot be a quick-fix, 'one-size-fits-all' solution. The major challenge lies in establishing sustainable and healthy dietary and physical activity patterns to promote long term weight maintenance and health after weight loss, and includes addressing psychosocial, environmental and physiological factors.



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Our bodies need a range of nutrients sourced from a variety of food groups to survive. Diets like the Banting are, however, typically 'one dimensional' in focus. They promote increased intake of protein and fat containing foods at the expense of healthy carbohydrate containing foods, and focus on adherence to a limited food plan. Ignored are the other important factors impacting on health - like physical activity (the important of which we cannot emphasise enough), environmental factors, and individual health profiles.

UCT's Faculty of Health Sciences, a leading research institution in Africa, has a reputation for research excellence to uphold. Above all, our research must be socially responsible. We have therefore taken the unusual step of distancing ourselves from the proponents of this diet. To foster informed engagement of the issues related to the Diet debate, the Faculty has established a web page with material on this: <http://www.health.uct.ac.za/fhs/news/high-fat-diet-debate>.

Sincerely

Prof Wim de Villiers (Dean: Faculty of Health Sciences, University of Cape Town)

Prof Bongani Mqayisi (Head: Department of Medicine, UCT)

Emeritus Prof Lionel Opie (Hatter Institute of Cardiology, Department of Medicine)

Associate Professor Marionne Senekal: Assoc Prof (Head: Division of Human Nutrition)

Copied to:

Prof Timothy Noakes (University of Cape Town)

Hon Baleka Mbete, Speaker of Parliament

Minister of Health, Dr Aaron Matsaleled

MEC for Health, Western Cape Government, Dr Theunis Botha

Members of the South African Committee of Medical Deans



ENDS

Issued by:

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FACULTY OF HEALTH SCIENCES
UNIVERSITY OF CAPE TOWN

The Editor
Cape Times
22 August 2014

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Research article

Distinguishing online academic bullying: identifying new forms of harassment in a dissenting Emeritus Professor's case

Travis Noakes^{a,*}, Tim Noakes^b^a Dr Travis Noakes, Faculty of Informatics and Design, Cape Peninsula University of Technology, Cape Town 7700, Western Cape Province, South Africa^b Adjunct Professor Tim Noakes, Faculty of Informatics and Design, Cape Peninsula University of Technology, Cape Town 7700, Western Cape Province, South Africa

ARTICLE INFO

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Activity theory
 Cyberbullying
 Higher education
 Peer victimisation

ABSTRACT

The shift of academic discourse to an online space without guardians gives motivated academic cyberbullies an opportunity to harass susceptible recipients. Cyberbullying by higher education employees is a neglected phenomenon; despite the dangers it poses to academic free speech as well as other negative outcomes. In the absence of an adequate definition for Online Academic Bullying (OAB) as a surfacing threat, its targets cannot readily gauge its severity or confidently report that they are victims. Nor do their attackers have a reference point for understanding and, perhaps, correcting their own incivility.

To remedy this, we propose an analytical framework grounded in Routine Activity Theory (RAT) that can serve as an appropriate reporting instrument. The OABRAT framework is illustrated with an Emeritus Professor's case and the varied examples of cyber harassment that he experienced. This scientific influencer was relentlessly attacked on social media platforms by varied academics for expressing contrarian, but evidence-based, opinions. Spotlighting OAB's distinctive attacks should raise awareness amongst researchers and institutional policy makers. The reporting instrument may further assist with identifying and confronting this threat.

This article also flags ethical concerns related to dissident scholars' usage of online platforms for informal, public debates. Such scholars may face an asymmetrical challenge in confronting cyber harassment from hypercritical academics and cybermobs on poorly moderated platforms. Universities should therefore consider appropriate countermeasures to protect both the public and their employees against victimisation by academic cyberbullies.

1. Introduction

This article addresses a destructive phenomenon in higher education (HE) of whose risks many scholars may be unaware. Workplace and academic bullying are well-documented, as is cyberbullying and trolling within different ideological, political, religious and non-ideological settings. In contrast, there is less information describing how scholars experience cyber harassment and its untoward consequences (Cassidy et al., 2017). Our article makes a contribution by identifying the emergent threat of 'online academic bullying' (OAB) in HE: OAB is a drawn-out situation in which its recipient experiences critique online by employees in HE that is excessive, one-sided and located outside of typical scholarly debate and accepted standards for its field. We base this on the Noakes Foundation, Cape Town, 2018. © The Noakes Foundation, Cape Town, 2018. This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

workplace bullying that is common, although not as extensively researched as other types of bullying (Mahmoudi, 2019). With the expansion of the use of social media, academics interact with others online, with legitimate informal debates or OAB ensuing. However, to our knowledge, research on this digital form of intellectual harassment by academic cyberbullies is non-existent.

The online space has particular characteristics, which include anonymity, being boundaryless in terms of time and audience, and supporting, indeed encouraging, coordinated action. This environment's characteristics may be attractive to academics who are motivated to squash dissident opinions. A susceptible OAB recipient who espouses a contrarian view is likely to utilise online mechanisms for sharing ideas that may be suppressed in conventional academic fora. However, this strategy is risky since academic free speech and critique can be subverted by opponents and even abused. For example, academic cyberbullies may



University of Cape Town

- Medicine Ranking

📍 South Africa 🏛️ Established: 1829 👤 Scholars: 20



Best Scientists

Overview

👤 Best scientists

Position in the ranking is based on each scientist's D-index using data compiled from OpenAlex and CrossRef by December 21st 2022.

