

# L'obésité, un problème de santé reconnu mais mal défini:

## Vers le développement de solutions cliniques et sociétales



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# L'obésité, de quoi parle-t-on?

- Bien plus qu'un problème de poids...
- Souvent un marqueur de notre mode de vie qui explique la prévalence dramatiquement élevée (et coûteuse) des maladies chroniques sociétales
- Nos progrès en médecine et le chemin qu'il nous reste à faire...
- L'obésité à risque: un problème de graisse interne... la graisse viscérale et ectopique
- L'obésité à risque: repenser notre façon de l'évaluer et de la prendre en charge en clinique
- Cibler l'adiposité viscérale et la graisse ectopique et nos comportements...



# Chaire internationale sur le risque cardiométabolique



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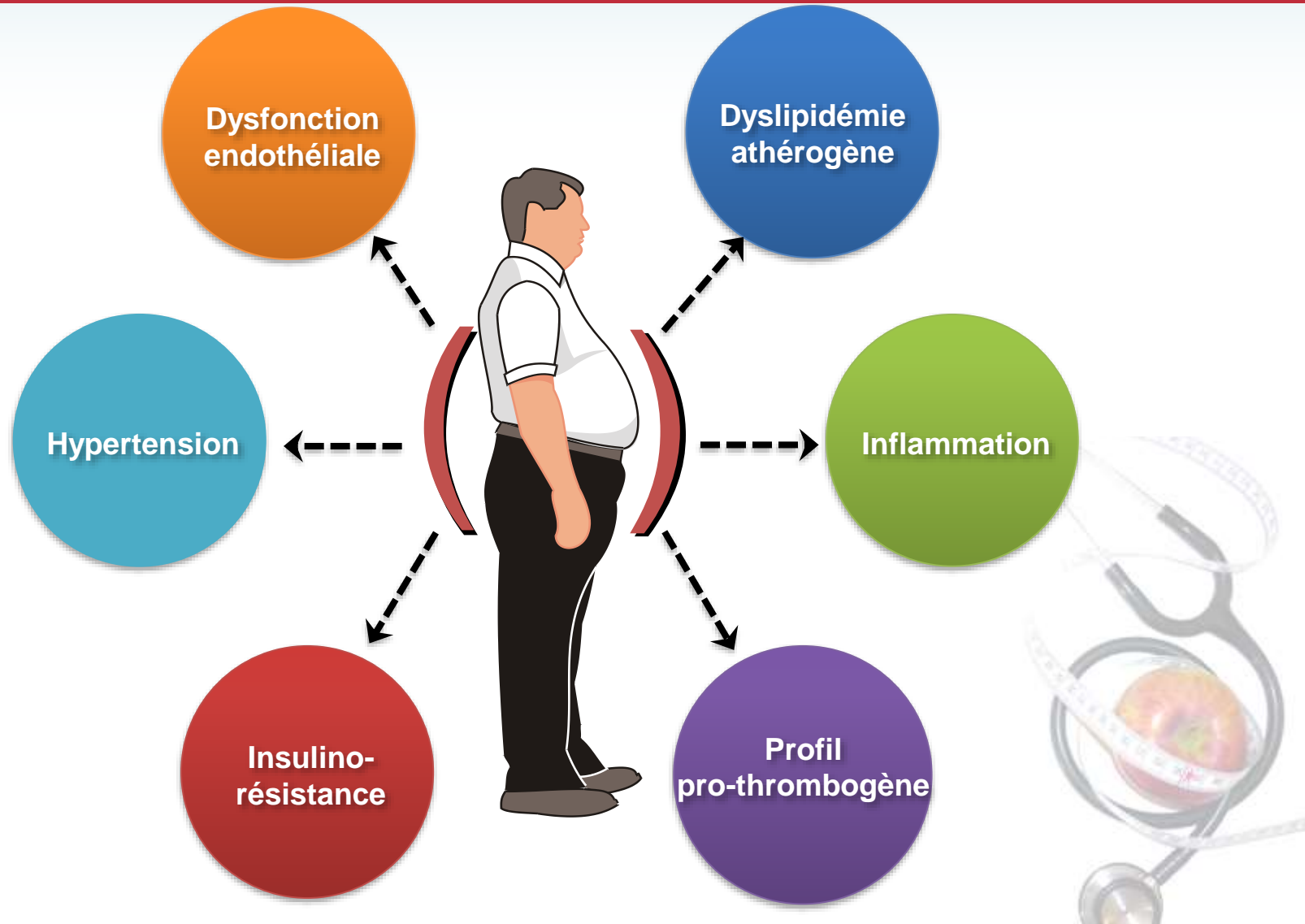


*Paul  
POIRIER*



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# Notre objectif : prévenir et prendre en charge l'obésité abdominale par la qualité nutritionnelle et l'activité physique



### CMR Short Reviews

- ▶ The Concept of CMR
- ▶ Evaluating CMR
- ▶ Managing CMR

Research and clinical tools to identify individuals with excess intra-abdominal adiposity and quantify their risk of diabetes and cardiovascular disease (global cardiometabolic risk).

- Clinical Tools
- Imaging Techniques
- Assessing CVD Risk: Traditional Approaches
- Metabolic Syndrome and Type 2 Diabetes/CVD Risk
- Assessing Cardiometabolic Risk

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CMR OVERVIEW 4:56

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### 4th International Congress on Abdominal Obesity



**4<sup>th</sup> INTERNATIONAL CONGRESS ON ABDOMINAL OBESITY**


**12 to 14 September 2013**  
 Grand Hilton Seoul, Korea


Organized by **International Chair on Cardiometabolic Risk**

BRIDGING THE GAP BETWEEN CARDIOLOGY AND DIABETOLOGY

Korean Society of Lipidology and Metabolism (KSLM)

### Recent Contributions


**Expert Opinions**  
 Are there ethnic differences in abdominal fat accumulation?  
 Beverley Balkau, PhD, INSERM, Center for Research in Epidemiology and Population Health, Epidemiology of Diabetes, Obesity, and Chronic Kidney Disease over the Lifecourse, University Paris Sud, Unité mixte de recherche en santé, Villejuif, France


**Expert Opinions**  
 Could you elaborate on the controversy of the added value of measuring waist circumference over the BMI?  
 Peter Davies, PhD, Professor, School of Exercise and Health Sciences, University of Exeter, Exeter, UK

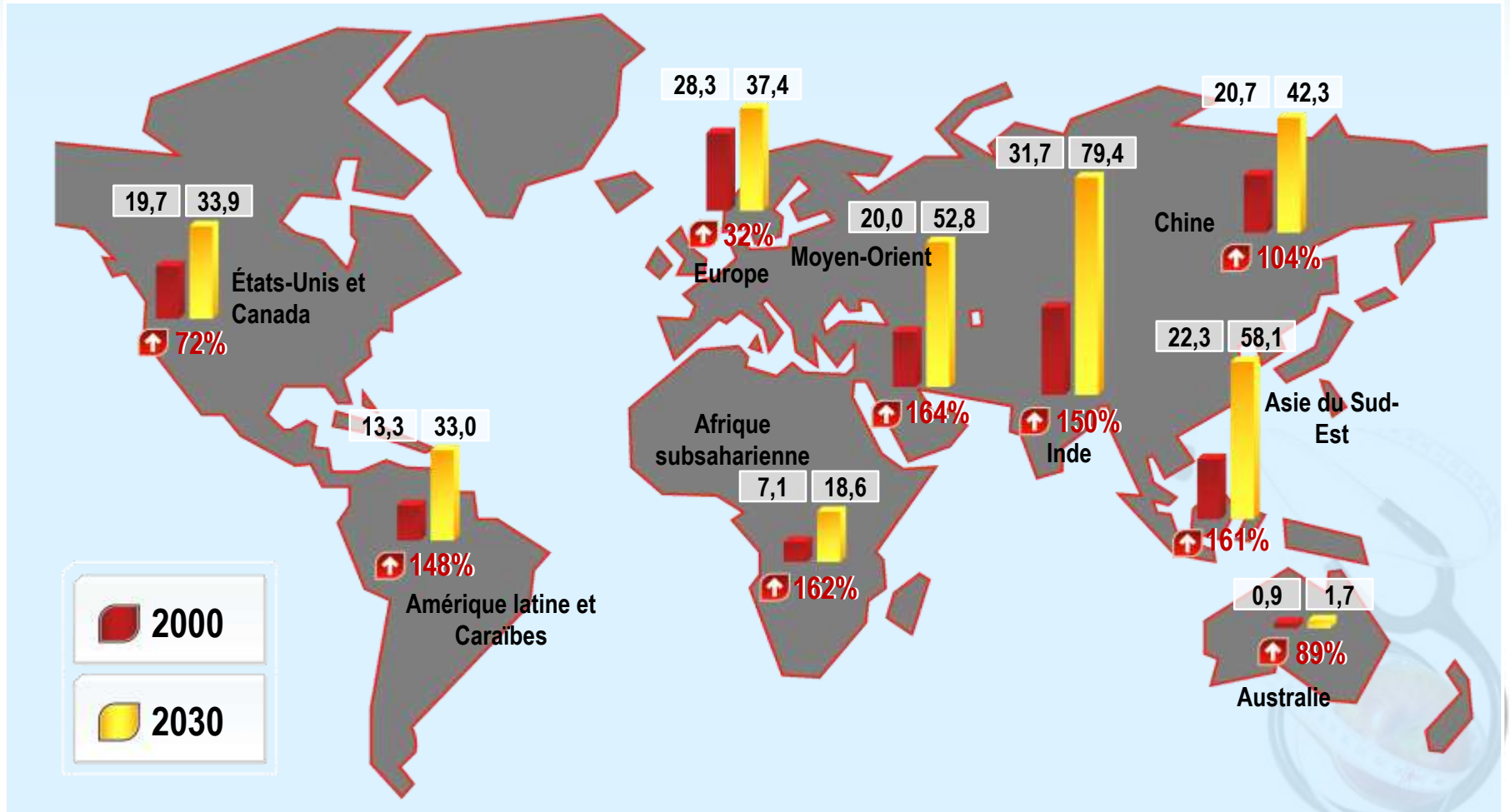
# Notre mode de vie toxique...



Changement de taille des boissons en fontaine



# Prévalence mondiale du diabète en 2000 et estimations pour 2030 (en millions)



# Worldwide trends in diabetes since 1980: a pooled analysis of 751 population-based studies with 4·4 million participants

*NCD Risk Factor Collaboration (NCD-RisC)\**

## Summary

**Background** One of the global targets for non-communicable diseases is to halt, by 2025, the rise in the age-standardised adult prevalence of diabetes at its 2010 levels. We aimed to estimate worldwide trends in diabetes, how likely it is for countries to achieve the global target, and how changes in prevalence, together with population growth and ageing, are affecting the number of adults with diabetes.

**Methods** We pooled data from population-based studies that had collected data on diabetes through measurement of its biomarkers. We used a Bayesian hierarchical model to estimate trends in diabetes prevalence—defined as fasting plasma glucose of 7·0 mmol/L or higher, or history of diagnosis with diabetes, or use of insulin or oral hypoglycaemic drugs—in 200 countries and territories in 21 regions, by sex and from 1980 to 2014. We also calculated the posterior probability of meeting the global diabetes target if post-2000 trends continue.

**Findings** We used data from 751 studies including 4 372 000 adults from 146 of the 200 countries we make estimates for. Global age-standardised diabetes prevalence increased from 4·3% (95% credible interval 2·4–7·0) in 1980 to 9·0% (7·2–11·1) in 2014 in men, and from 5·0% (2·9–7·9) to 7·9% (6·4–9·7) in women. The number of adults with diabetes in the world increased from 108 million in 1980 to 422 million in 2014 (28·5% due to the rise in prevalence, 39·7% due to population growth and ageing, and 31·8% due to interaction of these two factors). Age-standardised adult diabetes prevalence in 2014 was lowest in northwestern Europe, and highest in Polynesia and Micronesia, at nearly 25%, followed by Melanesia and the Middle East and north Africa. Between 1980 and 2014 there was little change in age-standardised diabetes prevalence in adult women in continental western Europe, although crude prevalence rose because of ageing of the population. By contrast, age-standardised adult prevalence rose by 15 percentage points in men and women in



# *International Conference on Nutrigenomics and Metabolic Health 2012*

October 15-16, 2012

Lecture Hall, Shanghai Institutes for Biological Sciences Building, CAS  
320 Yueyang Road, Shanghai, China



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# Chine : 114 millions de diabétiques...



