

The little dark secrets of rice

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Academician, NAST

Rice farming in the Philippines

- Uses about 1/3 of all arable lands
- Uses up more than 50% of fresh water resources
- The main source of income for 2.5 million families, including 2.1 million farmers



Rice grain

- The world's most important staple food
- Provides 20% of the calories worldwide
- Provides more than 50% of the calories of Filipinos
- Accounts for 25% of food expenditure of the bottom 30% of the population



What many of us do not know

- Rice farming is a main contributor to global warming
- Rice farming is more wasteful of water to produce than other food
- Rice farming is a serious threat to farmers' health and well-being

- Rice consumption is a serious threat to the health and well-being of consumers
- WE DO NOT REALLY HAVE TO EAT RICE

My objective for this talk

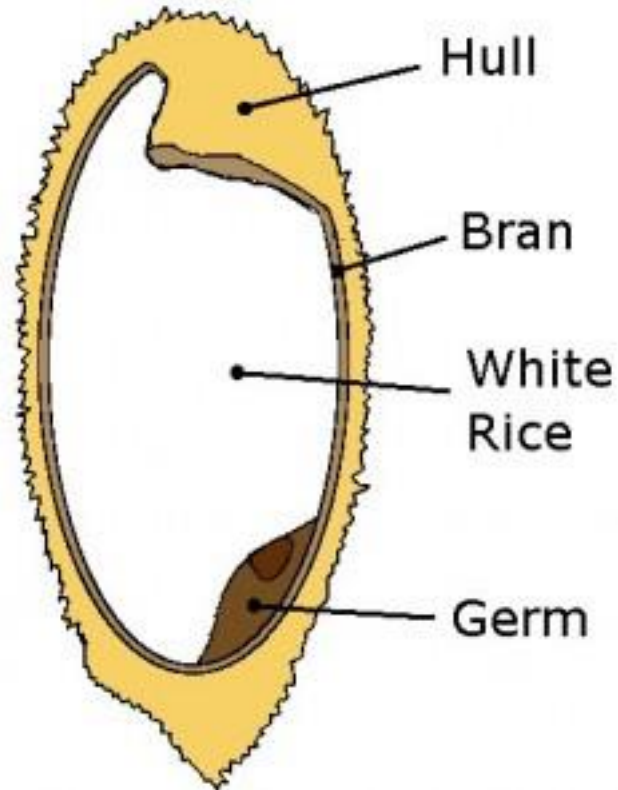
- Describe the dangers of rice consumption
- Suggest ways to avoid/reduce these dangers

All statements are based on verified global scientific literature up to September 2017

Fundamentals

- White rice – polished rice, mainly the endosperm
- Brown rice – unpolished rice; the endosperm plus the bran layer and germ
- Brown rice is not a variety of rice; it is the product of incomplete milling process

Parts of a rice grain




hull: silicon dioxide, lignin,

bran: antioxidants, vitamin B,
fiber, phytic acid

White rice:
mainly starch

germ: protein, lipids, fiber;
antioxidants

Contaminants:
As, Pb, Hg,
Cd, Cu, Mo;
pesticide
residues

A pregnant woman is shown from the side, wearing a red t-shirt and blue jeans. She is sitting outdoors on a grassy area with trees in the background. The image is used as a background for text.

White rice is bad for consumers' health

It is linked to diseases of modern civilization: heart failure, hypertension, stroke, arthritis, obesity, osteoporosis, gout, cancer, ulcer, etc.

Early evidence linking white rice and other refined carbohydrates to chronic (lifestyle) diseases.