This ranking lists all the best researchers from the Medicine discipline and affiliated with University of Cape Town. There are a total of 20 researchers included with 1 of them also being included in the global ranking. The total sum for the D-index values for the best scientists in University of Cape Town is 1,802 with a mean value for the h-index of 90.10. The total sum of publications for the best scientists in University of Cape Town is 9,887 with the mean value for publications per scientist of 494.35.

Search by name 🔍 Medicine ▾ Sort by World Position ▾

World	National	Scholar	D-index	Citations	Publications
279	1	 Dan J. Stein University of Cape Town, South Africa	171	180,662	1,815
1430	3	 Timothy D. Noakes University of Cape Town, South Africa	130	51,349	789
3397	4	 Robin Wood University of Cape Town, South Africa	109	42,272	500
4175	5	 Linda-Gail Bekker University of Cape Town, South Africa	104	39,193	621
5991	8	 Karen Sliwa University of Cape Town, South Africa	95	95,938	492

SEVEN WORDS THAT SPARKED A LEGAL FIRESTORM



Pippa J Styling

@PippaLeenstra

3 Feb 14

@ProfTimNoakes @SalCreed is LCHF eating ok for breastfeeding mums? Worried about all the dairy + cauliflower = wind for babies??



Tim Noakes

@ProfTimNoakes

 Follow

@PippaLeenstra @SalCreed Baby doesn't eat the dairy and cauliflower. Just very healthy high fat breast milk. Key is to ween baby onto LCHF

8:32 PM - 5 Feb 2014

  1  6

HPCSA 4TH PRELIMINARY COMMITTEE'S CHARGE SHEET



Prof Dr Amaboo Dhai (Chair)

Director of the Steve Biko Centre for Bioethics, Faculty of Health Sciences, University of the Witwatersrand, South Africa .

That you are guilty of unprofessional conduct, or conduct which, which when regard is had to your profession is unprofessional, in that during February 2014, you acted in a manner that is not in accordance with the norms and standards of your profession in that you provided unconventional advice on breastfeeding babies on social networks (tweet).

THREE MEMBERS OF THE LEGAL DREAM TEAM



Tim Noakes: 'Why I won't practise medicine of failure'

BIZNEWS

University of Cape Town deputy vice chancellor and law professor Danie Visser calls emeritus professor Tim Noakes a "force in the world". The Health Professions Council of South Africa (HPCSA) is more likely to call Noakes a tsunami. When the HPCSA resumed its hearing this week against Noakes on a charge of unprofessional conduct for giving unconventional advice to a breastfeeding mother on Twitter, he defended his research to show he had been neither unprofessional nor was the advice he gave not evidence-based. The HPCSA hoped the new addition to its legal team, advocate Ajay Bhoopchand who is also a former stem Noakes' defensive tide, it was wrong. Bhoopchand tried hard to stop Noakes' pre-emptive influence of food and soft drink industries on dietary guidelines and nutrition advice, but he was 'lecturing' and giving 'too much minutiae and detail'. Noakes' own medical doctor, Dr. Ramdass explained the relevance in minute detail to Bhoopchand. Chair of the HPCSA, Dr. Adams, against Noakes, Pretoria advocate Joan Adams, overruled Bhoopchand, saying it was not a matter of fairness or justice for the HPCSA to charge Noakes with giving advice that was not evidence-based. He presented him presenting evidence to show his advice was evidence-based.

Bhoopchand was powerless to stop Noakes in full sail as he waded into these vested interests. How they are embedded in academia, have bought off top scientists and academics, sports associations – including the Association for Dietetics in SA (ADSA), whose former president, Dr. Strydom, laid the complaint that led to the charge against him – to spin their products, dietary guidelines, nutrition advice and our ideas about obesity and weight loss. He showed how the soft drinks industries have made low-fat, high-carb foods the dominant 'conventional' diet. He showed how science to back it up, contributing to global epidemics of obesity, heart disease, diabetes and more. Noakes took special aim at the sugar industry, but had many other targets, including the pharmaceutical industry. Doctors were telling patients diabetes was incurable when they had the means to reverse it: 'We are practising medicine of failure. I don't want to practice that kind of medicine.' He also explained – in minute detail – why heart disease in future will be treated not by cardiologists, but by hepatologists (liver specialists). In this fourth part of a series, science and business writer Rob Worthington-Smith looks at Noakes' views on how and why obesity and heart disease began in the cradle of civilisation. – Marika Sboros

By Rob Worthington-Smith





Noakes hearing postponed to February

HEALTH & WELLNESS / 1 DECEMBER 2015, 06:37AM / SIPOKAZI FOKAZI AND FRANCESCA VILLETTE



Professor Tim Noakes with his wife Marilyn during his professional conduct hearing. Picture: David Ritchie

Cape Town - Professor Tim Noakes will know early next year whether or not he'll lose his licence to practice as a doctor.

The hearing into his professional conduct by the Health Professions Council of SA (HPCSA) was postponed on Monday.

The inquiry came to an abrupt end after his lawyers said they were not ready to cross-examine a "surprise witness" called by the HPCSA.