# Les Chinois et le « fast-food »



# Beijing Chang'an Street



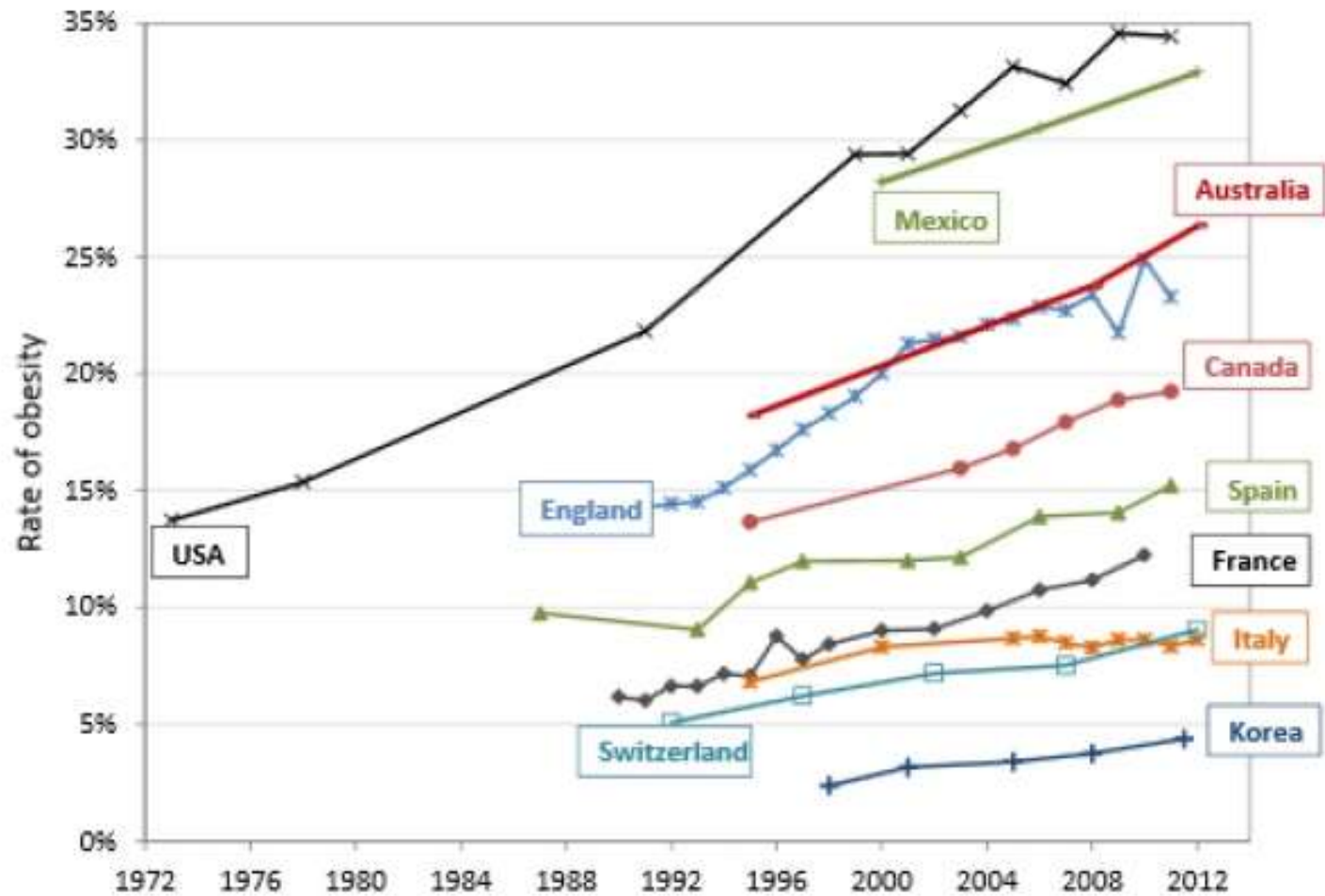
**2010**



**1986**



# La progression de l'obésité: phénomène mondial



# Quelques statistiques pour le Québec...

- 830 000 ont le diabète...  
... une maladie sociétale!  
Beaucoup l'ignorent!
- Nos hôpitaux sont pleins!!!



# La médecine a ajouté des années à la vie (notre espérance de vie est bonne) mais...

- Procédures tardives et médicaments.
- Des changements fondamentaux dans les comportements santé à l'échelle de la population causent préjudice à nos efforts, augmentent les coûts de santé et diminuent la productivité.
- La médecine garde les patients vivants mais... très malades.

# De la maladie cardiovasculaire à la santé cardiovasculaire: Une révolution tranquille

## AHA Special Report

### Defining and Setting National Goals for Cardiovascular Health Promotion and Disease Reduction

#### The American Heart Association's Strategic Impact Goal Through 2020 and Beyond

Donald M. Lloyd-Jones, MD, ScM, FAHA, Chair;

Yuling Hong, MD, MSc, PhD, FAHA\*; Darwin Labarthe, MD, MPH, PhD, FAHA\*;

Dariusz Mozaffarian, MD, DrPH, FAHA; Lawrence J. Appel, MD, MPH, FAHA;

Linda Van Horn, PhD, RD, FAHA; Kurt Greenlund, PhD\*; Stephen Daniels, MD, PhD, FAHA;

Graham Nichol, MD, MPH, FAHA; Gordon F. Tomaselli, MD, PhD, FAHA; Donna K. Arnett, PhD, FAHA;

Gregg C. Fonarow, MD, FAHA; P. Michael Ho, MD, PhD; Michael S. Lauer, MD, FAHA;

Frederick A. Masoudi, MD, MPH; Rose Marie Robertson, MD, FAHA; Véronique Roger, MD, FAHA;

Lee H. Schwamm, MD, FAHA; Paul Sorlie, PhD; Clyde W. Yancy, MD, FAHA;

Wayne D. Rosamond, PhD, FAHA; on behalf of the American Heart Association Strategic Planning Task Force  
and Statistics Committee



# Mesures qui définissent la santé cardiovasculaire idéale

- 3 facteurs biologiques favorables :
  - Cholestérol < 5,2 mmol/l
  - Tension artérielle (non traitée) < 120/< 80 mm Hg
  - Absence de diabète : glucose < 5,6 mmol/l
- 4 comportements idéaux :
  - Non fumeur
  - IMC < 25 kg/m<sup>2</sup>
  - Niveau d'activité physique à la cible (150 min modérée/semaine)
  - Indice de qualité nutritionnelle
- Absence d'événements cardiovasculaires



**Pourcentage de la population  
avec une santé cardiovasculaire  
idéale?**

**Avec les 7 critères simples?**

0,1 %!!!

Étude ARIC

n=12,744

Folsom AR et al. J Am Coll Cardiol 2011;57:1690-96

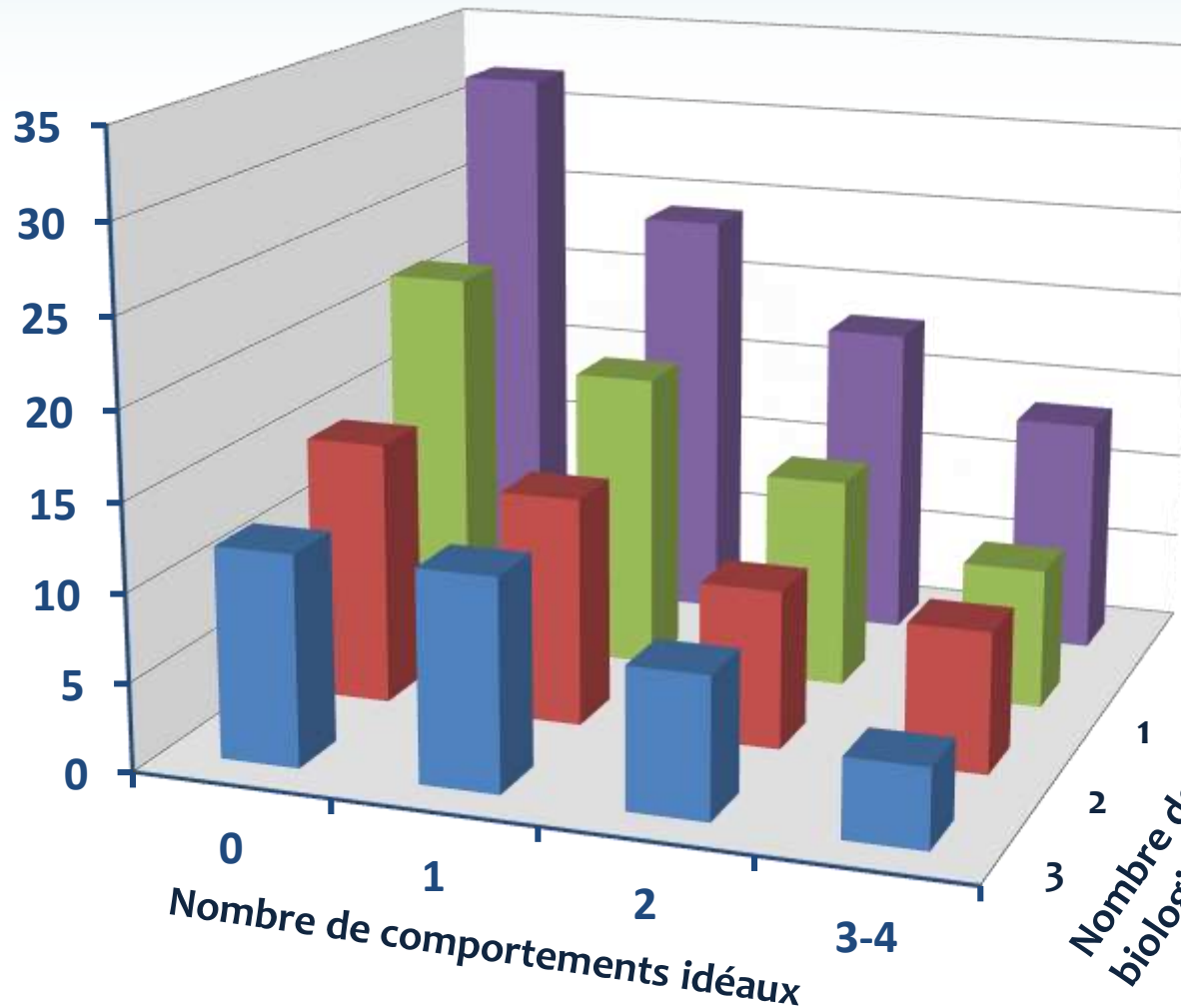
Cohorte Kailuan, Nord de la Chine

n=101,510

Wu S, Huang Z, Yang X, et al. Circ Cardiovasc Qual Outcomes 2012;5:487-93

# Incidence de maladies cardiovasculaires en fonction des facteurs de risque biologiques et comportementaux

Taux d'incidence ajusté pour l'âge, le sexe et l'ethnie (/1 000 personnes-année)



**Afin de prévenir de façon optimale les maladies cardiovasculaires, il est aussi important de cibler les facteurs de risque comportementaux que les facteurs de risque biologiques (tension artérielle, cholestérol, diabète).**