- 1. 1999 study: Diabetes was virtually unknown in the Neolithic Age, before rice was cultivated based on archaeological records and observations of modern hunter gatherer societies (Australia aborigines and Alaska eskimos)**
- 2. US study (2009): incidence of diabetes and obesity started to increase in 1980s, paralleled by increase in refined carbohydrate consumption**

*Refined carbohydrates – forms of starches and sugars that do not exist in nature

RESEARCH

White rice consumption and risk of type 2 diabetes: meta-analysis and systematic review



OPEN ACCESS

Emily A Hu *research assistant*¹, An Pan *research fellow*¹, Vasanti Malik *research fellow*¹, Qi Sun *instructor in medicine*^{1 2}

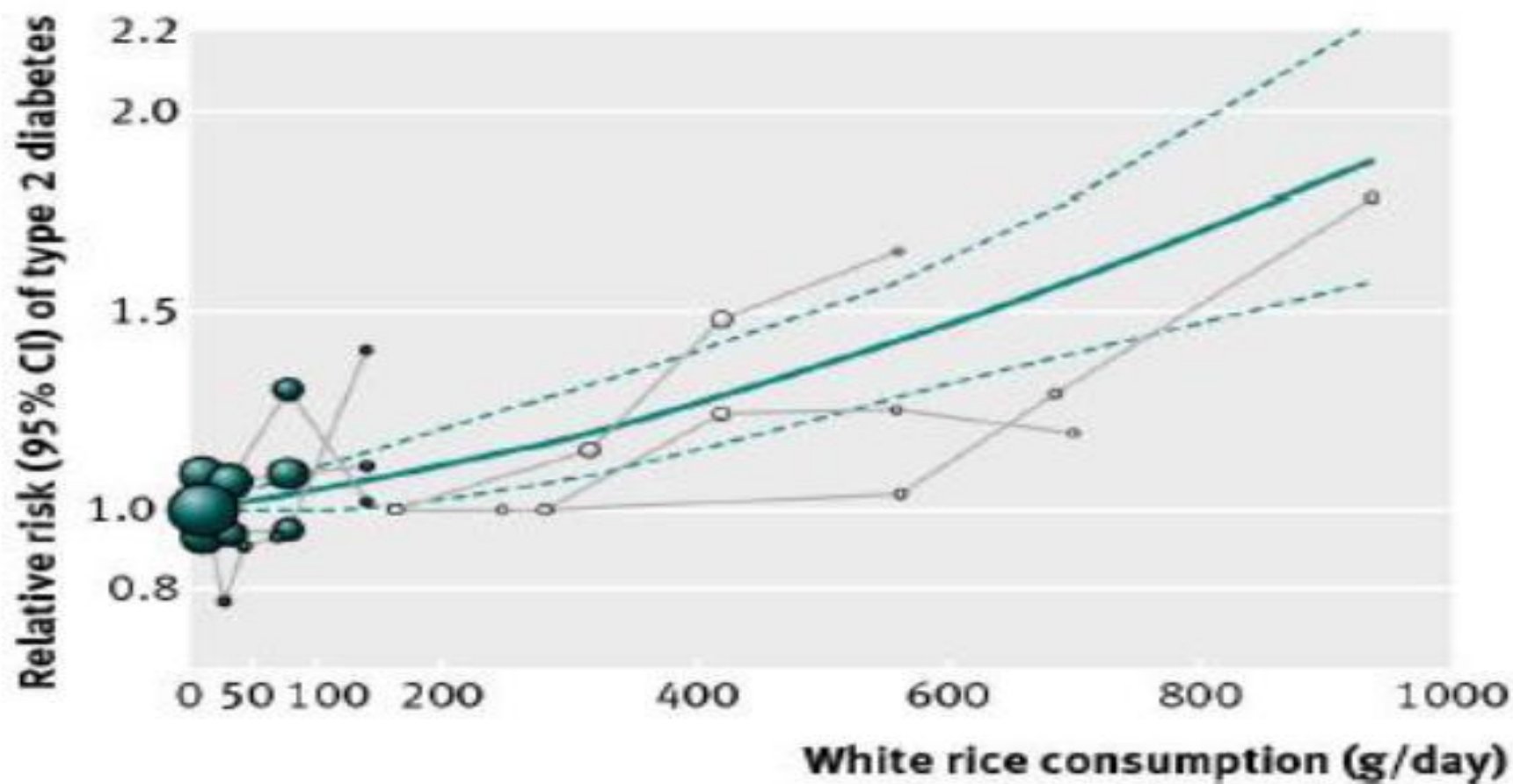
Results

A total of 13 284 incident cases of type 2 diabetes were ascertained among 352 384 participants with follow-up periods ranging from 4 to 22 years. Asian (Chinese and Japanese) populations had much higher white rice consumption levels than did Western populations (average intake levels were three to four servings/day versus one to two servings/week).