Noakes clears final hurdle, not guilty says HPCSA appeal committee

2018-06-09 14:55

Correspondent

news24



The HPCSA's appeal committee has upheld the not guilty verdict found in Professor Tim Noakes' case of alleged unprofessional conduct, his **Foundation** announced on Friday.

The Health Professionals Council of SA (HPCSA) charged Professor Noakes with unprofessional conduct in 2014 for "giving unconventional advice over social media (Twitter)".

He was subsequently found not guilty in April 2017. The latest judgment stems from an appeal that the HPCSA then lodged with its appeal committee.

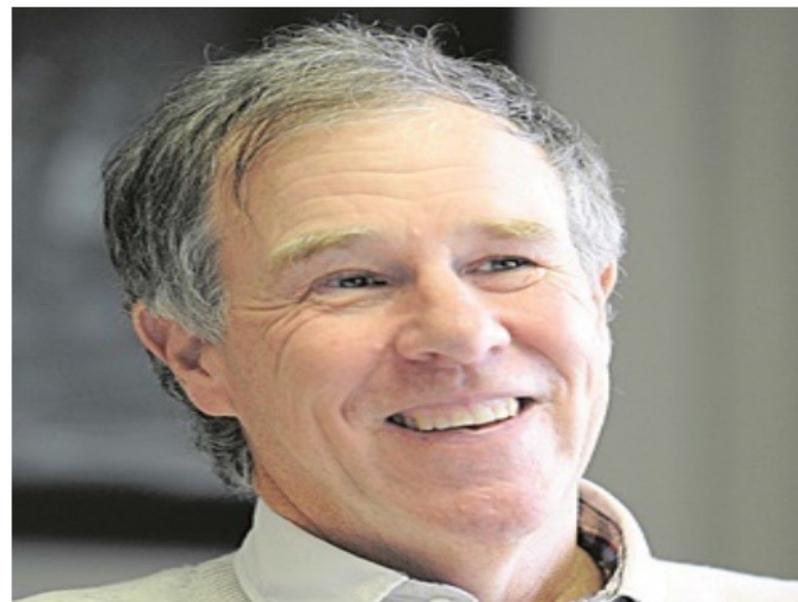
READ: Tim and Marilyn Noakes: We are fighters who never quit

"The argument of the Appellant that the Respondent provided unconventional advice of breast feeding babies is not persuasive and is rejected.

"Wherefore, it is the unanimous decision of the members of the appeal committee that the appeal be dismissed," reads the judgment, issued on Friday, of the Health Professions Council of South Africa's Appeal Committee.

'Acquitted on all counts'

Following the judgment, Noakes's Foundation issued a statement in which it said it was celebrating:



Prof Tim Noakes. (File)

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Related Links

- [Judgment reserved in Tim Noakes appeal](#)
- [Tweet that landed Noakes in hot water 'scientifically correct' – lawyer](#)
- [Tim Noakes left frustrated on first day of HPCSA appeal](#)

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“The argument by the Appellant that the Respondent provided unconventional advice of breast feeding babies is not persuasive and is rejected. Wherefore it is the unanimous decision of the appeal committee that the appeal is dismissed”.

Advocate Justice Mogotsi

June 8th 2018

KEEP FITNESS LEGAL

Defending the brand from junk science, yellow journalism, and invincible ignorance

ABOUT

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Robyn Flipse: The Coke-Funded Dietitian Threatening CrossFit Gyms
CrossFit Rebuttal Published in "Military Medicine" Journal
The Definitive Guide to Debunking Misconceptions About CrossFit
NSCA Disguises Pepsi Employee as University Professor, Pepsi is NSCA's Official Partner
The Russells' Blog Is Now Keep Fitness Legal



Russ Greene

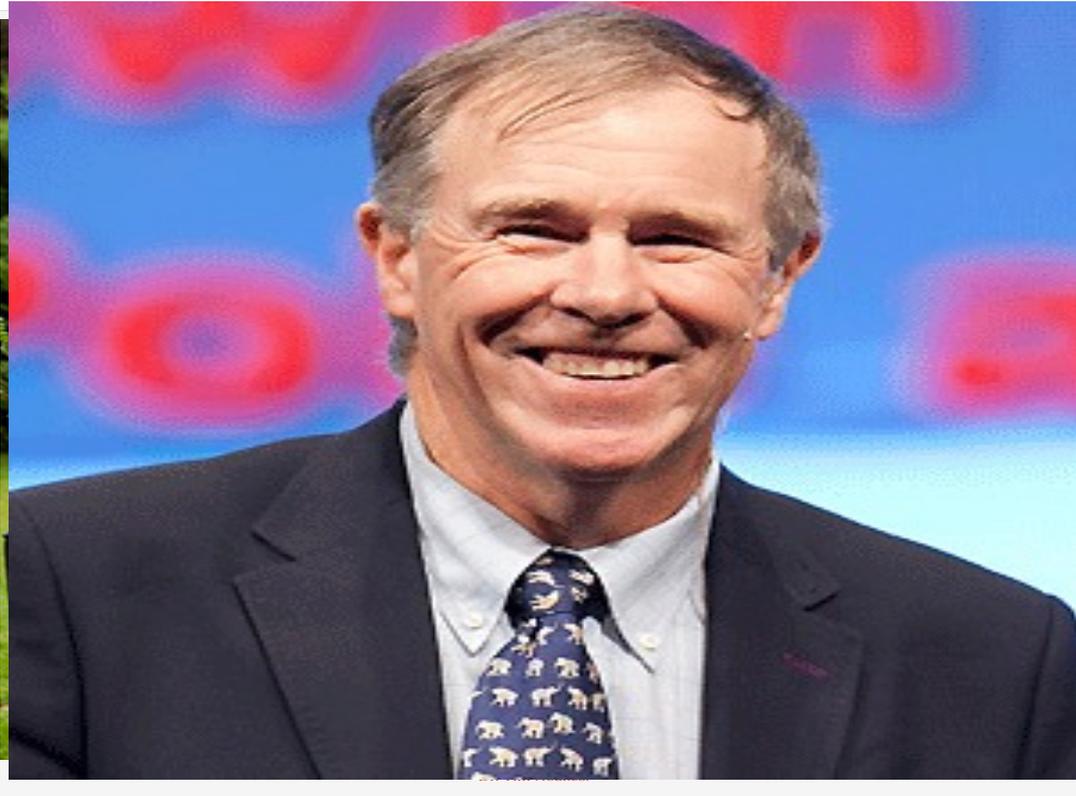
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Big Food Vs. Tim Noakes: The Final Crusade