**Le fait-on en médecine?**

**NON!**

# Profil type d'un patient diabétique de type 2 pris en charge dans les soins primaires

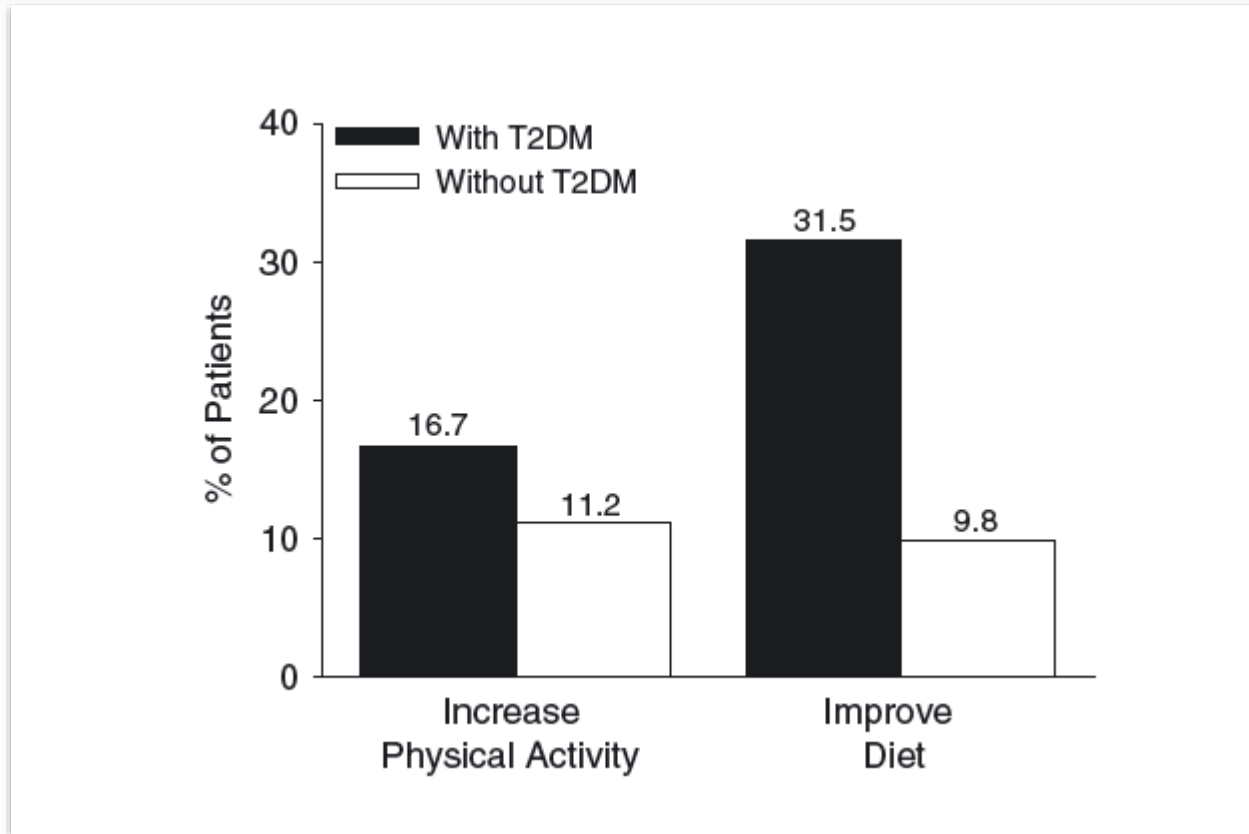
## Que faisons-nous au Canada?



- **Âge** : 63 ans
- **IMC** :
  - Homme = 30,3 kg/m<sup>2</sup>
  - Femme = 31,4 kg/m<sup>2</sup>
- **HbA1c** : 6,9%
- **Tension artérielle** : 130/76 mmHg
- **Cholestérol LDL** : 1,9 mmol/L
- **Dyslipidémie** : 55,4%
- **Hypertension** : 68,2%
- **Mode de vie sédentaire** : 56,5% (rapporté!!!)
- **Fumeur ou ancien fumeur** : 32,7%



# Proportion de patients avec et sans diabète de type 2 ayant reçu des recommandations de leur médecin sur les bonnes habitudes de vie

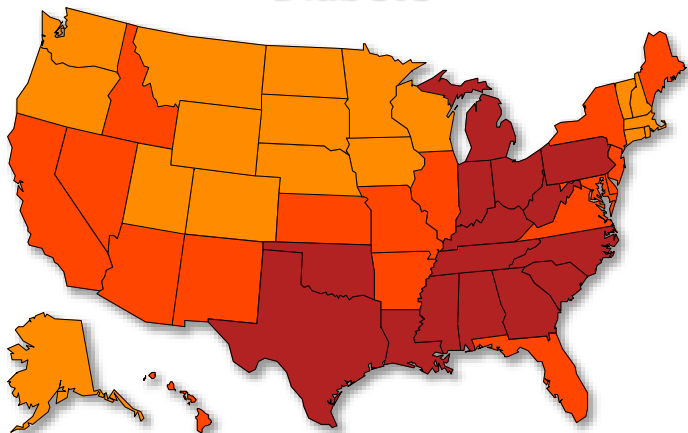


# Cibler notre alimentation ou la sédentarité?





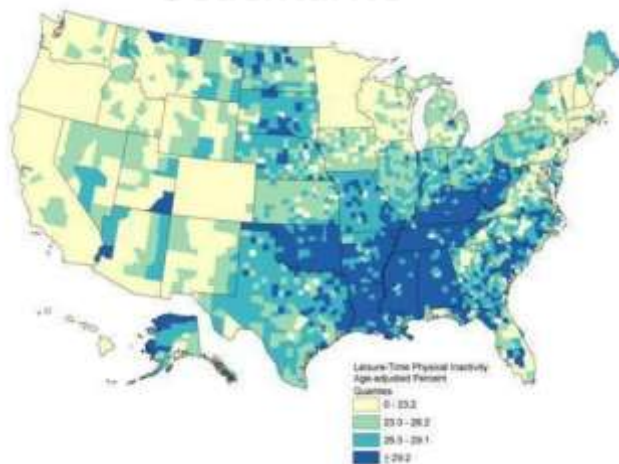
## Diabète



## Obésité



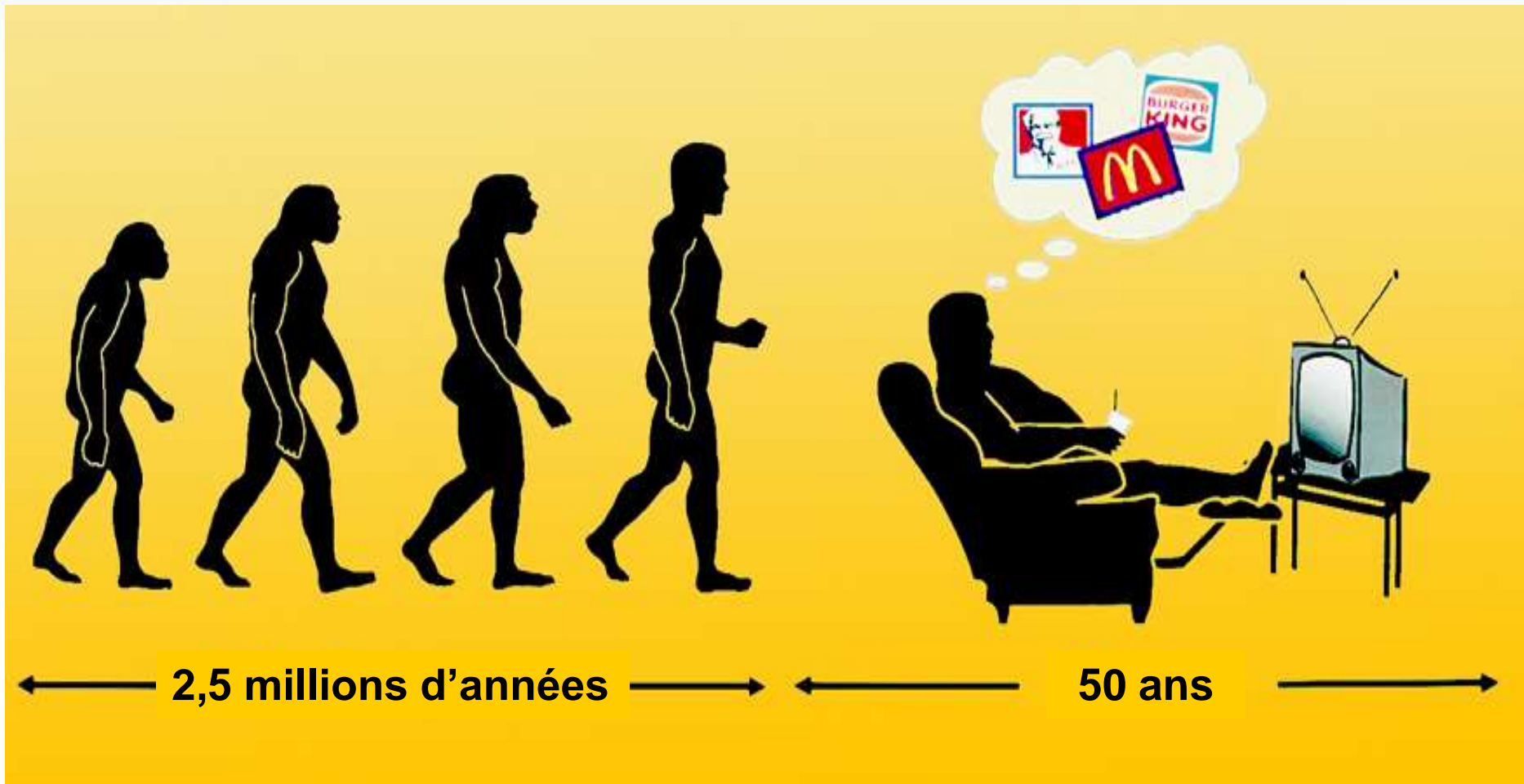
## Sédentarité



**L'obésité et le diabète :  
Ne pas oublier la sédentarité...**

# La restriction calorique?

## Incompatible avec notre physiologie...



# L'homme chasseur-cueilleur ne comptait pas ses calories...



"NOW YOU TELL ME YOU'VE GONE VEGAN?!"



# La restriction calorique...

Si elle n'est pas compatible avec notre physiologie, que devons nous faire?

Nous allons aborder cette question...



# **L'obésité**

**De quoi parlons-nous?**

# Ancel Keys

## Le père de l'IMC (poids santé)



*J Chron Dis* 1972. Vol. 25, pp. 329-343. Pergamon Press. Printed in Great Britain

### INDICES OF RELATIVE WEIGHT AND OBESITY

ANCEL KEYS,\* FLAMINIO FIDANZA,† MARTTI J. KARVONEN,‡ NOBORU KIMURA,§  
and HENRY L. TAYLOR¶

(Received 17 September 1971; in final form 27 December 1971)

#### INTRODUCTION

THE NEED for an index of relative body weight was recognized from the beginning of anthropometry, that is to say as soon as serious attention was given to the dimensions of the body and their biological and medical implications. Body weight in proportion to height or to some function of height is interesting because it should indicate something about 'build' or shape and about obesity or fatness.

Various indices of relative weight have been espoused and applied for many years but as yet there is no agreement on any particular index. In part this reflects confusion—or at least lack of agreement—about what a relative weight index should represent and mean; in part the reason is a lack of "calibrating" data and of systematic examination of wide-ranging samples of data analyzed in parallel. The purpose of this paper is to provide a comparison of various indices of relative weight as applied to data on weight, height and body fatness of men in several countries in Europe, in Japan, men in South Africa, as well as of white men in the United States.

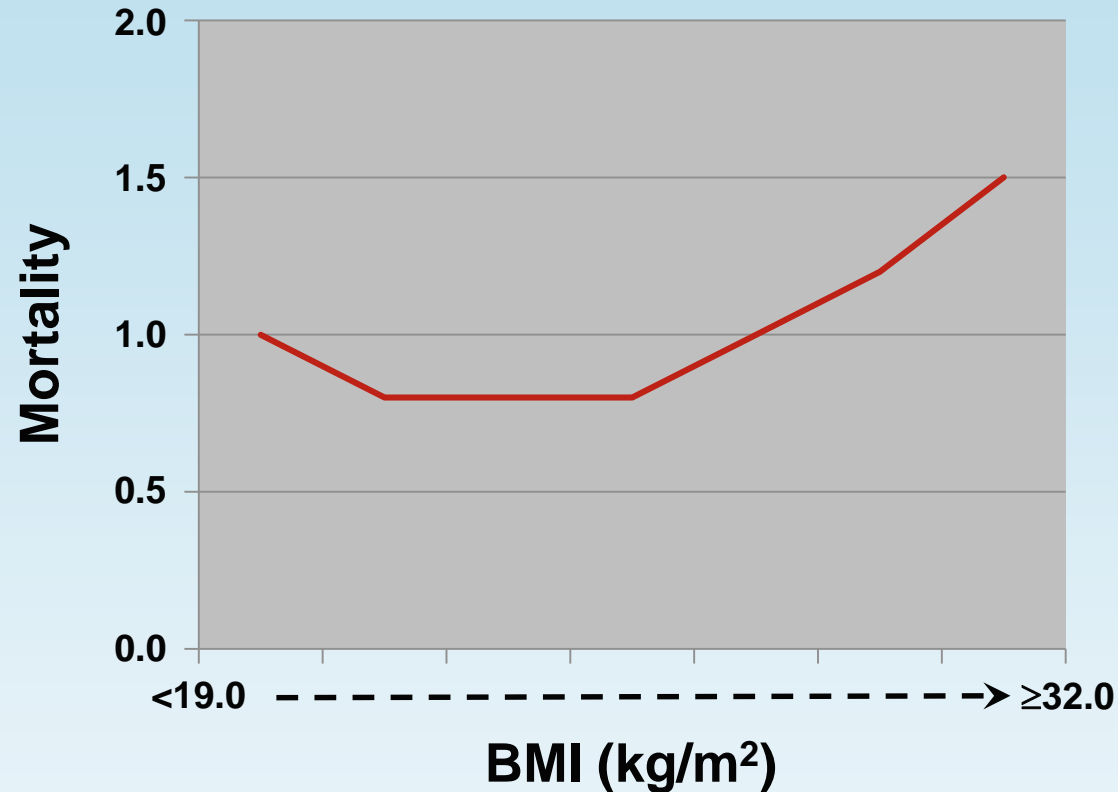
In the present paper guidance in the analysis was provided by two assumptions. First, it is assumed that a major reason for the use of a relative weight index is to remove the dependency of weight on height. Second, it is assumed that in the selection of an index attention should be given to the degree to which the index may indicate relative obesity or body fatness.