Conclusion

Higher consumption of white rice is associated with a significantly increased risk of type 2 diabetes, especially in Asian (Chinese and Japanese) populations.

Dose-Response Relation between White Rice Intake and Risk of Type 2 Diabetes



[E. A. Hu, A. Pan, V. Malik & Q. Sun (2012) White rice consumption and risk of type 2 diabetes- meta analysis and systematic review, *BMJ*, 344:e1454]



Singapore Institute
for Clinical Sciences

REVIEW

Whole grain and refined grain consumption and the risk of type 2 diabetes: a systematic review and dose–response meta-analysis of cohort studies

**Dagfinn Aune · Teresa Norat · Pål Romundstad ·
Lars J. Vatten**

We searched the PubMed database for studies of grain intake and risk of type 2 diabetes, up to June 5th, 2013. Sixteen cohort studies were included in the analyses... white rice was associated with increased risk.

Review Article

Rice consumption, incidence of chronic diseases and risk of mortality: meta-analysis of cohort studies

Parvane Saneei^{1,2}, Bagher Larijani³ and Ahmad Esmailzadeh^{4,5,*}

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Procedure

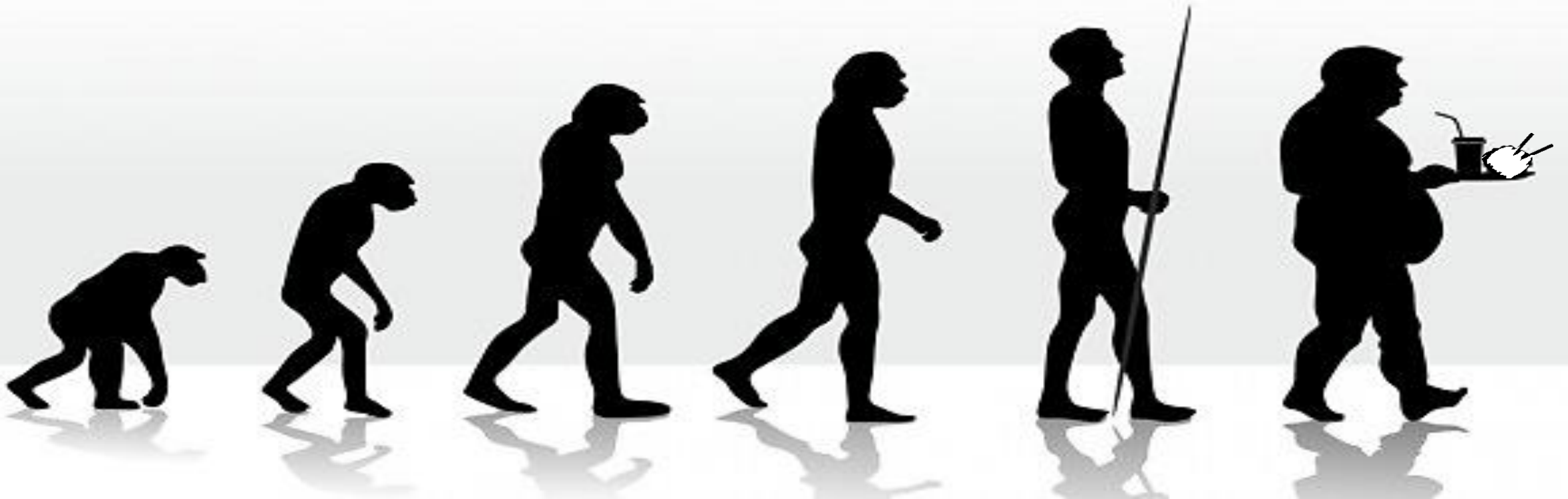
A systematic literature search of MEDLINE, Embase, Cochrane review, Google Scholar and Scopus databases for relevant cohort studies published until July 2014. For systematic review, we found nineteen studies examining the association between rice intake and risk of chronic diseases (obesity, hypertension, metabolic syndrome, diabetes, CVD and cancers) or mortality.