Tim Noakes' Final Crusade

An American may not be able to grasp what Tim Noakes means to South Africa since no equivalent to Professor Noakes exists in the U.S. In South Africa, Noakes is a nationally famous exercise scientist and physician who has transformed the practice of sport by challenging most commonly held beliefs. And yet, Noakes' own university and colleagues, along with the medical establishment, have suddenly turned against him in what he describes as his "final crusade." Having demolished dogma on subjects as diverse as hydration, motivation and fatigue, Noakes may have gone a step too far. He took on carbs.

On the surface, the Tim Noakes controversy looks like a simple turf war between the renegade scientist and a few South African dietitians. That story goes something like this: in February 2014, the world-renowned exercise physiologist and M.D. **tweeted** that babies should be weaned onto low-carbohydrate diets. Then Claire Julsing Strydom, the president of South Africa's dietetics association, ADSA, reported Noakes for unprofessional conduct. Noakes chose to fight back and defend his dietary advice even though he no longer practices medicine and could just as well have given up his license. And finally, after dozens of hours of hearings, South Africa's council for health professionals will decide whether Noakes will keep his medical license.

It feels like we've seen this story a thousand times before. Entrenched interests attempt to protect their industry from renegade outsiders empowered by the internet. It looks like the taxi industry vs. Uber, or ACSM vs. CrossFit affiliates. To get any deeper, you have to do a little bit of investigation.

Bill Gifford **published a superficial treatment** of the Noakes trial in Outside Magazine last month. Gifford attended a hearing in South Africa, saw Claire Strydom break down in tears and wondered, "Is this really the face of the vast pro-carb conspiracy that Noakes seems to think is arrayed against him?" In the field of nutrition, though, things are rarely as they seem. Outside's Gifford apparently did not bother with even the most basic level of research. We did.

We were already familiar with Dr. Noakes from our research on over-drinking in sports. Noakes wrote the most important book on the subject, "**Waterlogged**." And when CrossFit organized a scientific conference on that topic, we got to know



TIM NOAKES
& MARIKA SBOROS

LORE OF NUTRITION

CHALLENGING
CONVENTIONAL
DIETARY BELIEFS

Dr Tim Noakes
& Marika Sboros

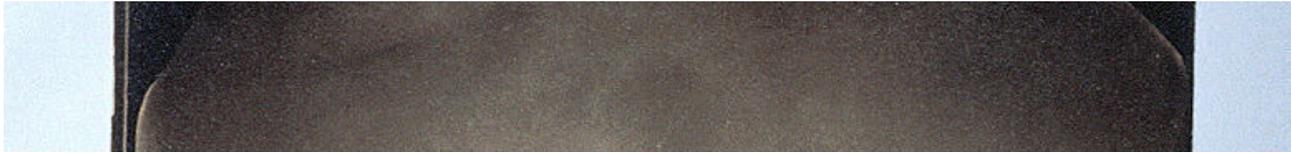
REAL FOOD ON TRIAL

How the diet dictators tried
to destroy a top scientist

"This book documents the travesty of justice behind the
marathon trial of Dr Tim Noakes for a single tweet on nutrition."

Lewis Pugh, maritime lawyer, pioneer swimmer,
UN Patron of the Oceans

Dr. Harvey knew that a diet of purely animal foods helped cure diabetes and would likely help obesity as well.



“It had long been well known that a **purely animal diet** greatly assisted in checking the secretion of diabetic urine; and it seemed to follow, as a matter of course, that the total abstinence from saccharine and farinaceous matter must drain the liver of this excessive amount of glucose, and thus arrest in a similar proportion the diabetic tendency. Reflecting on this chain of argument and knowing too that a saccharine and farinaceous diet is used to fatten certain animals and that in diabetes, the whole of the fat in the body rapidly disappears, it occurred to me that excessive obesity might be allied to diabetes as to its cause, although widely diverse in its development: and that if a **purely animal diet** was useful in the latter disease, a combination of animal food with such vegetable matter as contained neither sugar nor starch, might serve to arrest the undue formation of fat”. Dr William Harvey April 1864

<https://www.meatrition.com/history/harvey-diabetes-obesity-purely-animal-foods>



NOTE TO PAUL

The introductory slides end here – will take less than 10 minutes.

