Adaptive and Personalized Nutrition: Opportunities & Challenges in Brazil

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Descobrimento do Brasil. Cândido Portinari, 1956.

Retrato de Mulher. Benedito José Tobias

Imigrantes. Antonio Rocco, 1910

Brazil – facts and figures

	1960	2008
Population (million)	71	191
GDP per head (US$)	1448	4448
Urbanisation (%)	45	86
Adult literacy (%)	75	90
Total fertility rate (children/woman)	6.2	1.8

Victora et al. Lancet, 377:2042-53, 2011

Operários.
Tarsila do Amaral

November, 2009

July, 2010

Lancet Series 2011 – Health in Brazil

Series

Health in Brazil 4

Chronic non-communicable diseases in Brazil: burden and current challenges

Maria Inês Schmidt, Bruce Bartholow Duncan, Gulnar Azevedo e Silva, Ana Maria Menezes, Carlos Augusto Monteiro, Sandhi Maria Barreto, Dora Chor, Paulo Rossi Menezes

Non-communicable diseases (NCDs) have become a major health priority in Brazil—72% of all deaths were attributable

Lancet 2011; 377: 1949–61

Diseases and health problems that need special attention

	Frequency and trends
Health of mothers and children	
Illegal abortions	Highly prevalent
Infectious diseases	
Dengue fever	Repeated epidemics
Non-communicable diseases	
Overweight/obesity	Rapid increase
Diabetes	Increasing
Hypertension	High prevalence, still increasing
Cancer	Increasing

Victora et al. Lancet, 377:2042-53, 2011

Non Communicable Diseases as major health problems in Brazil

- 2007 - 72% deaths of all deaths
- Prevalence is greater among the poorest and less privileged ethnic groups
- US$4,18 billion (2006 – 2015) economic loss