Results

In a meta-analysis on seventeen risk estimates for highest v. lowest category of rice intake, provided from twelve studies, we found a trend towards a **positive association between rice consumption and risk of all chronic diseases**

Why does rice cause diseases?

1. Rice (and other grains) are relatively new to humans



Number of Plant Species Used by Hunter-Gatherers



Hunter-gatherer group	No. of plant species used	
	Total	Type
Alyawara (Central Australia)	92	36 seeds 32 flowers 26 fruits 8 roots
Tlokwa (Botswana)	126	47 fruits 31 roots 23 barks & resins 22 leaves & stalks 3 mushrooms



2. White rice is essentially just starch

- *Rice has lowest protein among cereals, lysine deficient

- *Low in iron, zinc, vit A, ascorbic acid

 - *Arsenic under wet condition

 - *Cadmium and methymercury under dry condition

 - *contamination from pesticides and fertilizers



Humans do not need to eat rice

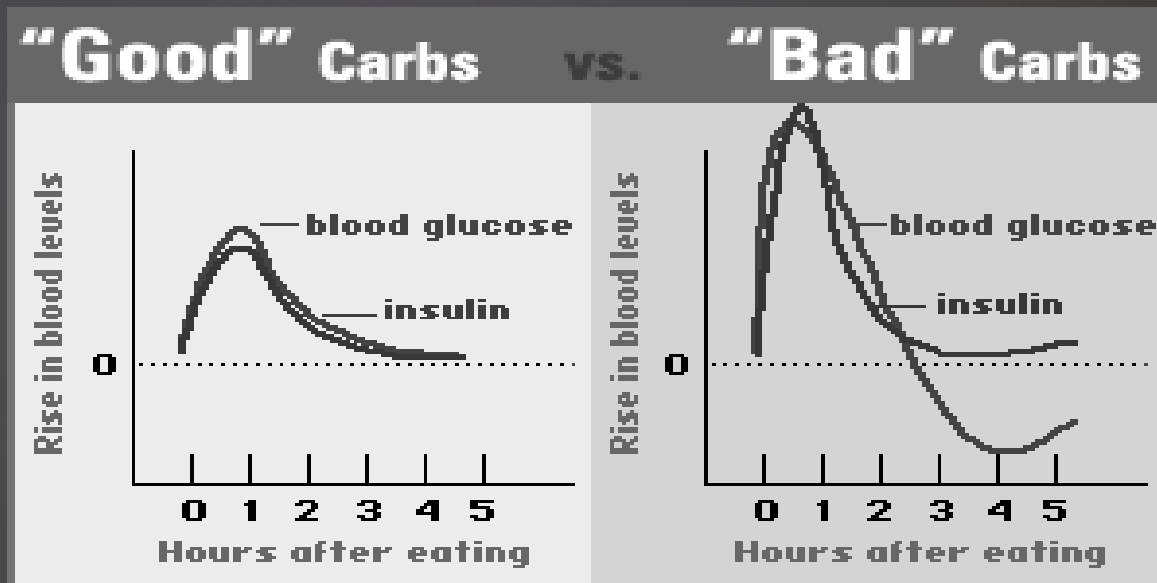
The energy we get from rice can be produced by the body by eating fatty and protein rich foods, such as meat and fish

This is the reason why our hunter gatherer ancestors survived before the advent of grains





When digested, starch, the main component of a rice grain, becomes glucose, the form that goes into the blood stream