The next slides are in case I need them during the Q and A session.

I appreciate that Paul wants to leave as much time as possible for discussion.

BIOLOGICAL FUNCTIONS OF THREE DIETARY MACRONUTRIENTS

CARBOHYDRATES	versus	PROTEIN	versus	FAT
Source of energy (as glucose)		Source of energy (as glucose, amino acids)		Source of energy (as glucose, ketones and free fatty acids)
		Synthesize enzymes and antibodies		Vitamin absorption (A,D,E,K)
		Maintain acid-based balance		Structural material (for cells, tissues and cell membrane)
		Repair and maintenance of tissues (hair, skin, eyes, muscles, organs)		Hormone production
		Hormones production		Chemical messengers (between cells)
		Transport of molecules (as haemoglobin)		Prostaglandin formation (role in inflammation, pain, fever and blood clotting)
		Messenger (transmit signals to coordinate biological processes)		Preserves integrity of blood brain barrier (Omega3)
				Insulation

BIOLOGICAL FUNCTIONS OF THREE DIETARY MACRONUTRIENTS

CARBOHYDRATES versus

PROTEIN

versus

FAT

There is an obligatory need for some glucose metabolism by the brain. But this can be provided endogenously by the liver without any need for exogenous carbohydrate ingestion.

HOWEVER, the main reason the body burns carbohydrate is not primarily as a fuel. Rather it is to regulate the blood glucose concentration.

Physiology of Insulin In Man

George F. Cahill, Jr., M.D., Boston

SUMMARY

Insulin serves as the body's signal for the fed or fasted state. High insulin levels, the "fed" signal, initiate tissue uptake and storage of fuels. Low insulin levels, the "fasted" signal, initiate mobilization of stored fuels from tissue stores, the rate being proportional to the lowness of the insulin. Certain metabolic states such as obesity or trauma alter the concentration of insulin at which no net transfer of fuel occurs, resulting in insulin resistance or hypersensitivity. *DIABETES* 20:785-99, December, 1971.

It is now fifty years since Banting and Best successfully gave to a diabetic dog a pancreatic extract which significantly diminished blood glucose concentration.¹ This dramatic event was soon followed by widespread clinical usage, acutely saving many ketosis-prone diabetics from fatal acidosis and subsequently not only prolonging their lives but also promoting the well-being of countless others with less severe forms of the disease. This discovery also initiated a long series of studies into the physiological controls of carbohydrate and, later, protein and lipid metabolism. A few of the more recent of these findings will be summarized in this brief review, and insulin's physiologic role in man will be set into a rather simple scheme, hopefully with some practical applications to clinical problems.

Insulin—the over-all fuel control in mammals. Multi-organ beings need communication systems. Simply speaking, the concentration of circulating insulin serves to coordinate fuel storage and fuel mobilization into and out of the various depots with the needs of the organism, and with the availability or lack of availability of fuel in the environment. High levels of insulin herald the "fed" state; low levels, the "fasted" state. There is evidence in non-mammalian vertebrates that other hormones, such as adrenal cortical hormones in fish² or glucagon in birds³ may play a dominant role in fuel mobilization, but in mammals, most data support insulin, or more accurately, its lowness or lack, as the primary signal for fuel mobilization during fasting. In the fed state, however, insulin appears indubitably to be the signal in all vertebrates. In figure 1 is hypothetically drawn man's fuel balance during a normal day's activity, relating insulin levels, one metabolic fuel, glucose, and over-all body anabolism and catabolism to the fed and fasted states respectively. Subsequent discussion will center about insulin's central role in this basic scheme.

Rules of the game. Mammals, and particularly man, appear to abide by several general metabolic guidelines relating to fuel homeostasis. These rules, for those so interested, provide fertile ground for teleologic speculation since, obviously, they have or must have had major survival value. One of these is to maintain glucose levels within very narrow limits, returning the level rap-

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Review

The Precious Few Grams of Glucose During Exercise

George A. Brooks

Exercise Physiology Laboratory, University of California, Berkeley, 5101 VLSB, Berkeley, CA 94720-3140, USA;
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The 5 litres of blood contains 5 grams of glucose.

If this is habitually increased to 6 grams, the person has type 2 diabetes mellitus.

If it is reduced to 2 grams, the person will be barely conscious and at risk of developing irreversible brain damage.

During exercise, the rate of blood glucose use can increase to 1 gram per minute.

However, the greatest threat to blood glucose regulation is NOT exercise or even fasting or starvation.

It is the ingestion of dietary carbohydrate.