Scmidt et al. Lancet, 377:1949-61, 2011

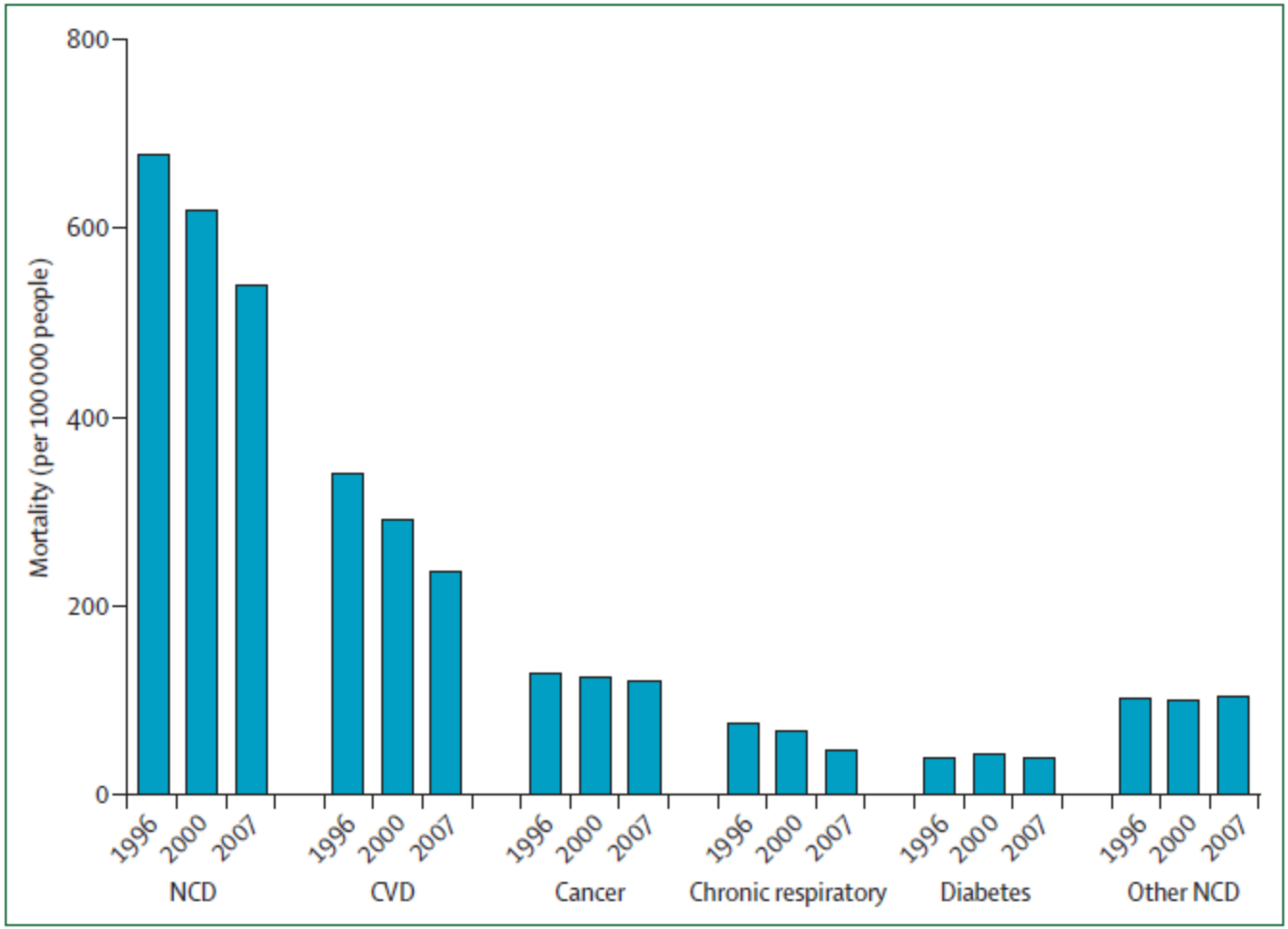
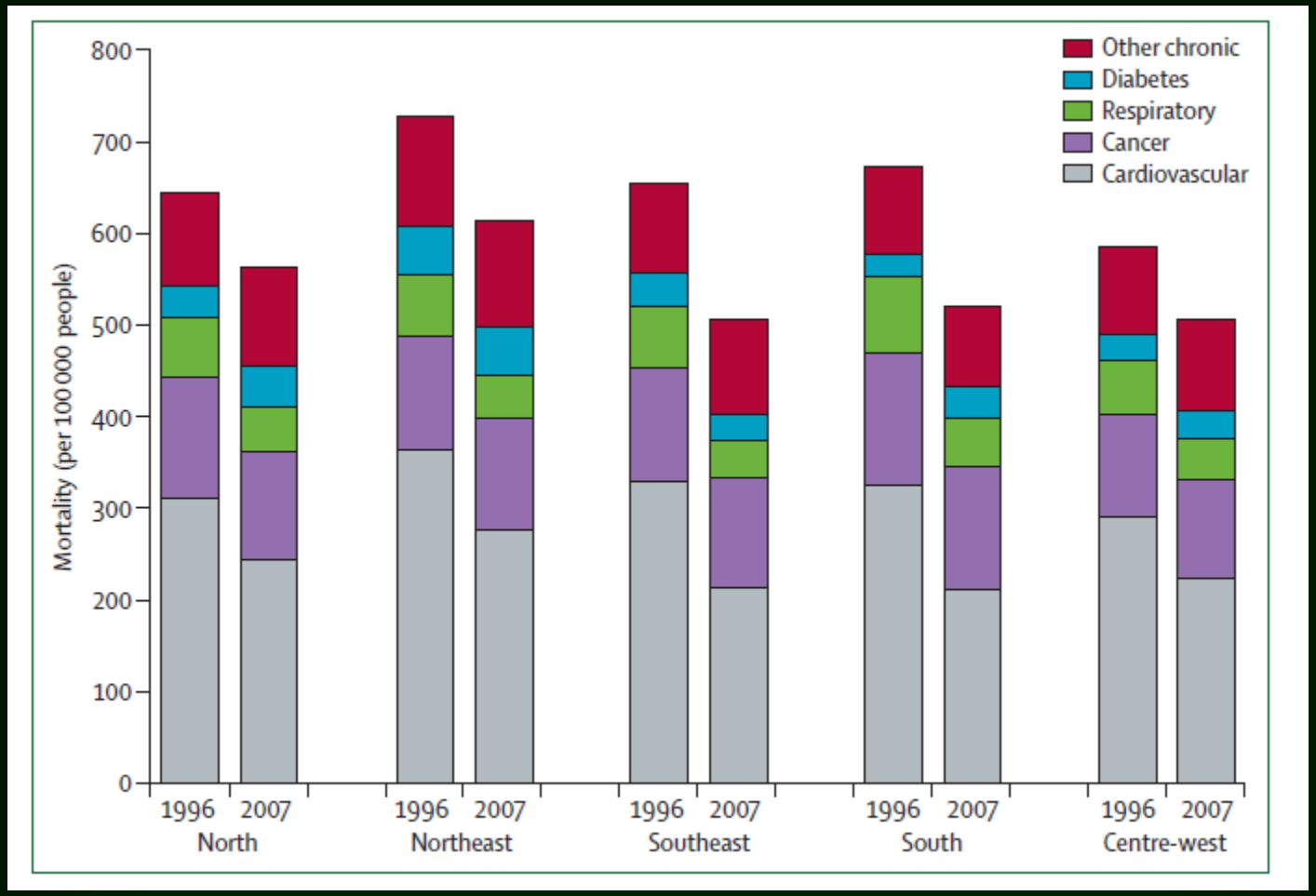


Figure 1: **Recent trends in NCD mortality for 1996 to 2000 and 2007**


NORTE
NORDESTE
CENTRO
OESTE
SUDESTE
SUL



Scmidt et al. Lancet, 377:1949-61, 2011

Non Communicable Diseases as major health problems in Brazil

- Greater income
- Mechanisation/ Industrialization
- Improved access to food
- Globalisation of unhealthy habits