Glycemic index, a measure of speed at which glucose reaches the bloodstream

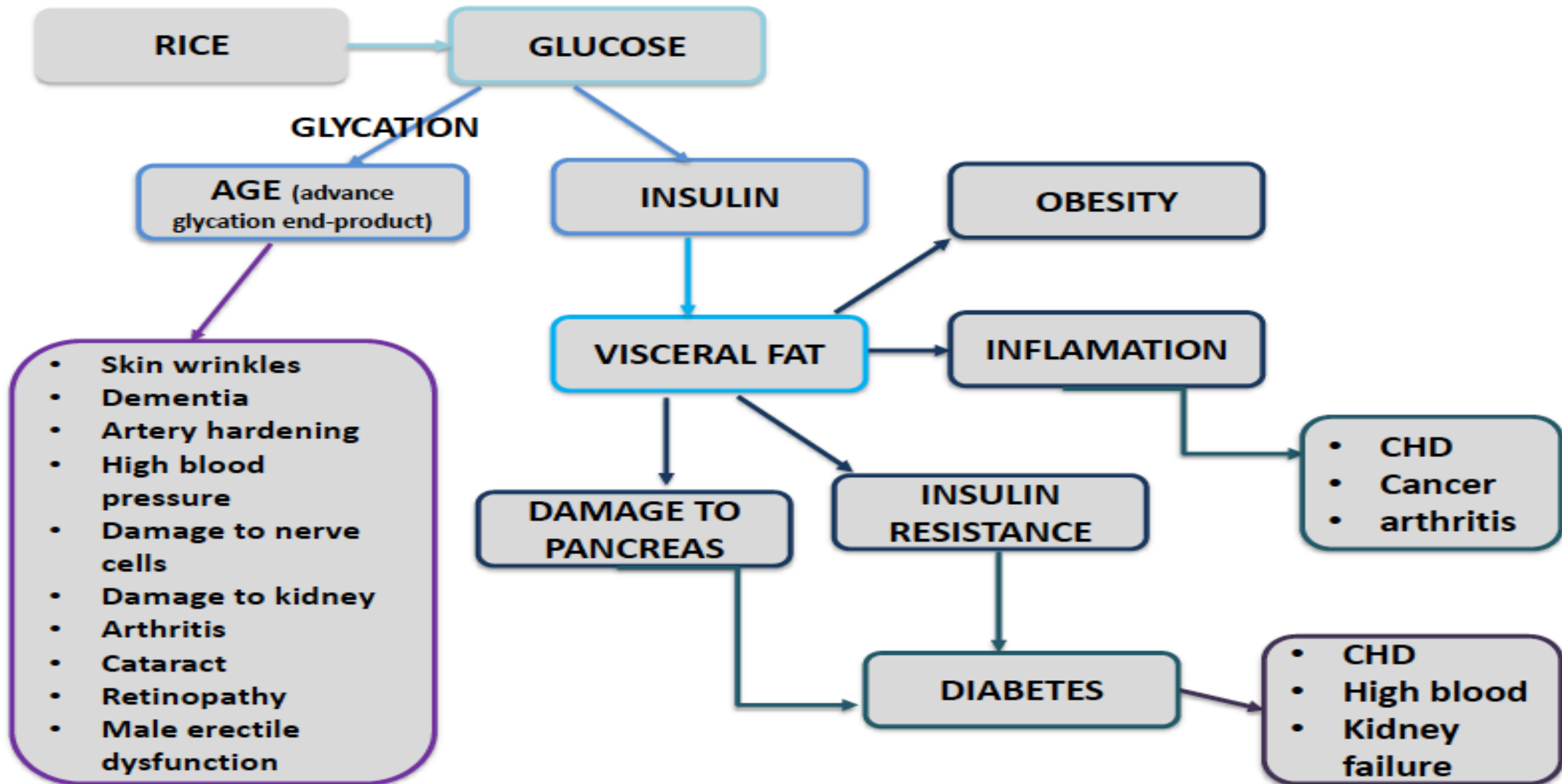
Staple food	Glycemic index
White rice (Rc 160)	70
Kamote	32
Cassava	30
Banana (saba)	53
White corn	54
Pan de sal	87
White bread	93
Sugar	65
Brown rice (average)	50
Parboiled rice (average)	38