# La notion complètement dépassée de poids santé...

$$\text{IMC} = \frac{\text{Poids (kg)}}{\text{Taille}^2 \text{ (m}^2\text{)}}$$

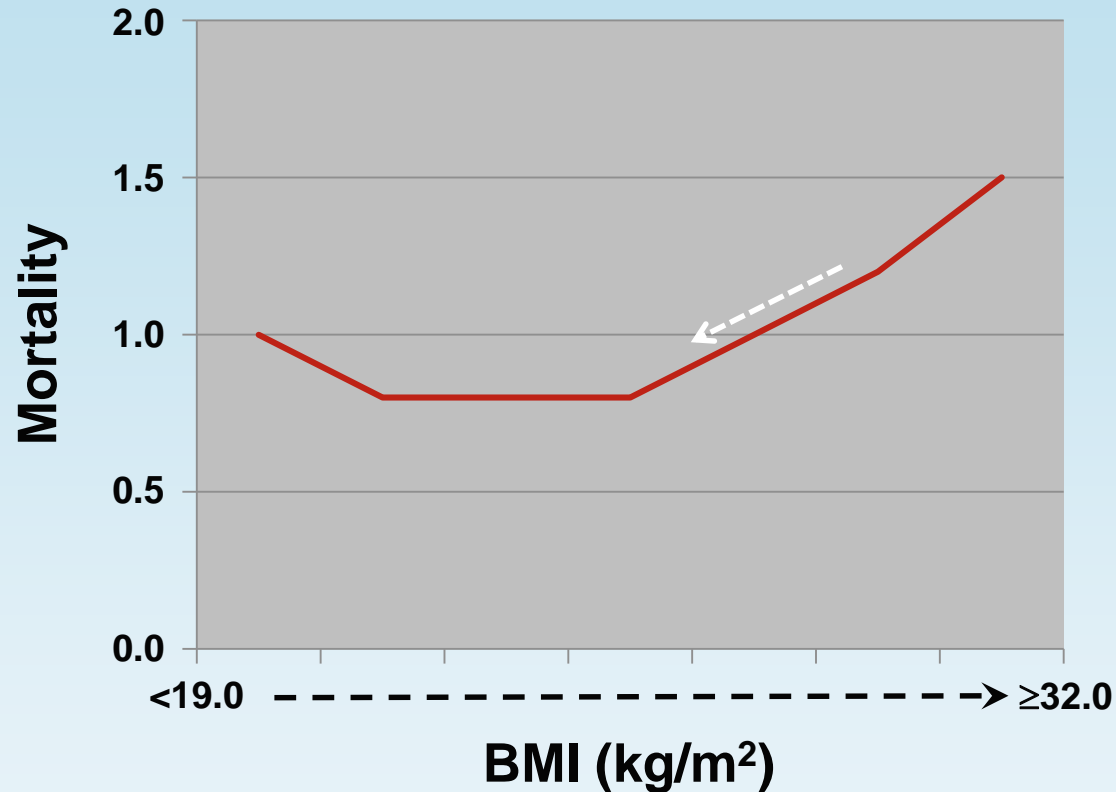
	<b>IMC (kg/m<sup>2</sup>)</b>	<b>Risque de comorbidités</b>
<b>Poids santé</b>	<b>18,5-24,9</b>	<b>Normal</b>
<b>Surpoids</b>	<b>25,0-29,9</b>	<b>Augmenté</b>
<b>Obésité classe I</b>	<b>30,0-34,9</b>	<b>Élevé</b>
<b>Obésité classe II</b>	<b>35,0-39,9</b>	<b>Très élevé</b>
<b>Obésité classe III</b>	<b>≥ 40,0</b>	<b>Extrêmement élevé</b>

# Risque relatif de mortalité associé à l'IMC (BMI)

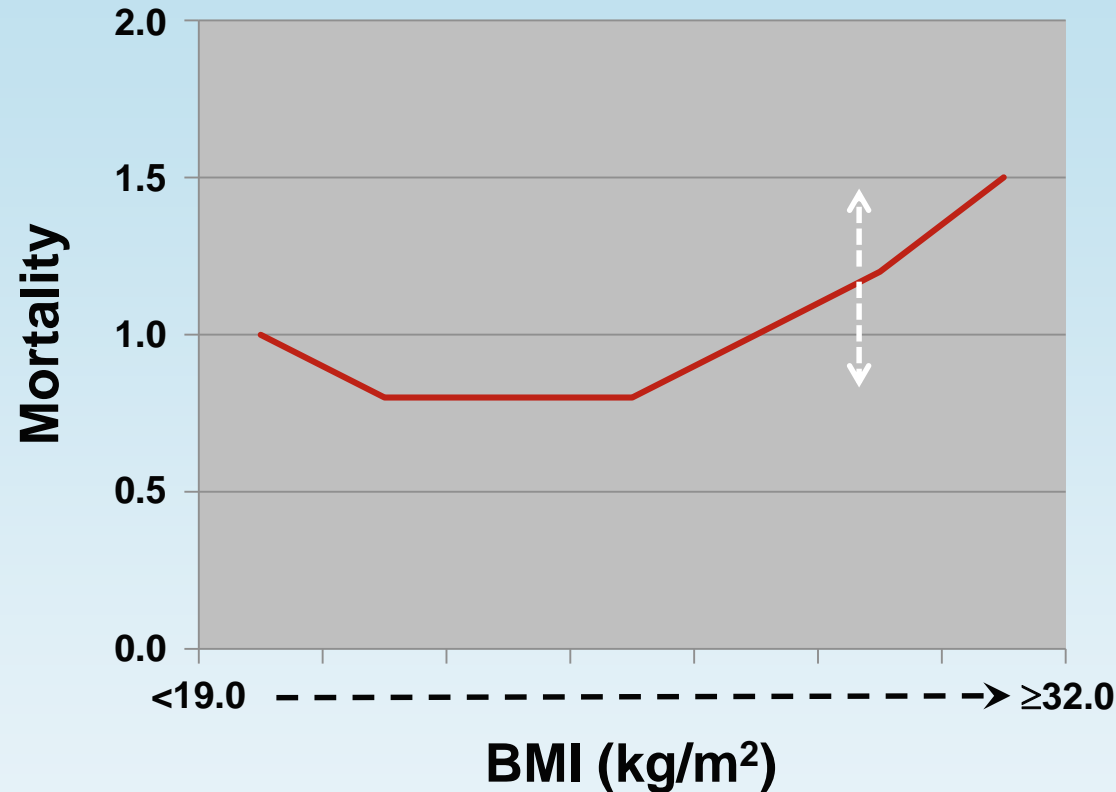




# La perte de poids réduit le risque?



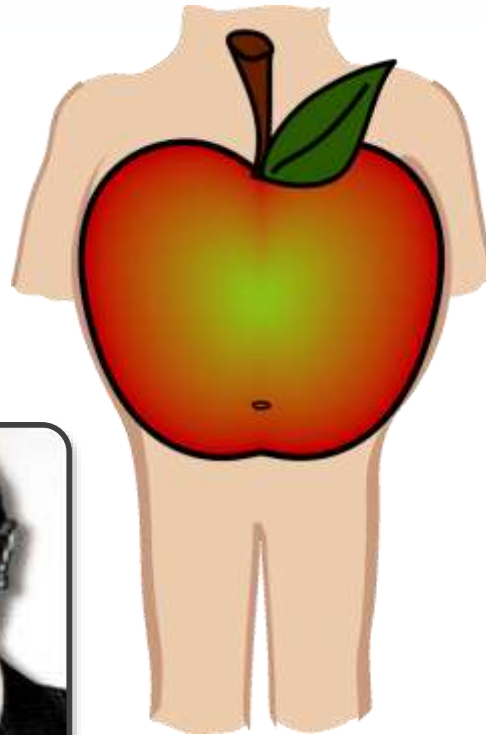
# Le risque varie considérablement à un IMC donné



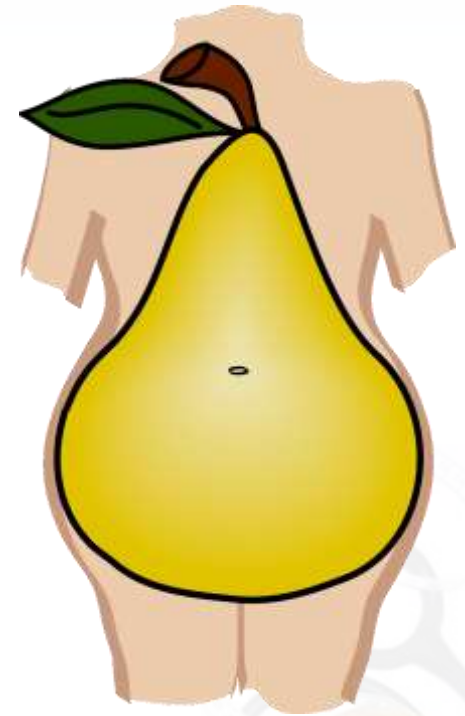
# Le pionnier...