→ NUTRITIONAL TRANSITION

Scmidt et al. Lancet, 377:1949-61, 2011

“Os retirantes”. Cândido Portinari

Dietary Guidelines for Brazilians (DGB)

- 1950s First official nutritional program

→ goiter

- 1970s Guidelines and small programs

→ overall nutritional deficiencies

- 1990s Chronic diseases

Sichieri et al. Cad Saúde Pública, 26:2050-2058, 2009

Dietary Guidelines for Brazilians (DGB)

- 2006
- Scientific committees – Ministry of Health
- WHO, USDA guidelines + local aspects
- No specific visual aid
- Folders, banners, pocket edition

  - non-academic language
  - graphically attractive

Sichieri et al. Cad Saúde Pública, 26:2050-2058, 2009

GUIA ALIMENTAR

COMO TER UMA ALIMENTAÇÃO SAUDÁVEL

SUS Sistema Único de Saúde

Ministério da Saúde

BRASIL UM PAÍS DE TODOS GOVERNO FEDERAL

www.saude.gov.br

Principles underlying the DGB

- Integrated approaching
- Scientific basis plus culture
- The food is the reference
- Environmental sustainability

Sichieri et al. Cad Saúde Pública, 26:2050-2058, 2009

Dietary Guidelines for Brazilians (DGB)

- Fruits and vegetables (3 portions each) 400g
- Cereals and roots: complex carbohydrates, 6 portions
- Beans: one portion daily; rice (2): beans (1)
- Fats: vegetable, olive oil; saturated fat (10% total energy)
- Sugar: 10% total energy
- Physical activity: at least 30 minutes/daily

Sichieri et al. Cad Saúde Pública, 26:2050-2058, 2009

How is your diet?

This test is about your food.

- If you think that more than one answer is right, choose the one that you do the most when you eat.
- Remember: answer what you really eat, and not what you would like or what you think would be better.
- If you have any difficulties in answering, ask for help, ask someone near in the family, friend or neighbor.
- Choose only ONE answer. Let's start!

1. How many pieces of fruit do you eat, or how many glasses of natural fruit juice do you drink a day?
   - [ ] I do not eat fruit and don't drink any natural fruit juice
   - [ ] 1
   - [ ] 2
   - [ ] 3
   - [ ] 4 or more

2. How many tablespoons of vegetables you eat a day?
   - [ ] I do not eat vegetables
   - [ ] 1 to 4 tablespoons
   - [ ] 5 to 8 tablespoons
   - [ ] 9 or more tablespoons

3. How many times a week you eat one of these foods: beans, lentils, peas, chick peas or lima beans?
   - [ ] none
   - [ ] 1 time
   - [ ] 2 times
   - [ ] 3 times
   - [ ] 4 or more

4. How many tablespoons of rice, flour or pasta do you eat a day?
   - [ ] none
   - [ ] 1 to 5 tablespoons
   - [ ] 6 to 10 tablespoons
   - [ ] 11 or more tablespoons

5. How many pieces of beef, pork, poultry, fish or eggs do you eat daily?
   - [ ] 0 to 1 piece or 1 egg
   - [ ] 2 pieces or 2 eggs
   - [ ] more than 2 pieces or more than 2 eggs

Brazilian Ministry of Health

10 steps for a healthy diet.

We are going to present to you the 10 steps for a healthy diet. These steps may and should be followed by the whole family. You have already answered the test about your diet and already know the weak points that need to be improved. Choose the one that would be the most useful for you and try to follow it every day. In the case that one day you are not able, don't give up. Try again the next day. When the step becomes part of your daily routine then begin trying the next step.

1

Increase and diversify your consumption of fruits and vegetables. Eat them 5 times a day.
The fruit and vegetables are rich in vitamins, minerals and fibres. Eat, at least, 3 tablespoons of vegetables (greens and legumes) 2 times a day. Put the vegetables on the plate at lunch and dinner.
Begin with 1 fruit or a slice of fruit for breakfast and add one more in the morning and afternoon snacks.

2

Eat beans at least once a day, and a minimum of 4 days a week.
Beans are rich in iron. At meal time put a ladle of beans on the plate, so as to avoid anemia.

3

Reduce fat foods, such as meats with visible fat, hen dogs, cold cuts, fried foods and salty snacks, to once a week.
Remove before cooking the skin of the chicken, the visible fat of meat and the skin of fish. Although vegetable oils being a healthier type of fat, anything in excess is harmful. The ideal is not to use more than one cup of vegetable oil per month for a family of 4 people. Choose cooked or baked foods and avoid cooking with margarine, vegetable shortening or butter.

4

Reduce the use of salt.
Take the saltshaker off the table.
Table salt is the greatest source of sodium in our diet. Sodium is essential for the body to work, but too much of it could cause high blood pressure, what we call hypertension. The children and the adults don't need more than a pinch of salt a day. Follow these hints: do not place a salt shaker on the table, that way you avoid putting additional salt on the food on the table. Avoid prepared condiments, canned food, salted meat and cold cuts such as bologna, ham, sausage and others. All of them are full of salt.