Consequences of glucose spikes in the bloodstream

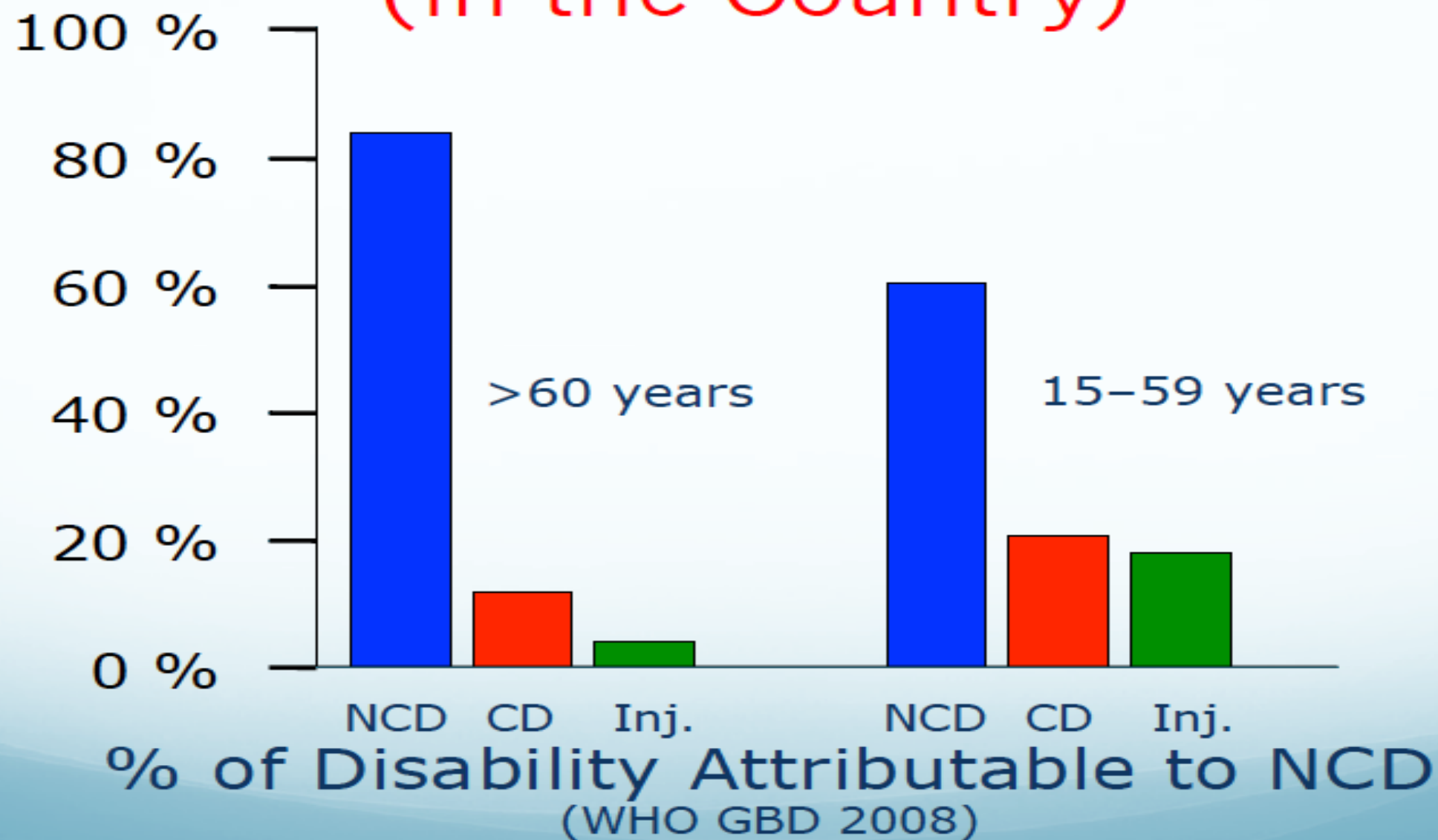
Diabetes. Hypertension. Obesity.
Coronary heart diseases. Stroke.
Others: gout, colon cancer, ulcer,
osteoarthritis, etc.