Jean Vague MD



Élevé

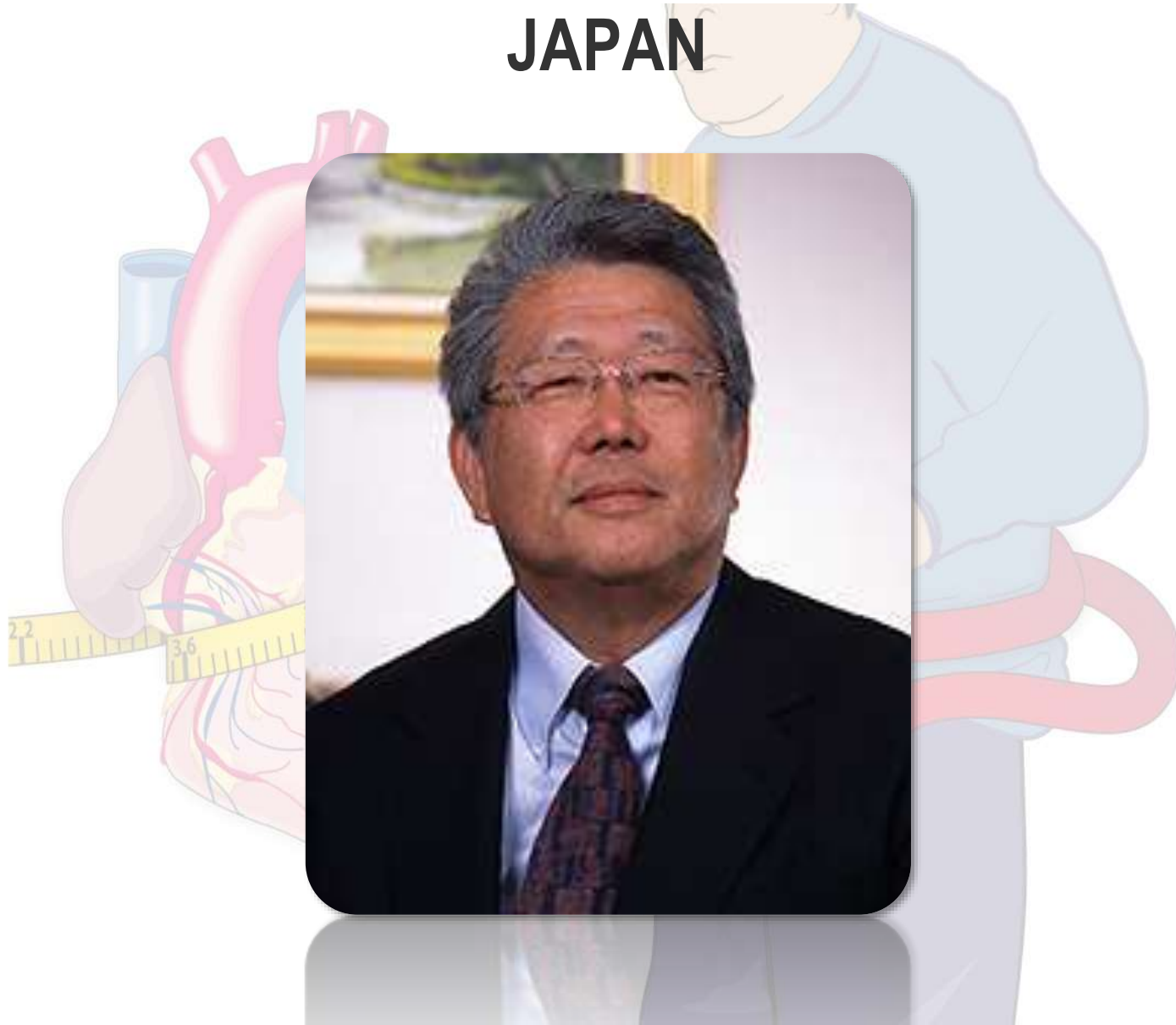


Faible

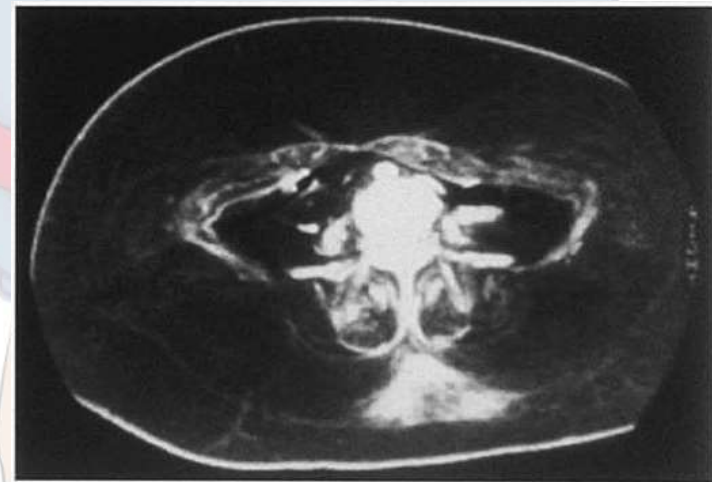
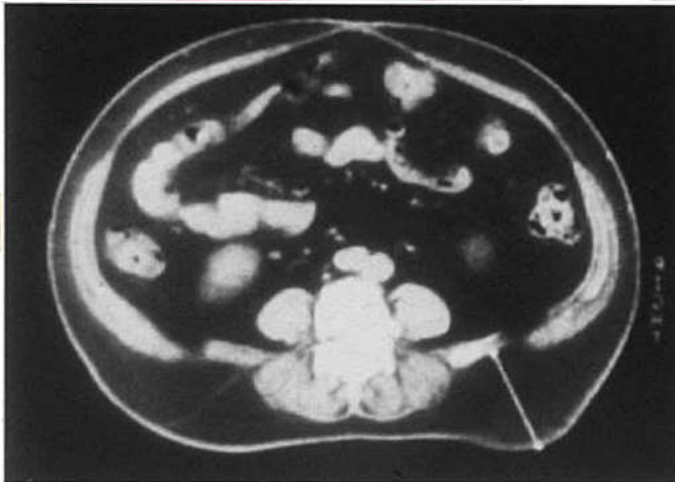
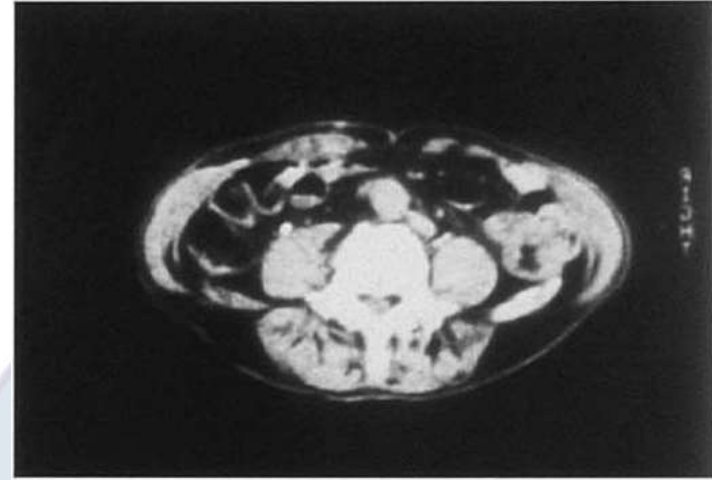
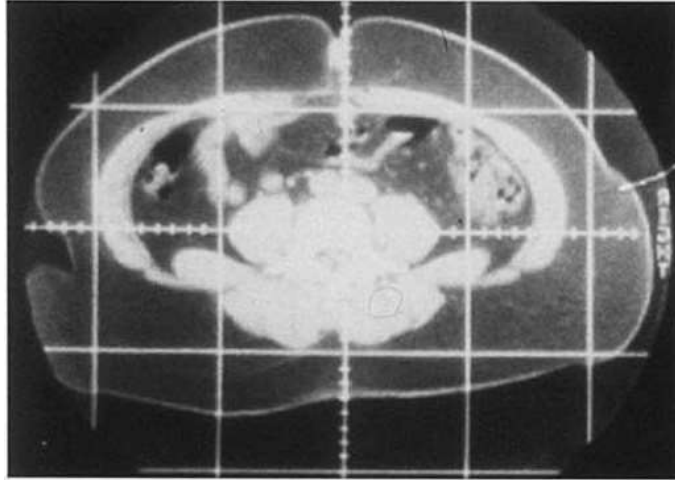
**RISQUE**

Vague J, Presse Méd, 1947

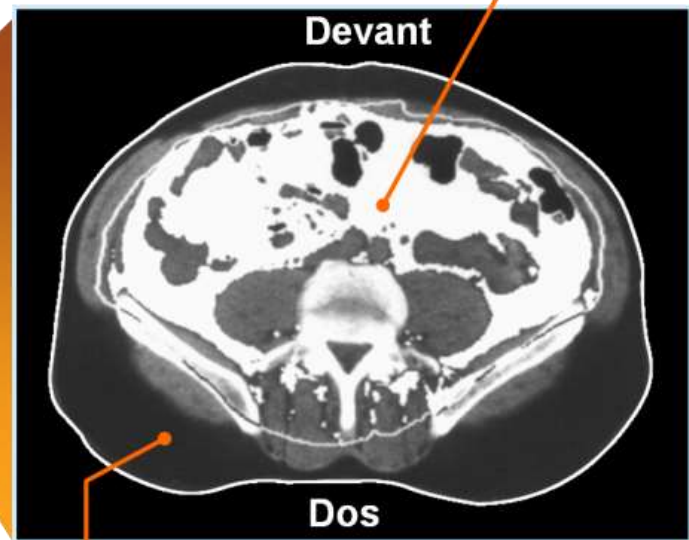
**Dr. Yuji Matsuzawa**  
**Dept. of Internal Medicine, University of Osaka,**  
**JAPAN**



# Une nouvelle méthode d'imagerie qui permet de aussi mesurer l'adiposité: La tomographie axiale



# Tout a débuté en 1986...



Tissu adipeux viscéral

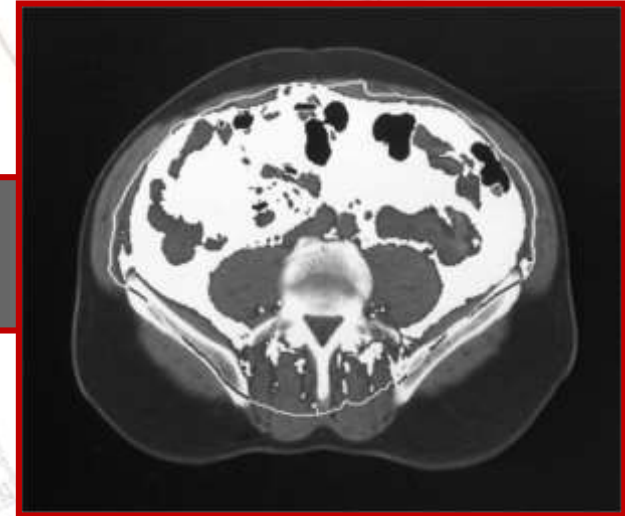
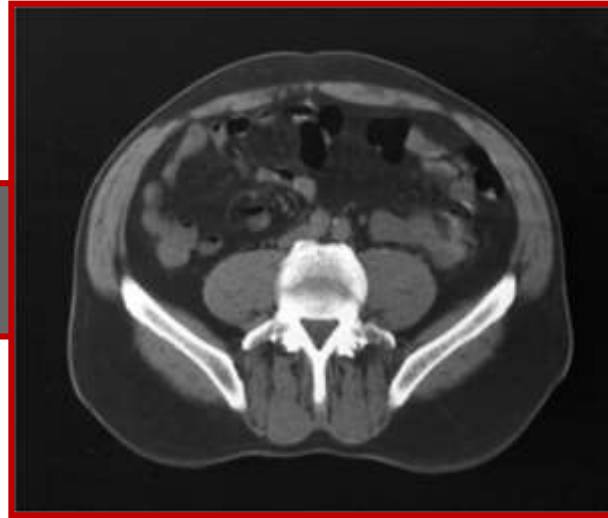
Devant

Dos

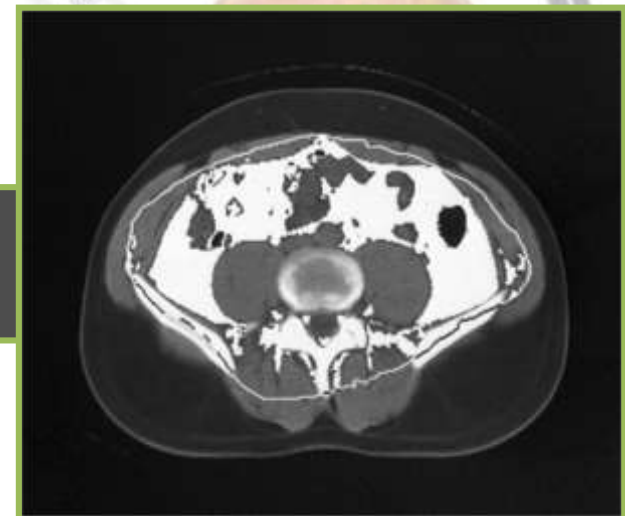
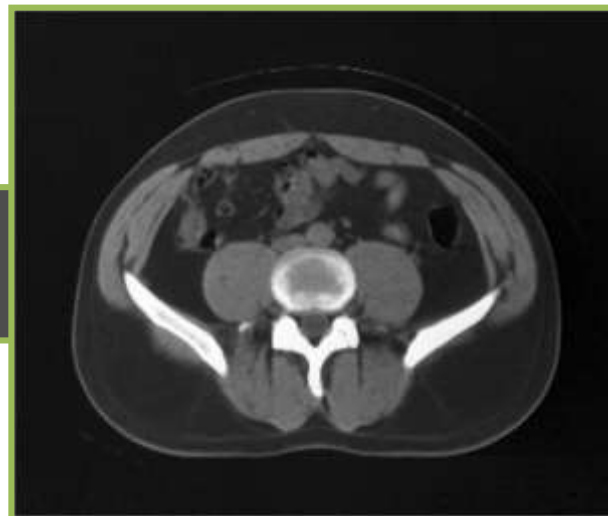
Tissu adipeux sous-cutané