5

Make at least 3 meals and a snack a day.
Don't skip meals.
For a snack and dessert prefer fruit. Having your all meals, you avoid the stomach to be empty for long and reduce the risk of gastritis, and also the exaggeration on the quantity when you eat. Avoid fasting, that will not help you control your weight.

6

Reduce eating sweets, cakes, cookies and other foods rich in sugar to no more than 3 times a week.

7

Reduce the consumption of alcohol and sodas. Avoid daily use.
Water is the best drink.

8

Enjoy your meal.
Eat slowly.
Make the meals a family gathering. Don't eat watching TV.

9

Keep your weight within healthy limits – see at your health service if your Body Mass Index is between 18.5 and 24.9 kg/m².
The index shows if your weight is adequate for your height. It is figured by divid ng the weight, in kilograms, by the height, in meters, squared.

Value of the BMI	Classification
less than 18.5	low weight
18.5 to 24.99	normal
25 a 29.99	over weight
more than 30	obesity

BMI= weight (in kg) / height (in m)²

10

Be active. Accumulate 30 minutes of physical activities every day. Walk your neighborhood. Climb stairs. Don't spend many hours watching TV.

Brazilian Ministry of Health

Dietary Guidelines for Brazilians (DGB)

- Limitations and Challenges

  - cultural-based icon

  - carbohydrate quality (glycemic index)

  - bioactive food compounds

  - Penetration of BDG???

  - Effectiveness???

Sichieri et al. Cad Saúde Pública, 26:2050-2058, 2009

Read meat consumption in São Paulo

- "Health Survey for São Paulo" – large cross sectional study
- 1677 individuals
- 24 h Dietary Recalls
- Maximum recommended daily intake (WCRF) = 71.4 g

De Carvalho et al. Public Health Nutrition, 2012

Table 1 Usual red and processed meat intake (g/d) according to sex and socio-economic variables: Brazilian adults (*n* 1677) aged ≥19 years, São Paulo, 2003

	Males			Females		
	n	Mean	95 % CI	*n*	Mean	95 % CI
Age group						
Adult	347	143	138, 148	399	84	79, 88
Elderly	395	105	101, 109	421	64	60, 68
*P**		<0·05			<0·05	
Education of household head						
≤7 years	436	135	128, 141	490	79	74, 85
≥8 years	298	142	135, 148	317	83	77, 88
*P**		0·14			0·42	
Family income per capita						
Low income	202	131	122, 139	299	82	76, 88
Middle income	226	141	133, 150	234	83	73, 92
High income	254	139	132, 146	226	80	74, 86
*P**		0·16			0·81	
Smoking						
Non-smoker	331	138	131, 145	572	78	74, 82
Smoker and ex	390	136	130, 142	226	87	78, 95
*P**		0·42			0·06	
Alcohol consumption						
Did not drink for 1 year	299	133	127, 140	542	79	74, 84
Drinks at least twice a month	419	139	132, 145	251	85	79, 91
*P**		0·26			0·14	
Race						
White	482	135	128, 141	551	83	78, 87
Other	258	143	135, 150	267	77	71, 84
*P**		0·17			0·19	
Total	742	138	133, 142	820	81	77, 85

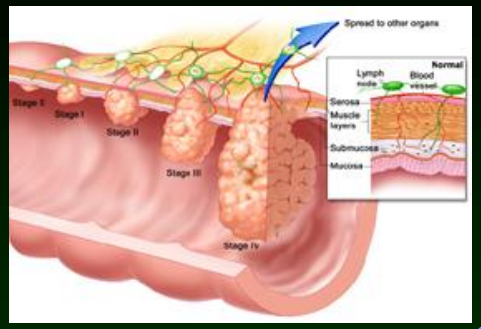
**P* value for *F* statistic (lincom test).

De Carvalho et al. Public Health Nutrition, 2012

Read meat consumption in São Paulo

- Consumed almost universally in the City of São Paulo
- Excessive consumption for males
- Consumption was greater when compared to the US
- How to stimulate consumption reduction?

De Carvalho et al. Public Health Nutrition, 2012



Colon cell

Benzo[a]pyrene (Bp)