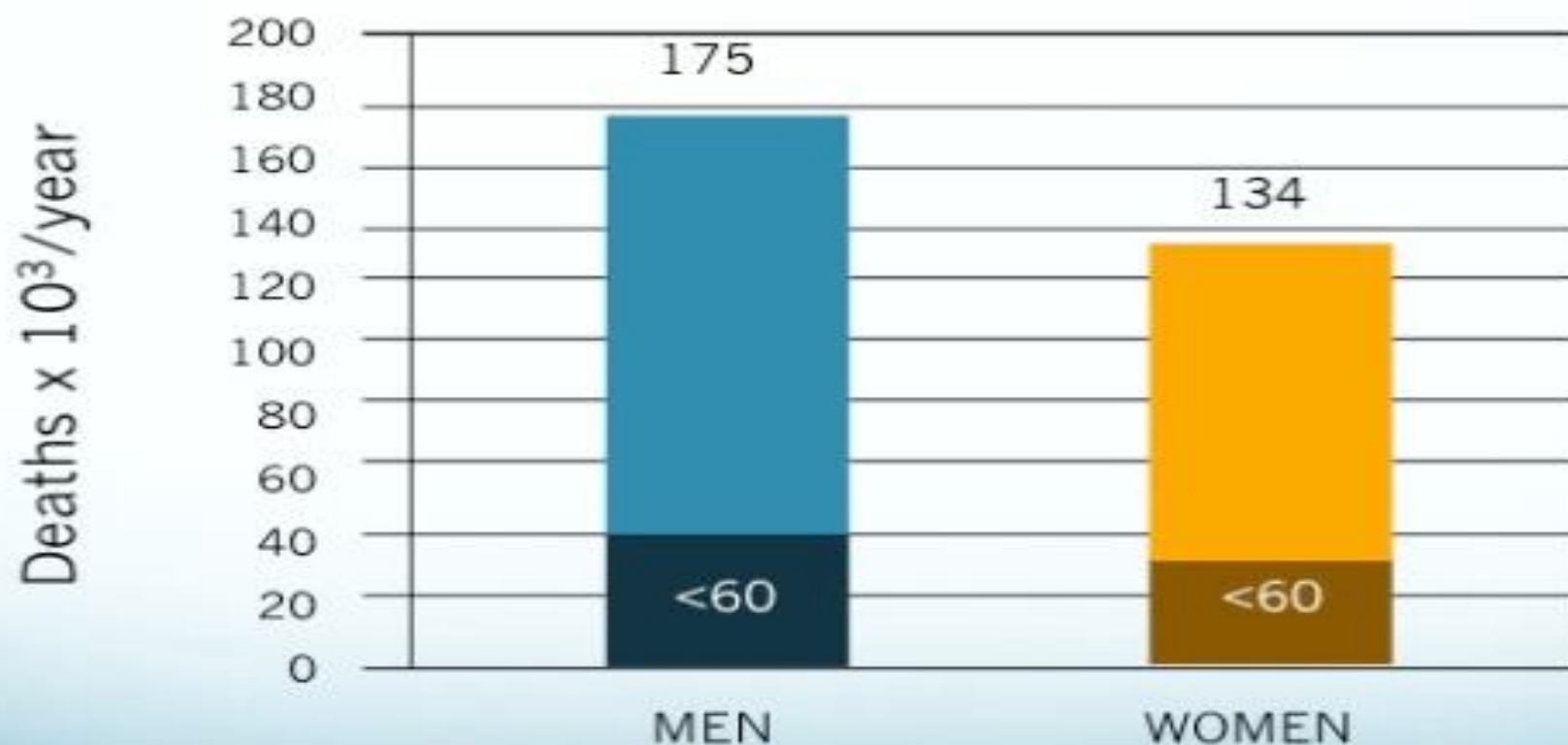
CONNECTING THE DOTS



How Big is the Burden? (In the Country)



How Big is the Burden? (In the Country)



NCD Deaths Per Year in 2010

WHO GBD 2010

Why is (white) rice so harmful particularly to Filipinos

- Filipinos eat too much boiled white rice, and little else

Years	Per capita/year (kg)
1980s-90s	92
2008-2009	111
2009-2010	119

- Global per capita consumption: **65 kg**, generally decreasing
- Other Asian countries with high per capita consumption (India, Bangladesh) prefers parboiled rice, or eat other fiber-rich food (Indonesia)

Why is (white) rice harmful particularly to Filipinos?

- Most of our rice varieties are short grain with higher GI than long grain
- We prefer the sticky type, which has higher GI than the fluffy type
- Asians are more predisposed to type 2 diabetes than Europeans
- Our method of rice consumption: eating freshly boiled rice







If rice is so bad,
why do we eat it?