# Nos premiers résultats...il y a 28 ans!!!

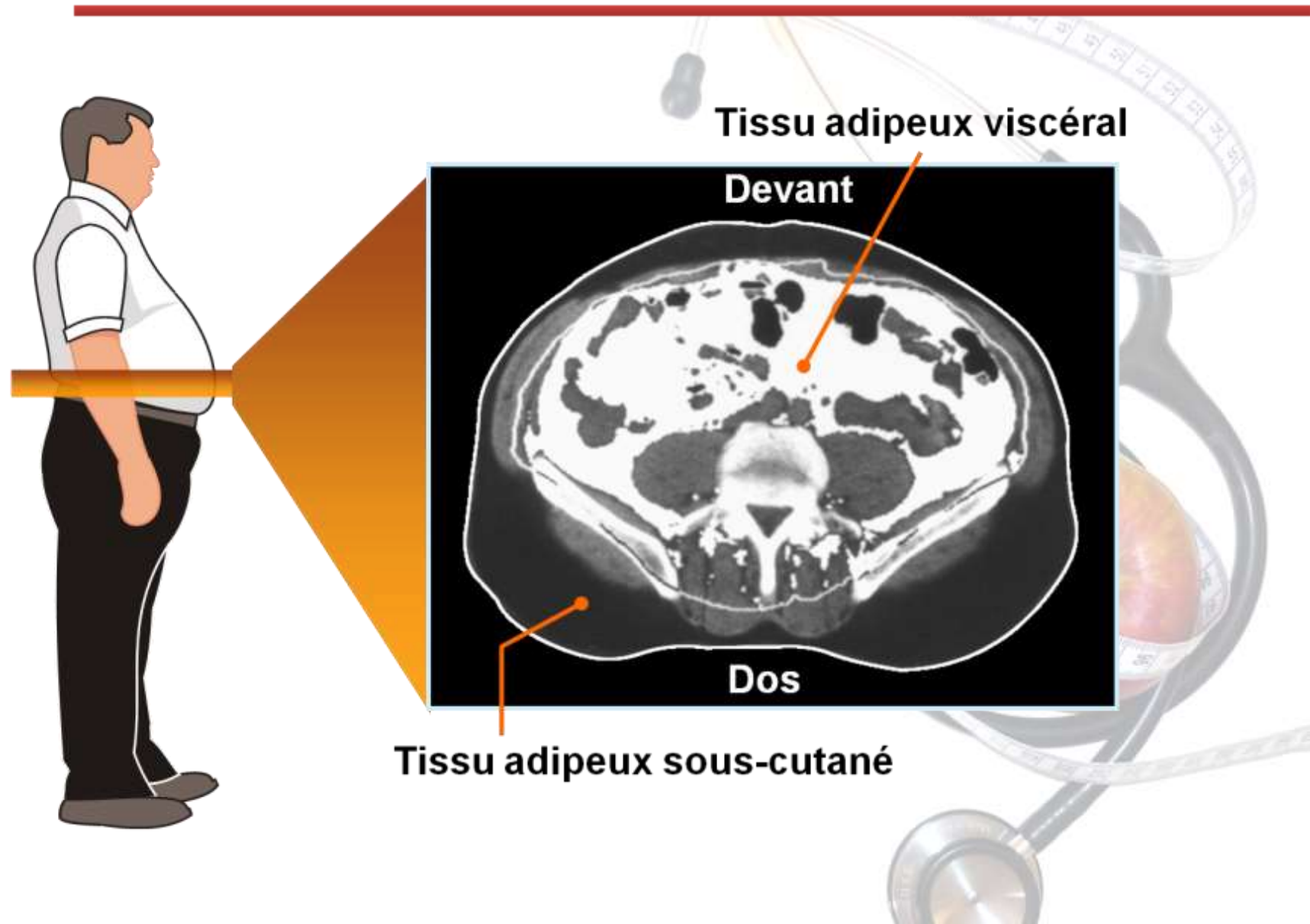
**Masse grasse : 19.8 kg**  
**TA viscéral : 155 cm<sup>2</sup>**



**Masse grasse : 19.8 kg**  
**TA viscéral : 96 cm<sup>2</sup>**

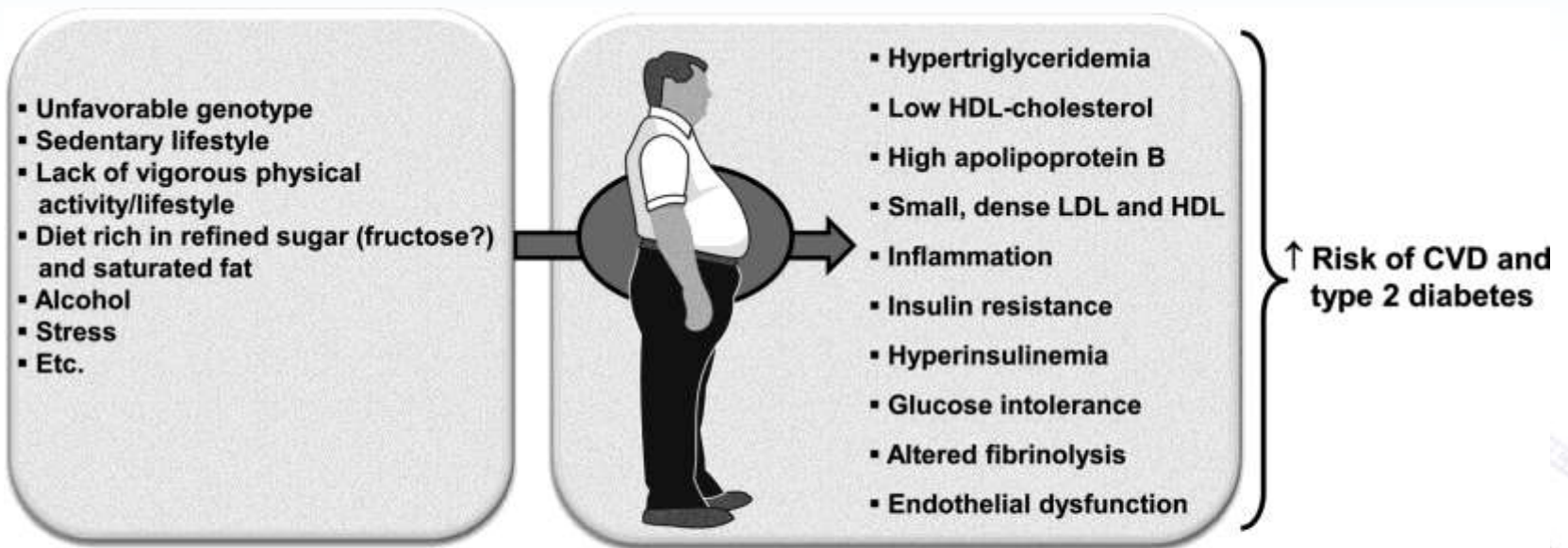


# Le tissu intra-abdominal (viscéral) : La graisse interne dangereuse!!!





# L'obésité viscérale et le risque cardiométabolique



**SYNDROME X (REAVEN'S SYNDROME)?  
INSULIN RESISTANCE SYNDROME?  
METABOLIC SYNDROME?  
EXCESS VISCERAL/ECTOPIC FAT?**



Dr Eric Larose

Laboratoire d'imagerie  
cardiovasculaire avancée



Centre de recherche de l'UICPQ  
Québec, Canada



PLATEFORME  
D'IMAGERIE  
AVANCÉE  
CENTRE DE RECHERCHE DE L'UICPQ

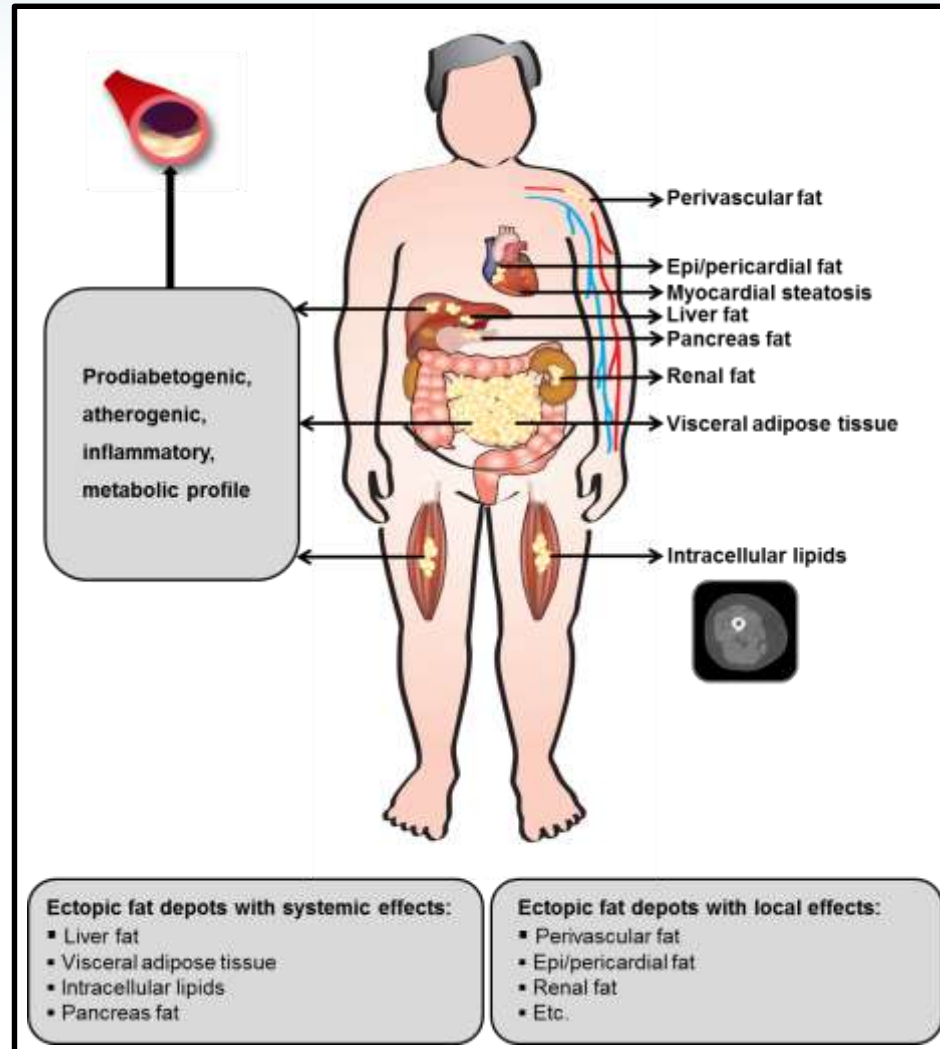


CHAIRE DE RECHERCHE  
ET D'INNOVATION EN  
**IMAGERIE**  
CARDIOVASCULAIRE

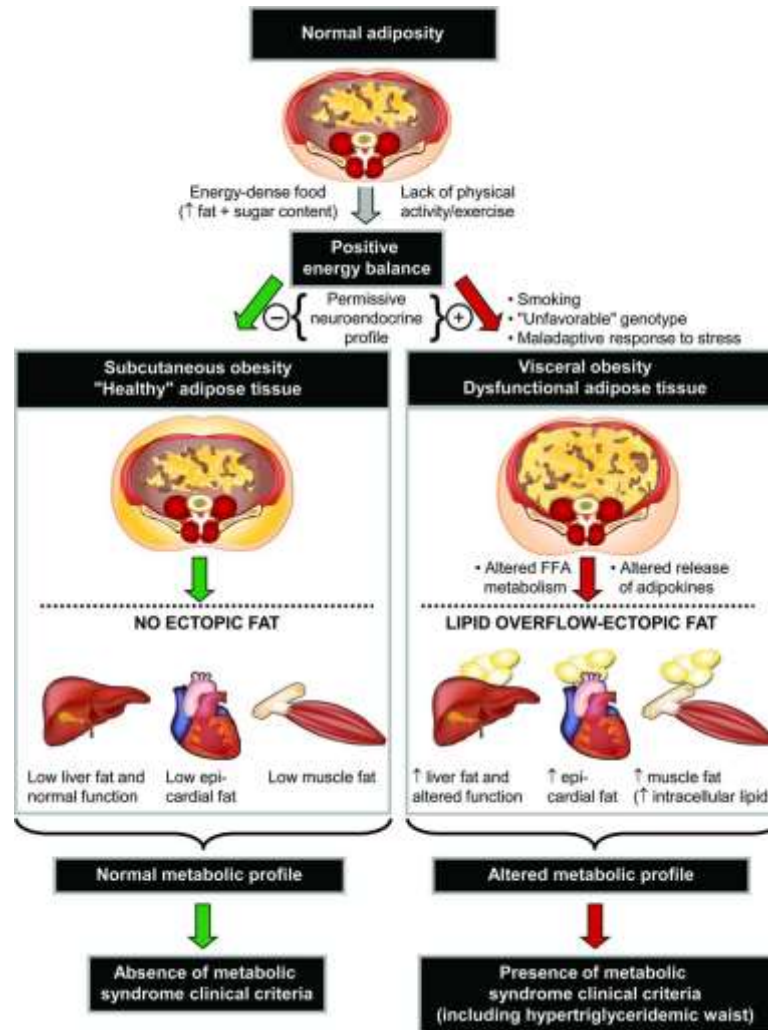


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# Les patients avec diabète de type 2 ont cette maladie non pas parce qu'ils sont obèses mais parce qu'il ont trop de graisse interne... Est-ce qu'on leur dit?