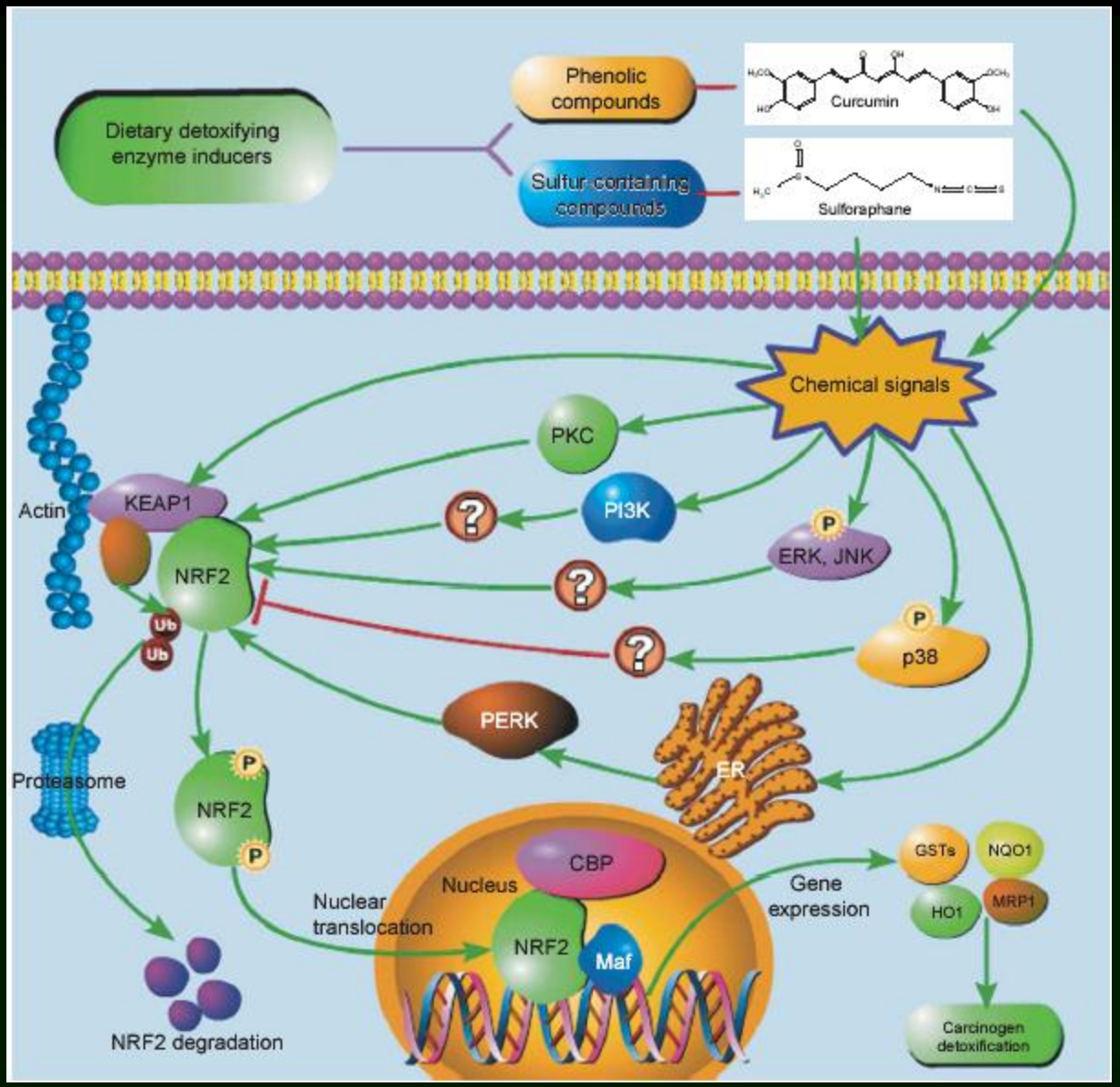
Bp

MUTATION

Glutathione *S*-transferase

Bp/glutathione

Bp/glutatione



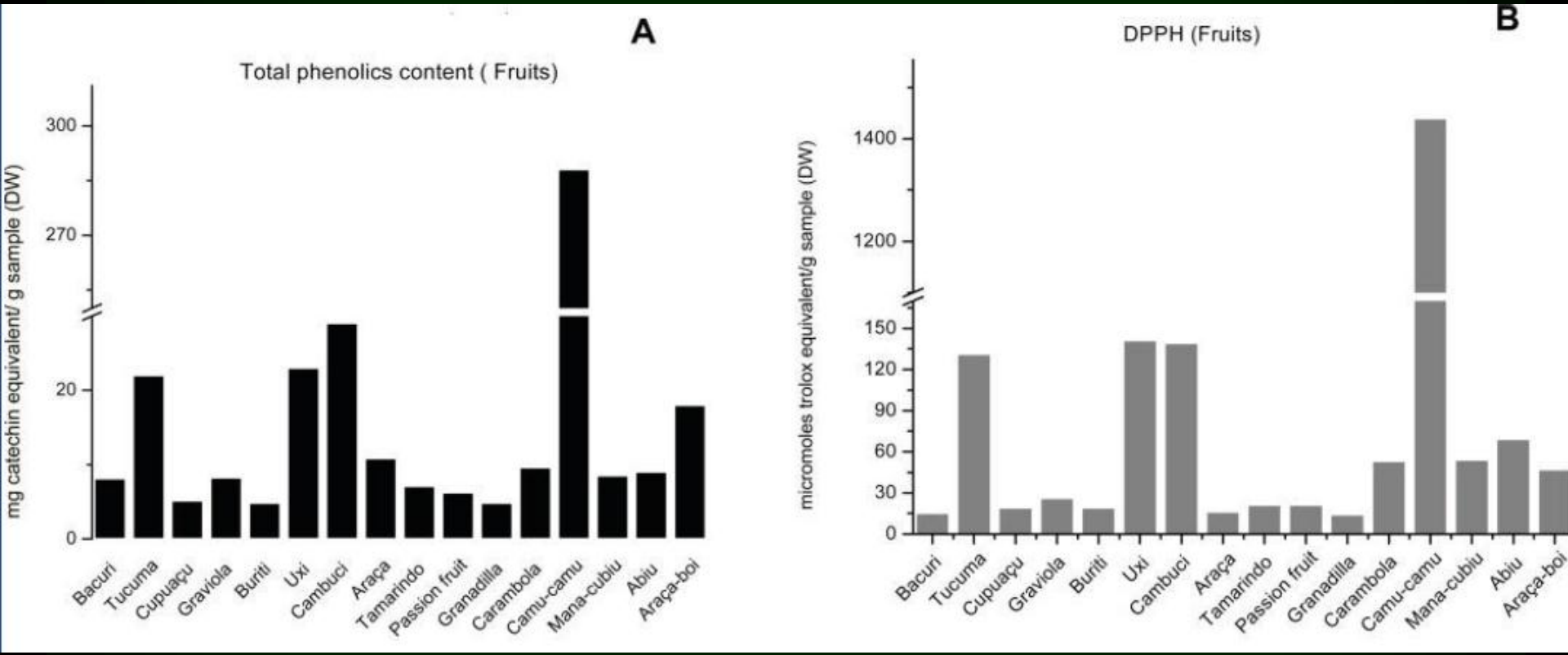
Chen C & Kong A-N T. *Trends Pharmacol Sci*, 26: 318-326, 2005.

Jabuticaba

Camu-Camu

Pindaíba

Chemical composition and antioxidant potential of Brazilian native fruits



Gonçalves et al. J Agric Food Comp, 58:4666-74, 2010

Camu-Camu

- Quercitin
- Ellagic acid
- Cyanidin

Cambuci

- Quercitin
- Ellagic acid

Gonçalves et al. J Agric Food Comp, 58:4666-74, 2010

Effects of Maté tea consumption in healthy young women

- 15 healthy young women
- 5g/500 mL maté tea/day – 1 week
- Oxidative stress markers in plasma
- Expression of antioxidant genes in blood cells