CHEAP

to some rice and salt constitutes the meal



CONVENIENT

easy to transport,
store, cook



Our parents and
grandparents **DID**



STATUS SYMBOL

camote is not as sexy

We are
ADDICTED



How science can help you in...

Choosing your rice

1. Long grain is better than short grain
2. Fluffy is better than sticky
3. Brown rice is better than white rice
4. Stored rice is better than newly harvested rice
5. Rice dried at high temperature better than sun drying
6. Parboiled rice is better than non-parboiled rice
7. Germinated brown rice is best

Cooking your rice

1. Wash before cooking
2. Use a lot of clean water
3. Cook in oil before adding water to boil
4. Cook in microwave oven instead of rice cooker
5. Store cooked rice in refrigerator before eating

Critical Reviews in Food Science and Nutrition

ISSN: 1040-8398 (Print) 1549-7852 (Online) Journal homepage: <http://www.tandfonline.com/loi/bfsn20>

Rice bran nutraceuticals: A comprehensive review

Muhammad Sohail, Allah Rakha, Masood Sadiq Butt, Muhammad Jawad Iqbal & Summer Rashid

Bioactive components of rice bran, mainly γ -oryzanol, have been reported to possess antioxidant, anti-inflammatory, hypocholesterolemic, anti-diabetic, and anti-cancer activities. Rice bran oil contains appreciable quantities of bioactive components and has attained the status of “Heart oil” due to its cardiac-friendly chemical profile

Effects of the brown rice diet on visceral obesity and endothelial function: the BRAVO study

Michio Shimabukuro^{1,2,3,4*}, Moritake Higa^{3,4}, Rie Kinjo⁵, Ken Yamakawa^{3,4}, Hideaki Tanaka⁴, Chisayo Kozuka³, Kouichi Yabiku³, Shin-Ichiro Taira³, Masataka Sata² and Hiroaki Masuzaki³

In conclusion, consumption of BR may be beneficial, partly owing to the lowering of glycaemic response, and may protect postprandial endothelial function in subjects with the metabolic syndrome. Long-term beneficial effects of BR on metabolic parameters and endothelial function were also observed.

Germinated brown rice



Benefits of germinated brown rice

- Higher GABA (gamma amino butyric acid) content
- Promotes fat loss, stimulates immune system, lowers blood pressure, inhibits cancer cells

RESEARCH ARTICLE

Open Access

Germinated brown rice ameliorates obesity in high-fat diet induced obese rats



See Meng Lim^{1,5}, Yong Meng Goh², Norhafizah Mohtarrudin³ and Su Peng Loh^{1,4*}

JOURNAL OF FUNCTIONAL FOODS 8 (2014) 193–203



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journal homepage: www.elsevier.com/locate/jff



Germinated brown rice regulates hepatic cholesterol metabolism and cardiovascular disease risk in hypercholesterolaemic rats



Mustapha Umar Imam^{a,**}, Aminu Ishaka^a, Der-Jiun Ooi^a,
Nur Diyana Md Zamri^a, Nadarajan Sarega^a, Maznah Ismail^{a,b,*},
Norhaizan Mohd Esa^{a,b}

How to eat the scientific way

Splitting rice meals better

Chopstick better than spoon

Eating with fingers has no advantage

Fewer mastication better than more mastication

Eat rice after eating everything else

Better still: Eat alternative staples such as banana, cassava, corn



Contents lists available at ScienceDirect

Physiology & Behavior

journal homepage: www.elsevier.com/locate/phb



The impact of eating methods on eating rate and glycemic response in healthy adults

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Clinical Nutrition Research Centre, Singapore Institute for Clinical Sciences, Singapore 117609, Singapore

HIGHLIGHTS

- Glycemic response of consuming rice with chopstick was lower than with spoon.
- The glycemic index of rice using chopsticks (GI: 68) was lower than spoon (GI: 81).
- Little observed differences (GI) between using fingers with spoon or with chopsticks.
- Different ways of consuming white rice alter glycemic index.

Take home messages

- White rice and similar refined carbohydrates should be avoided
- Be more selective about the form of rice you eat
- Be more scientific in the way you eat rice
- Diversify your food

White is not necessarily
beautiful

Have a germinated brown
rice day!!