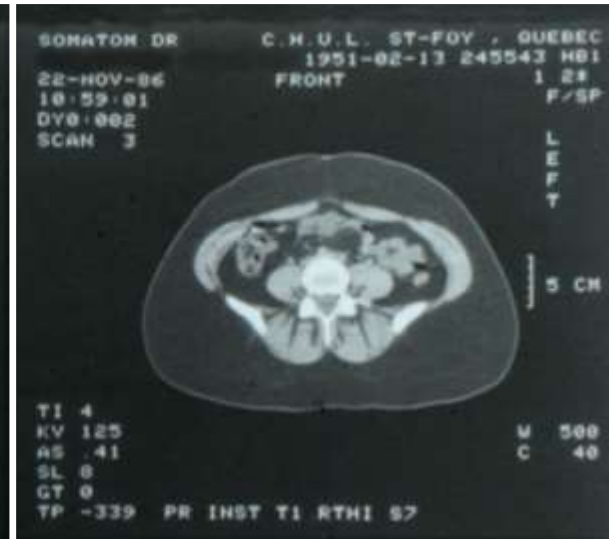


# Comment fait-on de la graisse viscérale/ectopique?

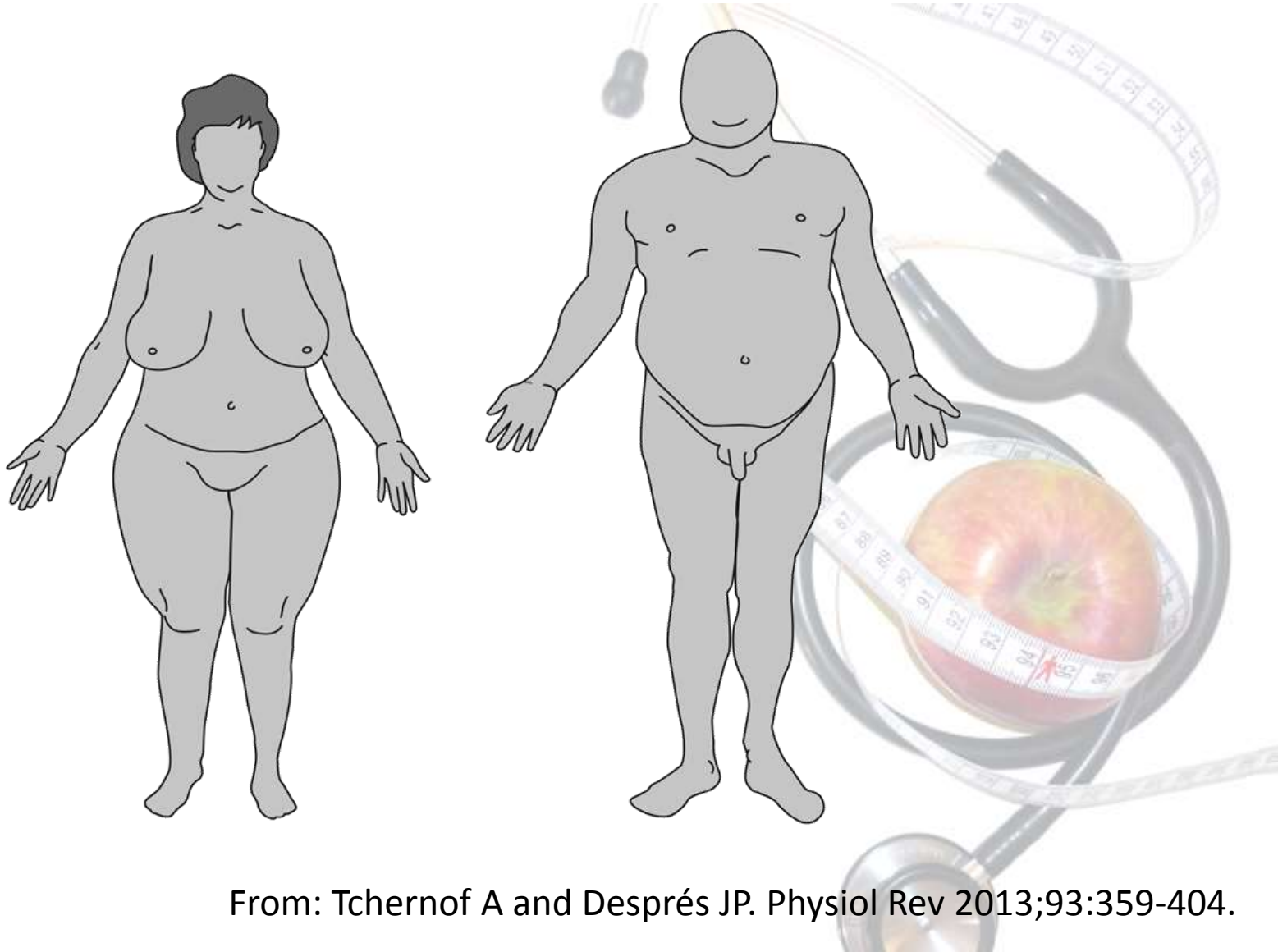


Després JP Circulation 2012;126:1301-1313

# L'obésité massive (BMI > 40 kg/m<sup>2</sup>) sans anomalies métaboliques s'explique maintenant...



# Le tissu adipeux gluteo-fémoral: Protecteur?



From: Tchernof A and Després JP. *Physiol Rev* 2013;93:359-404.

## Body Fat Distribution and Incident Cardiovascular Disease in Obese Adults



Emerging evidence suggests that significant heterogeneity exists in the cardiometabolic risk associated with excess body fat in obese individuals (1). We investigated the associations of novel imaging markers of adiposity, including visceral adipose tissue (VAT) and abdominal subcutaneous adipose tissue (SAT) by magnetic resonance imaging, lower body subcutaneous adipose tissue (LBAT) by dual-energy x-ray absorptiometry, and liver fat by magnetic resonance spectroscopy, with the risk for cardiovascular disease (CVD) events in a multiethnic cohort of obese adults.

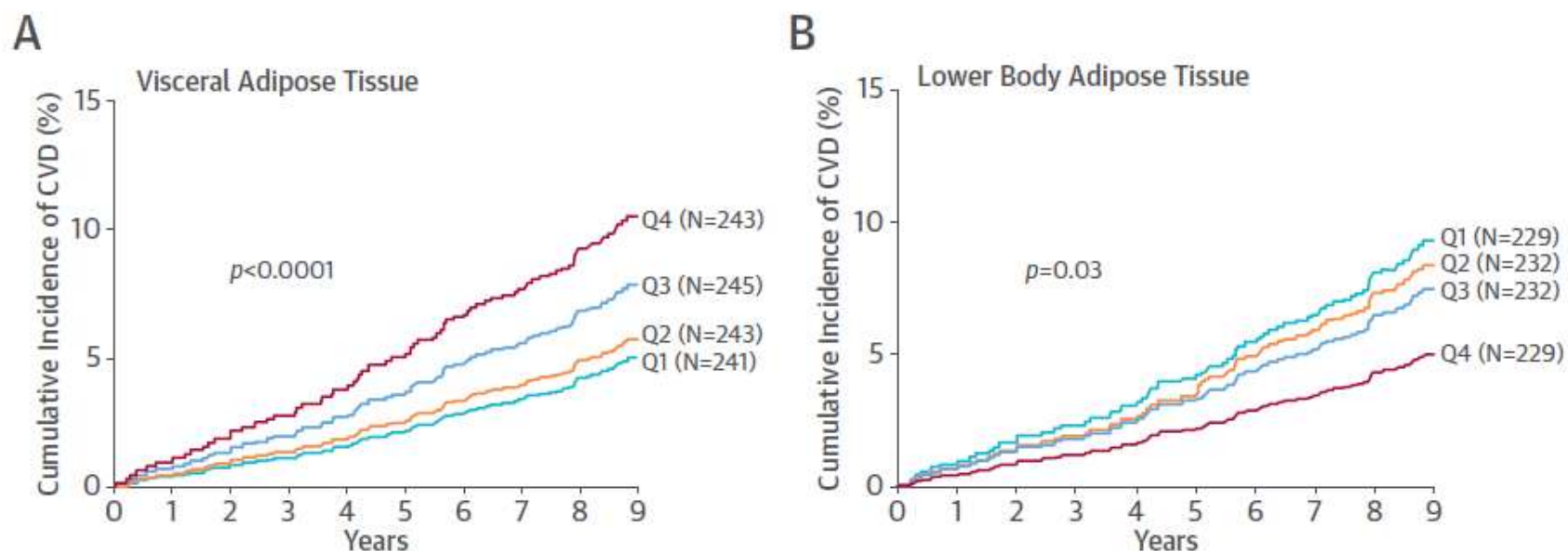
The Dallas Heart Study is a cohort study with methods previously described (1). Participants with body mass index (BMI) values  $<30$  kg/m<sup>2</sup>, prevalent CVD, and missing imaging data were excluded. The primary outcome was a composite of a first or subsequent CVD event: cardiovascular death; myocardial infarction, hospitalized unstable angina, or coronary revascularization; ischemic stroke, transient ischemic attack, or cerebrovascular revascularization; periph-

ate hazard ratios and 95% confidence intervals for the primary outcome associated with baseline measurements of each adiposity marker.

A total of 972 obese participants (mean age 44 years, 62% women, 54% African-Americans) were followed for a median of 9.1 years. Eighty-one individuals had first or subsequent CVD events, resulting in 108 events. The cumulative incidence of CVD increased in a stepwise fashion across sex- and race-specific quartiles of VAT, from 5.3% in quartile 1 to 10.0% in quartile 4 (Figure 1A). In contrast, an opposite association was observed for LBAT: the CVD event rate was 10.0% in quartile 1 and 5.4% in quartile 4 (Figure 1B). BMI, abdominal SAT, and liver fat were not associated with CVD. In multivariate analyses adjusting for age, sex, race, hypercholesterolemia, smoking status, and BMI, VAT remained associated with CVD (hazard ratio per 1 SD: 1.21; 95% confidence interval: 1.03 to 1.43), whereas LBAT was inversely associated with CVD (hazard ratio per 1 SD: 0.56; 95% CI: 0.44 to 0.72). Adjustment for hypertension, biomarkers of inflammation, insulin resistance, and dyslipidemia, and for adipocytokines, did not attenuate these associations. Adjustment for baseline diabetes status modestly attenuated the association of VAT with CVD. Lean mass and physical activity both were inversely associated with CVD and mildly attenuated the relation between VAT and CVD. Substitution of waist circumference for BMI showed