Matsumoto et al. J Agric Food Res, 57:1775-80, 2009

Effects of Maté tea consumption in healthy young women

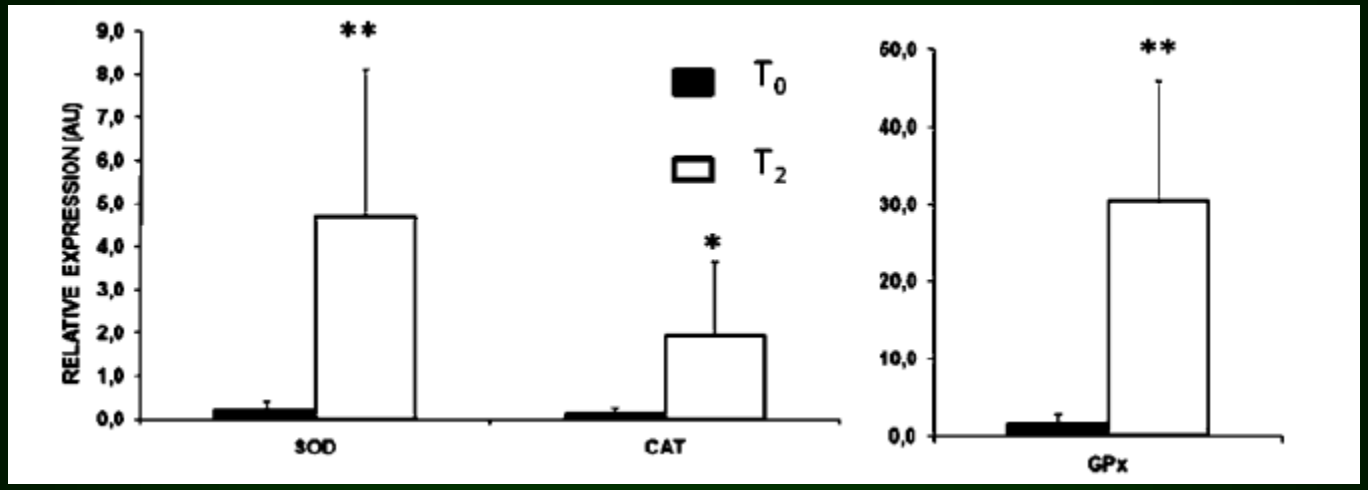
Table 3. Lag Time, TBARs, and Total Antioxidant Status of Plasma from Subjects at the Baseline (T_0) and after Acute (One Hour -T_1) and Prolonged (One Week -T_2) Ingestion of Instant Maté Tea

period	lag time (min)[a]	TBARS (μmol/L)[a]	TAS (mmol/L)[a]
baseline (T_0)	12.46 ± 7.58	4.32 ± 1.15	0.92 ± 0.10
one hour (T_1)	21.15 ± 11.46^b	3.60 ± 1.15^c	0.91 ± 0.11
one week (T_2)	23.90 ± 20.3^b	2.73 ± 0.65^c	0.97 ± 0.09^c

[a] Values are expressed as the mean $\pm$ SD ($n = 15$). [b] $p < 0.05$ compared to T_0. [c] $p < 0.001$ compared to T_0.