Review

The Precious Few Grams of Glucose During Exercise

George A. Brooks

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Abstract: As exercise intensity exceeds 65% of maximal oxygen uptake carbohydrate energy sources predominate. However, relative to the meager 4–5 g blood glucose pool size in a postabsorptive individual ($0.9\text{--}1.0\text{ g}\cdot\text{L}^{-1} \times 5\text{ L blood} = 18\text{--}20\text{ kcal}$), carbohydrate (CHO) oxidation rates of $20\text{ kcal}\cdot\text{min}^{-1}$ can be sustained in a healthy and fit person for one hour, if not longer, all the while euglycemia is maintained. While glucose rate of appearance (i.e., production, R_a) from splanchnic sources in a postabsorptive person can rise 2–3 fold during exercise, working muscle and adipose tissue glucose uptake must be restricted while other energy substrates such as glycogen, lactate, and fatty acids are mobilized and utilized. If not for the use of alternative energy substrates hypoglycemia would occur in less than a minute during hard exercise because blood glucose disposal rate (R_d) could easily exceed glucose production (R_a) from hepatic glycogenolysis and gluconeogenesis. The goal of this paper is to present and discuss the integration of physiological, neuroendocrine, circulatory, and biochemical mechanisms necessary for maintenance of euglycemia during sustained hard physical exercise.

Keywords: glucose; metabolism; exercise; homeostasis; euglycemia; lactate

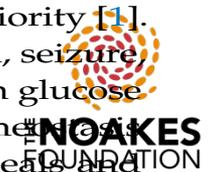
1. Introduction

Maintenance of blood glucose concentration in a narrow range is a major physiological priority [1]. Because of its essential role in brain metabolism, an acute fall in glucose results in disorientation, seizure and even death. On the other hand, a chronic elevation in blood glucose concentration, results in glucose

toxicity, diabetes, and metabolic syndrome. The problem of maintaining blood glucose homeostasis

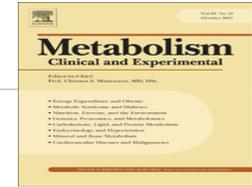
(euglycemia) is always a major challenge, particularly after high carbohydrate containing meals and

during physical exercise when the demand for carbohydrate (CHO) energy use is huge compared to blood



Available online at www.sciencedirect.com

Metabolism

www.metabolismjournal.com

Comparison of a carbohydrate-free diet vs. fasting on plasma glucose, insulin and glucagon in type 2 diabetes ☆☆☆

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ABSTRACT

Objective. Hyperglycemia improves when patients with type 2 diabetes are placed on a weight-loss diet. Improvement typically occurs soon after diet implementation. This rapid response could result from low fuel supply (calories), lower carbohydrate content of the weight-loss diet, and/or weight loss per se. To differentiate these effects, glucose, insulin, C-peptide and glucagon were determined during the last 24 h of a 3-day period without food (severe calorie restriction) and a calorie-sufficient, carbohydrate-free diet.

Research design. Seven subjects with untreated type 2 diabetes were studied. A randomized-crossover design with a 4-week washout period between arms was used.

Methods. Results from both the calorie-sufficient, carbohydrate-free diet and the 3-day fast were compared with the initial standard diet consisting of 55% carbohydrate, 15% protein and 30% fat.

Results. The overnight fasting glucose concentration decreased from 196 (standard diet) to 160 (carbohydrate-free diet) to 127 mg/dl (fasting). The 24 h glucose and insulin area responses decreased by 35% and 48% on day 3 of the carbohydrate-free diet, and by 49% and 69% after fasting. Overnight basal insulin and glucagon remained unchanged.

Conclusions. Short-term fasting dramatically lowered overnight fasting and 24 h integrated glucose concentrations. Carbohydrate restriction per se could account for 71% of the reduction. Insulin could not entirely explain the glucose responses. In the absence of carbohydrate, the net insulin response was 28% of the standard diet. Glucagon did not contribute to the metabolic adaptations observed.