Matsumoto et al. J Agric Food Res, 57:1775-80, 2009

Effects of Maté tea consumption in healthy young women



Matsumoto et al. J Agric Food Res, 57:1775-80, 2009

Effects of Brazil nuts consumption in obese women

- 37 morbidly obese women
- 1 nut/day 8 weeks
- 290 micrograms selenium
- GPX1 PRO198LEU

Comminetti et al. Nutrition, 27:891-6, 2011

Effects of Brazil nuts consumption in obese women

Plasma and erythrocyte Se concentrations, erythrocyte GPx activity, and comet length before and after 8 wk of consumption of Brazil nuts*

	Baseline			After supplementation		
	Pro/Pro ($n = 18$)	Pro/Leu ($n = 14$)	Leu/Leu ($n = 5$)	Pro/Pro ($n = 18$)	Pro/Leu ($n = 14$)	Leu/Leu ($n = 5$)
Plasma Se (μg/L)	54.0 ± 12.1	55.2 ± 14.0	62.7 ± 16.0	126.6 ± 21.3†	134.4 ± 40.4†	148.3 ± 45.0†
Erythrocyte Se (μg/L)	60.8 ± 18.5	65.0 ± 37.6	59.7 ± 23.1	200.8 ± 33.1‡	207.3 ± 39.5‡	220.2 ± 76.0‡
Erythrocyte GPx (U/g Hb)	38.5 ± 18.0	33.0 ± 12.4	31.4 ± 19.6	57.4 ± 21.5§	51.7 ± 19.7§	45.2 ± 19.1§
Comet length (μm)	80.8 ± 18.5	67.6 ± 24.3	92.1 ± 12.8	64.2 ± 16.4‖	68.5 ± 21.7	111.4 ± 46.3¶

Comminetti et al. Nutrition, 27:891-6, 2011

Nutrição no pós-genoma: fundamentos e aplicações de ferramentas ômicas

Nutrition in the post-genome era: 'omic' tools basics and applications

Eliane FIALHO[1]
Fernando Salvador MORENO[2]
Thomas Prates ONG[3]

Rev. Nutr., Campinas, 21(6):757-766, nov./dez., 2008

A ciência da nutrição em trânsito: da nutrição e dietética à nutrigenômica

The science of nutrition in transit: from nutrition and dietetics to nutrigenomics

Francisco de Assis Guedes de VASCONCELOS[1]

Rev. Nutr., Campinas, 23(6):935-945, nov./dez., 2010

Self-reported skin color, genomic ancestry and the distribution of *GST* polymorphisms

Guilherme Suarez-Kurtz[a], Daniela D. Vargens[a], Claudio J. Struchiner[b], Luciana Bastos-Rodrigues[c] and Sergio D.J. Pena[c]

Pharmacogenetics and Genomics 2007, Vol 17 No 9

September, 2008

saúde

Exame de DNA indica como evitar problemas na pele

Padrão genético mostra propensão de cada um e é base para prescrição de tratamento

A primeira impressão é a que fica, e a imagem do seu rosto ajuda muito a criá-la. Um novo tratamento garante que, com exames de DNA, o paciente pode controlar o futuro da pele. Com isso, poderia evitar rugas, flacidez, manchas e inflamações, como acnes, além de impedir o envelhecimento precoce.

A técnica foi pesquisada e lançada pela fisioterapeuta dermatofuncional Ludmila Bonelli. Ela explica que, antes de começar a terapia, o paciente faz o exame de DNA para descobrir qual problema ele pode desenvolver.

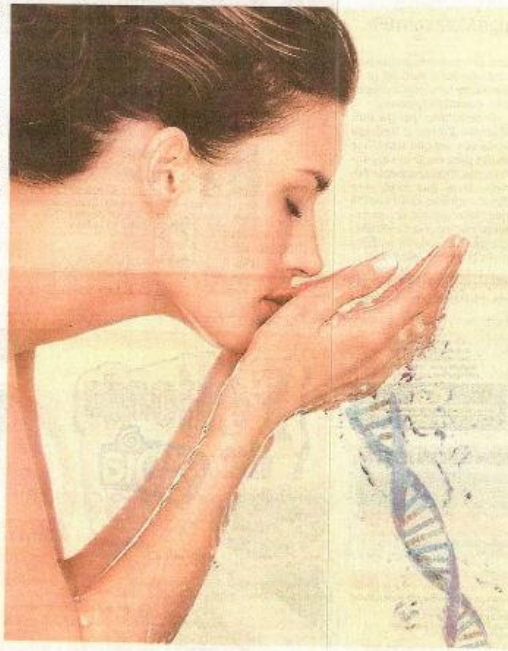
A partir do resultado do teste, que demora cerca de 20 dias para ficar pronto, o tratamento é iniciado. "Quando chega o relatório, identificamos a tendência do gene do paciente e começamos a prevenção", explica Ludmila.

Resultado do exame identifica o risco de cada paciente e facilita na prevenção de danos à pele

Cada problema tem um tratamento: para não ter rugas, uma dieta com pouco açúcar é indicada. Caso o paciente apresente sinais de flacidez, são prescritos ginástica facial específica e cosméticos com ativos antioxidantes.

Se a pessoa tiver tendência a desenvolver manchas, a prevenção é feita com o uso habitual do protetor solar com PPD e terapia com LEDS, uma luz que trabalha com bioestimulação celular. E, no caso de indicação de envelhecimento da pele, a prevenção deve ser feita com ginástica facial e drenagem linfática.

A pesquisadora explica que o exame dela revelou quase 100% de propensão a ter rugas. "Mas, como eu sempre tive muito cuidado, não tenho nada até hoje", diz ela.



O que exame identifica

Rugas
Flacidez cutânea
Manchas
Inflamação (acne)
Envelhecimento precoce da pele

Como evitar

RUGAS: o especialista faz uma prevenção diminuindo o índice glicêmico diário de consumo da pessoa através da alimentação, uma vez que já está comprovado que o açúcar é o vilão número 1 das rugas.

FLACIDEZ: a prevenção nesse caso é feita através da prática da ginástica facial e do uso de cosméticos com ativos antioxidantes.

MANCHAS: uso habitual do protetor solar com PPD e a utilização da terapia com LEDS, uma luz que trabalha com bioestimulação celular.

ACNE: Contra elas são usados cremes e pomadas específicas, de acordo com cada tipo de pele.

ENVELHECIMENTO DA PELE: a prevenção deve ser feita com ginástica facial e drenagem linfática.

VIVA VOZ

LUDMILA BONELLI
Fisioterapeuta

"Quando chega o relatório, identificamos a tendência do gene do paciente e começamos imediatamente a prevenção"

O exame só precisa ser feito uma vez e pode ser realizado em qualquer idade. "Quanto mais cedo fizermos o teste, vamos conseguir prevenir de maneira mais eficiente os problemas", afirma Ludmila.

A técnica será apresentada pela primeira vez à comunidade médica no 20° Congresso Científico Internacional de Estética, que será realizado de 2 a 5 de agosto no Centro de Convenções do Anhembi, em São Paulo.

ALGO MAIS

Teste é feito com amostra da saliva

■ O exame feito por Ludmila Bonelli consiste numa análise do genoma bucal de cada pessoa. Com um cotonete, é recolhida uma amostra da saliva do paciente e levada para o laboratório para avaliação.

"Quando temos os resultados, sabemos qual vai ser o futuro da sua pele. Conhecemos o alvo e o combatemos", explica Ludmila.

A especialista afirma também que, como a informação no DNA não muda, a idade do paciente não terá influência no resultado.

July, 2012

Challenges for personalized nutrition in Brazil

- Capacity building for Nutrigenomics research
  - Scientific training at undergraduate and graduate levels
  - Integrative research
  - National and international collaboration
  - Funding

Call for Proposals - Strategic Research Collaboration in Food Science in the State of São Paulo, Brazil and Denmark – 2012

A collaboration between the Danish Council for Strategic Research
and
The State of São Paulo Research Foundation

3. Research topics

This call invites joint research proposals within the following research topics:

- Nutrigenomics
- Source of bioactive compounds, alternative ingredients and biological non-food products from waste residues
- Healthy and sustainable food products, with retained nutritional values, produced from emerging new technologies
- Epidemiological studies related to the consumption of food and prevention of diseases
- Research of the impact of new dietary habits and public recommendations

FoRC

Food

Research

Center

6th Congress of the International Society of Nutrigenetics/Nutrigenomics

November 18-21, 2012

São Paulo, Brazil

Rebouças Convention Center

www.isnnbrazil.org.br

Organizer:

ISNN

International Society of Nutrigenetics / Nutrigenomics

Co-Organizers:

USP

SBAN

Challenges for personalized nutrition in Brazil

- Health professionals – nutrigenomics education

  - Nutrigenomics in health curricula
  - Continuous education
  - Who is going to teach?
  - Graduate Programs in Nutrition/Genetics/Molecular Biology

Challenges for personalized nutrition in Brazil

- Regulatory perspective - ANVISA
  - Legislation
  - Consumer protection
  - Genetic testing

Challenges for personalized nutrition in Brazil

- The consumer?
- Proactive
- Access
- Private or public health system