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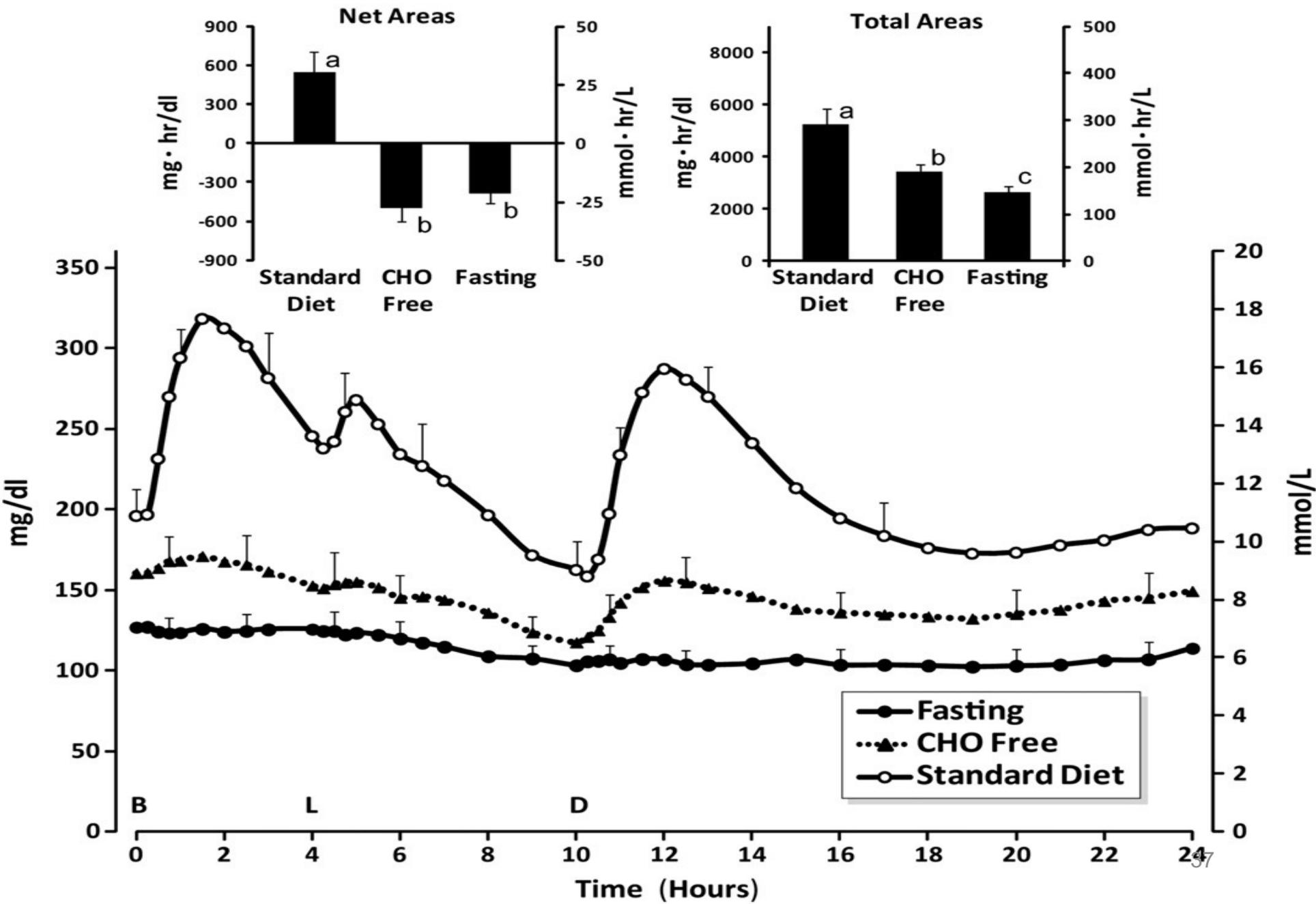
Abbreviations: T2DM, type 2 diabetes mellitus; CHO, carbohydrate; IRB, Institutional Review Board; h, hour; kcal, kilocalorie; kg, kilogram; DPC, Diagnostic Product Corporation; DSL, Diagnostic Systems Laboratories, Incorporated; SDTU, Special Diagnostic & Treatment Unit; AM, ante meridiem; STD, standard; SEM, Standard Error of the Mean; M.T., Medical Technologist.

* Supported in part by Merit Review Funds from the Department of Veterans Affairs. The Department of Veterans Affairs had no influence in study design, collection, analysis and interpretation of data, writing of the report or decision to submit the article for publication.

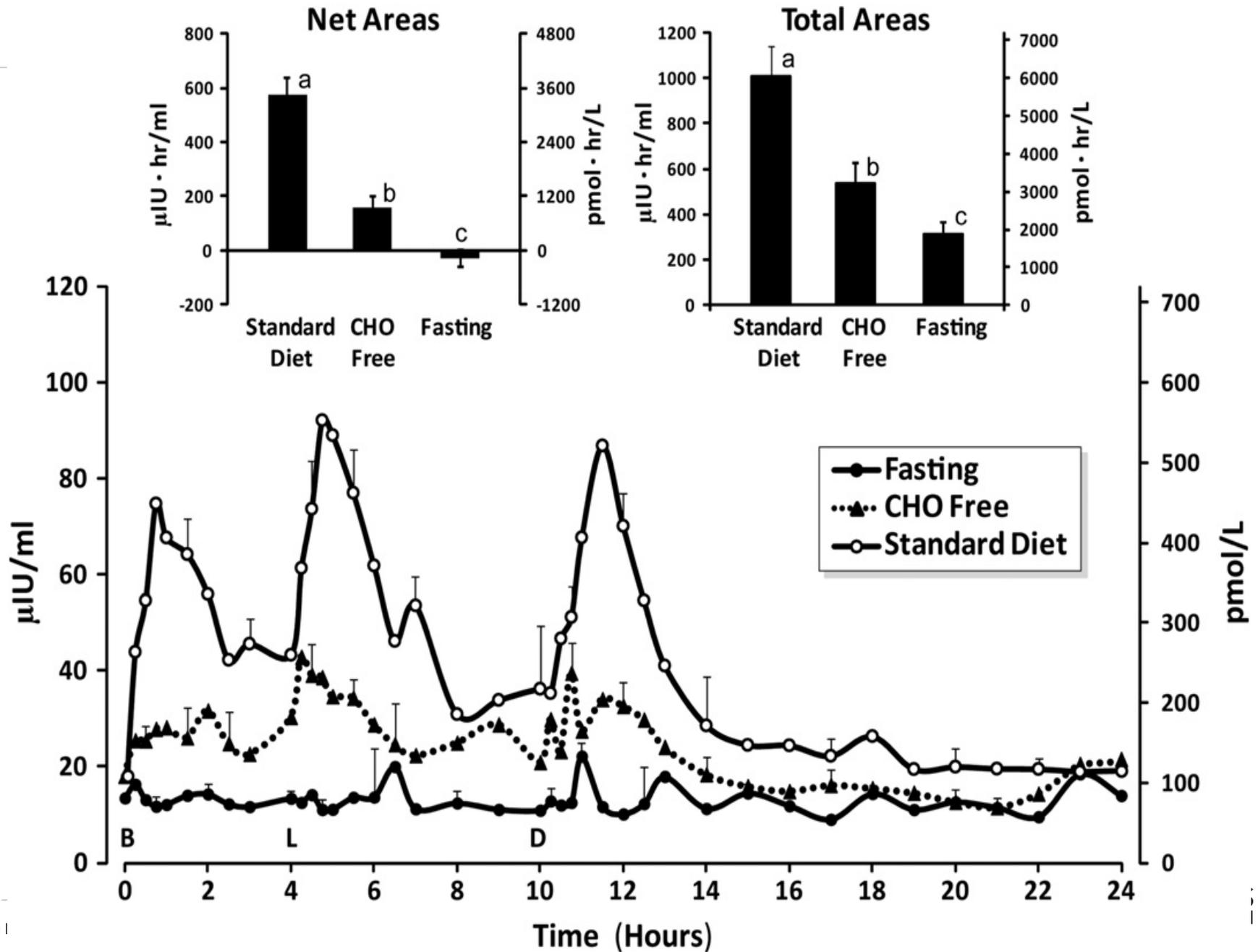
☆☆ ClinicalTrials.gov Identifier: NCT01469104.

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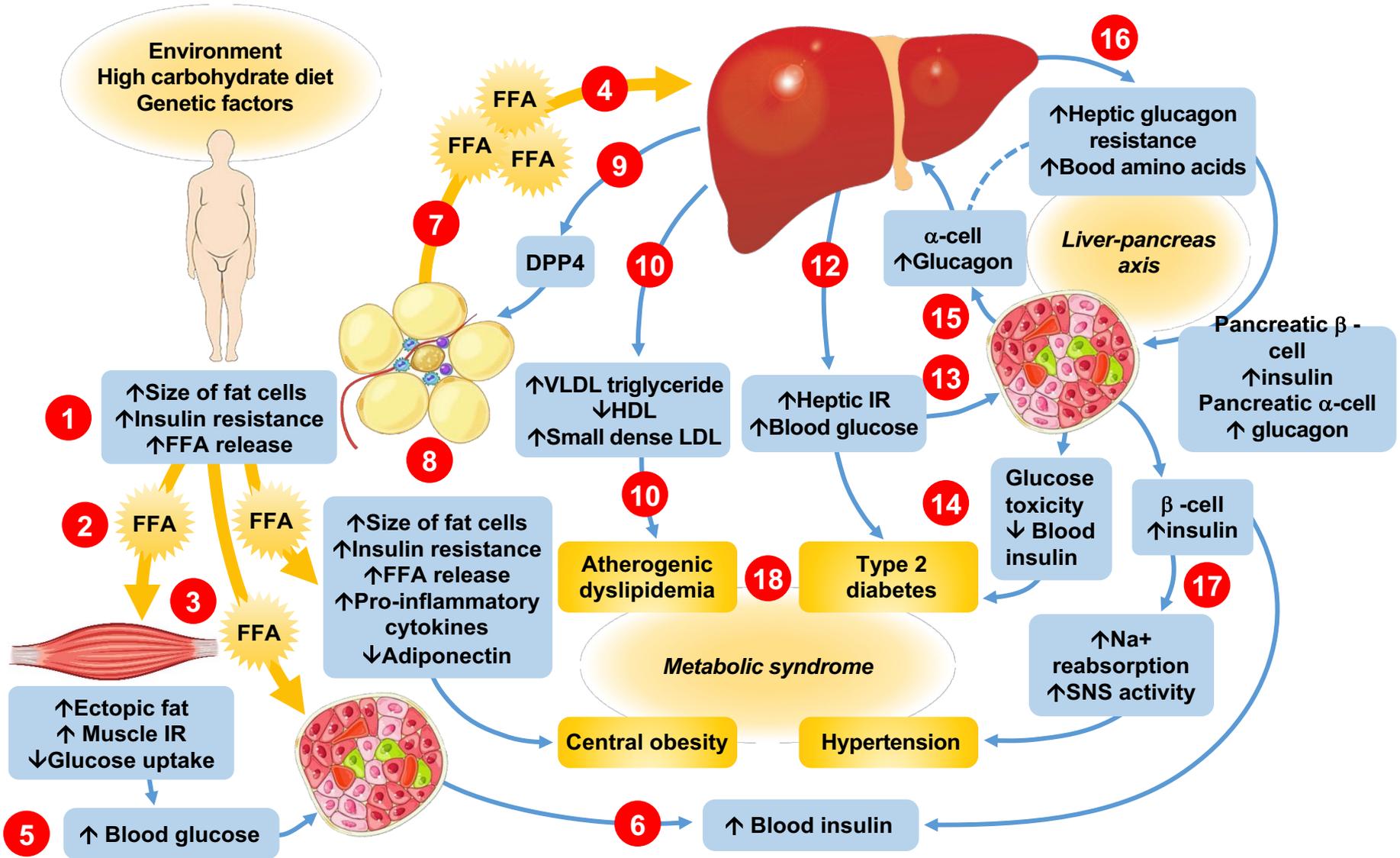
Glucose Response



Insulin Response



HOW INSULIN RESISTANCE AND HIGH CARBOHYDRATE DIETS PRODUCE THE METABOLIC SYNDROME



HOW INSULIN RESISTANCE AND HIGH CARBOHYDRATE DIETS PRODUCE THE METABOLIC SYNDROME