# L'adiposité des fesses et des cuisses protège contre les maladies cardiovasculaires!

**FIGURE 1** Associations of Imaging-Based Markers of Adipose Tissue Distribution With CVD Events

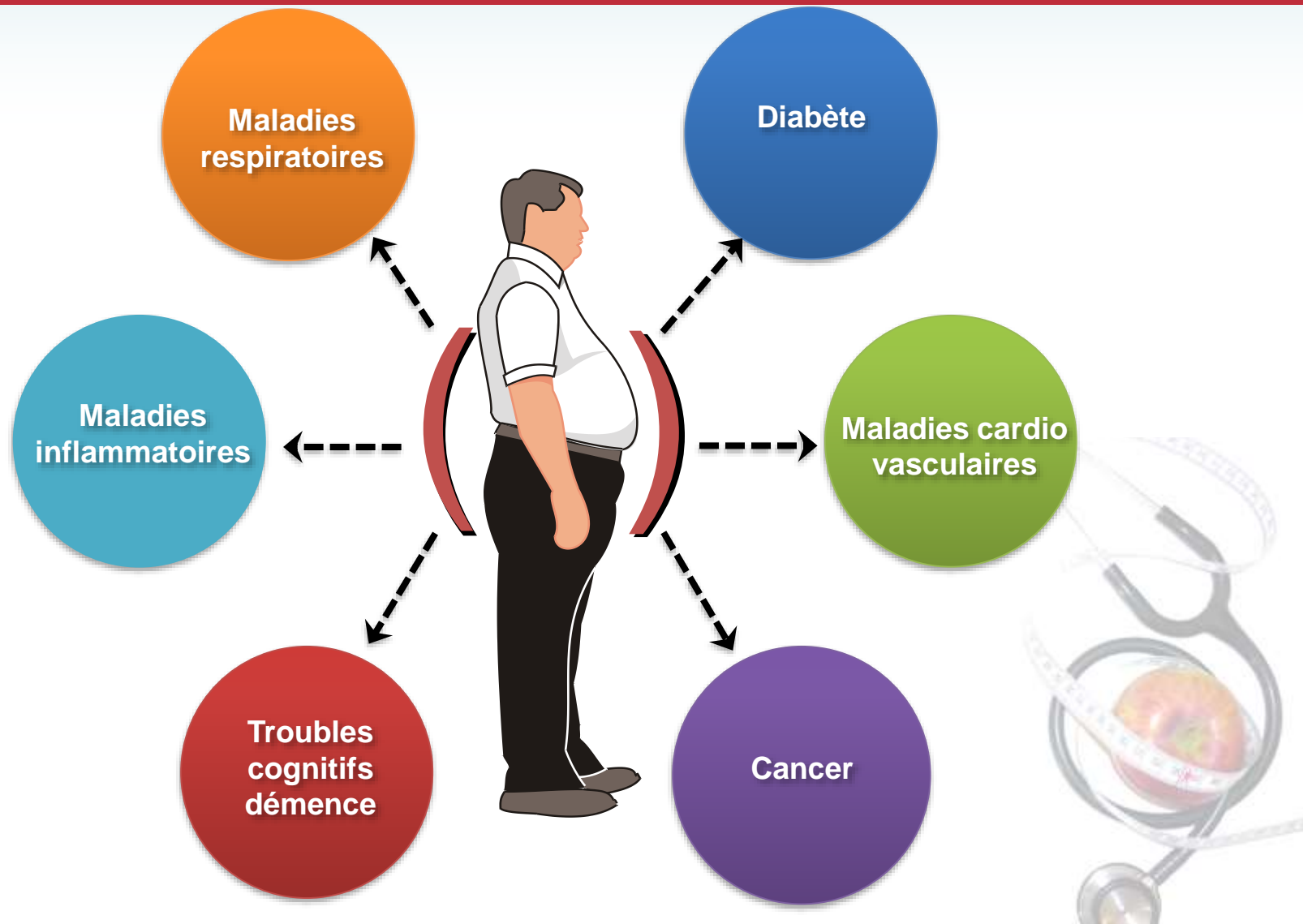


Cumulative incidence of cardiovascular disease (CVD) by visceral (A) and lower body (B) adipose tissue mass.



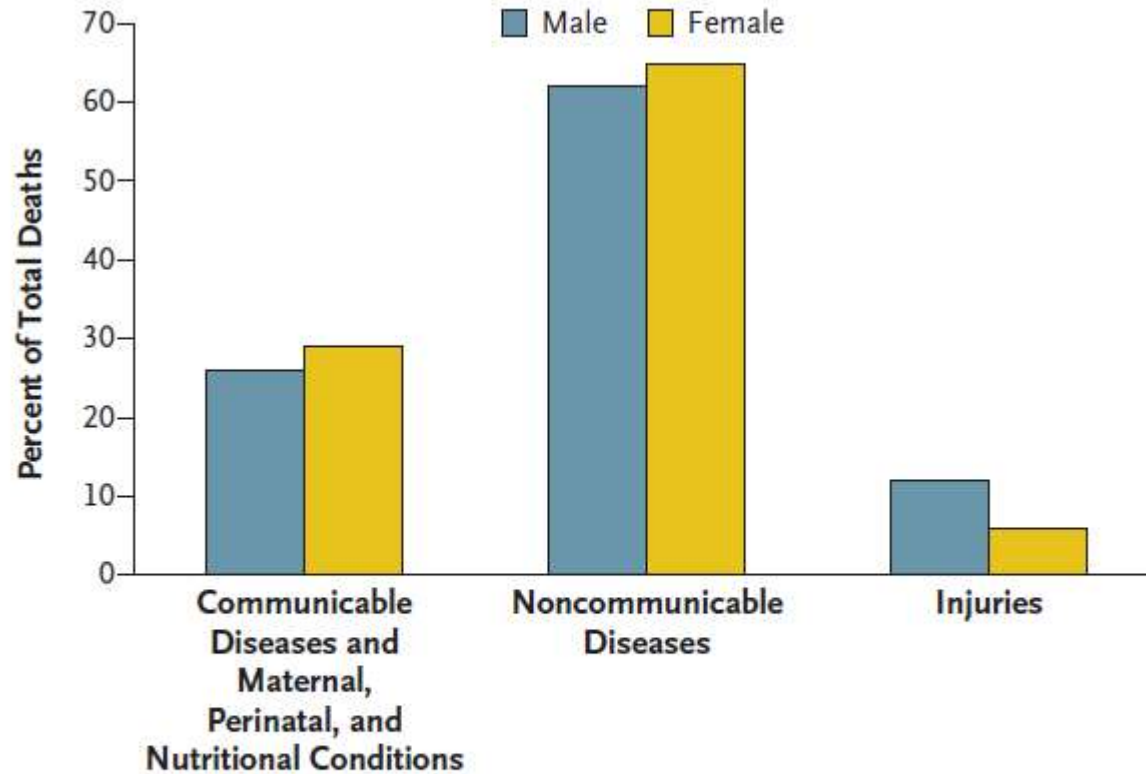
# L'obésité abdominale et les maladies chroniques sociétales

## Des problèmes de santé majeurs et coûteux!



# Les maladies chroniques sociétales

## 60% des décès!!!



**Figure 1.** Global Deaths According to Cause and Sex, 2008.

Adapted from the World Health Organization (WHO).<sup>4</sup>

**“However, four common behavioral risk factors (tobacco use, excessive alcohol consumption, poor diet, and lack of physical activity) are associated with four disease clusters (cardiovascular diseases, cancers, chronic pulmonary diseases, and diabetes) that account for about 80% of deaths from noncommunicable diseases. According to WHO estimates, noncommunicable diseases contributed to 36 million deaths globally in 2008, accounting for 63% of 57 million total deaths.”**



**Les maladies chroniques  
sociétales...**

**...cela nous coûte cher!**

**Quoi faire?**

**À la recherche de solutions...**



INSTITUT UNIVERSITAIRE DE  
CARDIOLOGIE  
ET DE PNEUMOLOGIE  
DE QUÉBEC



UNIVERSITÉ  
**LAVAL**

**Comment mieux évaluer et prendre en charge en clinique le profil de santé des patients avec une obésité à risque???**

**Obésité  
abdominale**

**Condition  
cardiorespiratoire**

**Qualité  
nutritionnelle**

**Habitudes activité  
physique**

**Comment mieux évaluer et prendre en charge en clinique le profil de santé des patients avec une obésité à risque???**

**Obésité  
abdominale**

**Condition  
cardiorespiratoire**

**Qualité  
nutritionnelle**

**Habitudes activité  
physique**

# Le tour de taille: un signe vital!!!



## Waist Circumference and Abdominal Sagittal Diameter: Best Simple Anthropometric Indexes of Abdominal Visceral Adipose Tissue Accumulation and Related Cardiovascular Risk in Men and Women

Marie-Christine Pouliot, MSc, Jean-Pierre Després, PhD, Simone Lemieux, MSc, Sital Moorjani, PhD, Claude Bouchard, PhD, Angelo Tremblay, PhD, André Nadeau, MD, PhD, and Paul J. Lupien, MD, PhD



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# A Pooled Analysis of Waist Circumference and Mortality in 650,000 Adults

James R. Cerhan, MD, PhD; Steven C. Moore, PhD; Eric J. Jacobs, PhD;  
Cari M. Kitahara, PhD; Philip S. Rosenberg, PhD; Hans-Olov Adami, MD, PhD;  
Jon O. Ebbert, MD; Dallas R. English, PhD; Susan M. Gapstur, PhD;  
Graham G. Giles, PhD; Pamela L. Horn-Ross, PhD; Yikyung Park, PhD;  
Alpa V. Patel, PhD; Kim Robien, PhD; Elisabete Weiderpass, PhD;  
Walter C. Willett, PhD; Alicja Wolk, PhD; Anne Zeleniuch-Jacquotte, PhD;  
Patricia Hartge, PhD; Leslie Bernstein, PhD; and Amy Berrington de Gonzalez, PhD

## Abstract

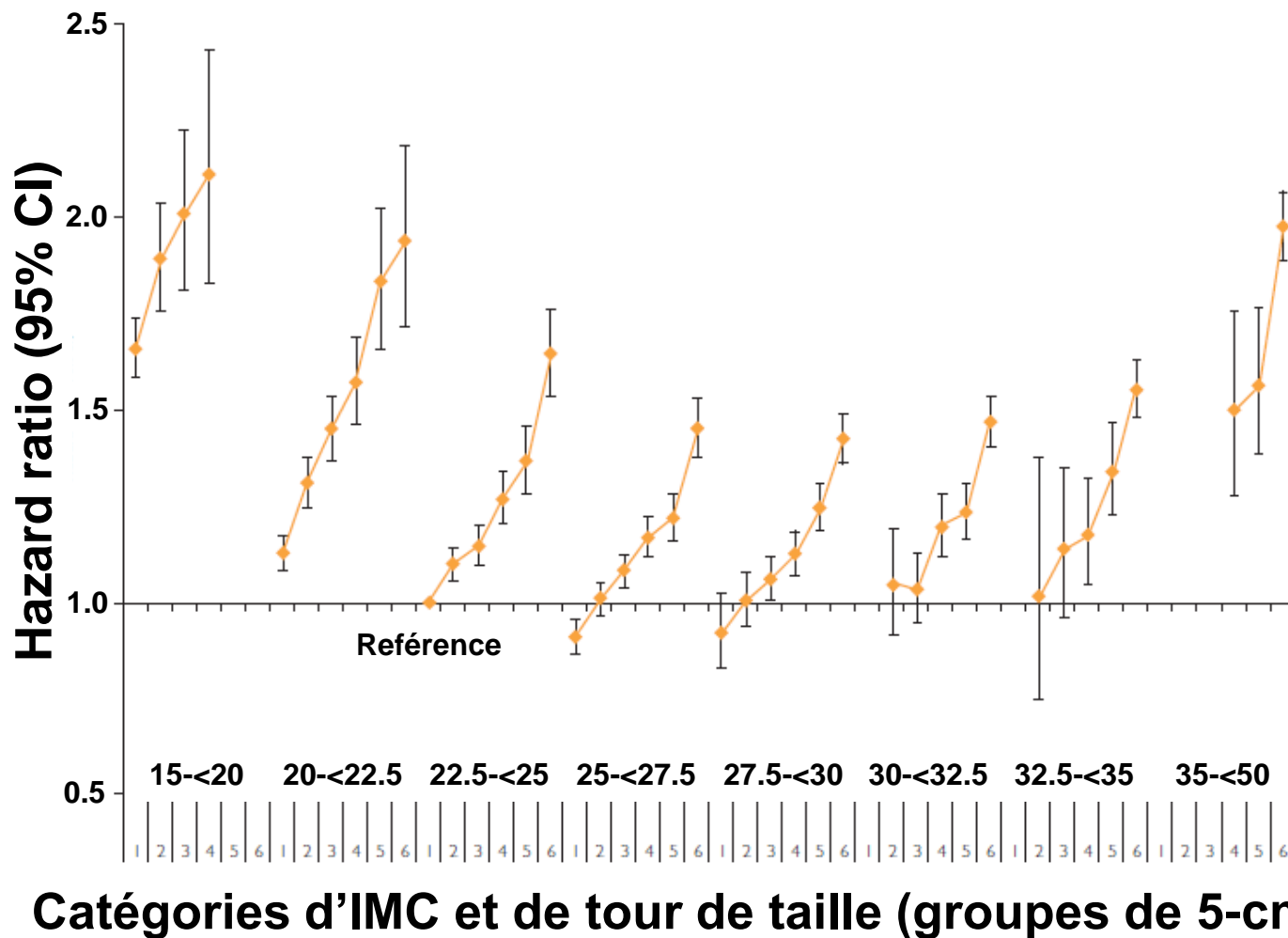
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**Objectives:** To assess the independent effect of waist circumference on mortality across the entire body mass index (BMI) range and to estimate the loss in life expectancy related to a higher waist circumference.

**Patients and Methods:** We pooled data from 11 prospective cohort studies with 650,386 white adults aged 20 to 83 years and enrolled from January 1, 1986, through December 31, 2000. We used proportional hazards regression to estimate hazard ratios (HRs) and 95% CIs for the association of waist circumference with mortality.

**Results:** During a median follow-up of 9 years (maximum, 21 years), 78,268 participants died. After accounting for age, study, BMI, smoking status, alcohol consumption, and physical activity, a strong

# Chaque augmentation de 5 cm du tour de taille augmente le risque de mortalité indépendamment du poids santé



# L'évaluation clinique et gestion du risque cardiométabolique chez les patients avec diabète de type 2: de nouvelles cibles?

**Obésité  
abdominale**

**Condition  
cardiorespiratoire**

**Qualité  
nutritionnelle**

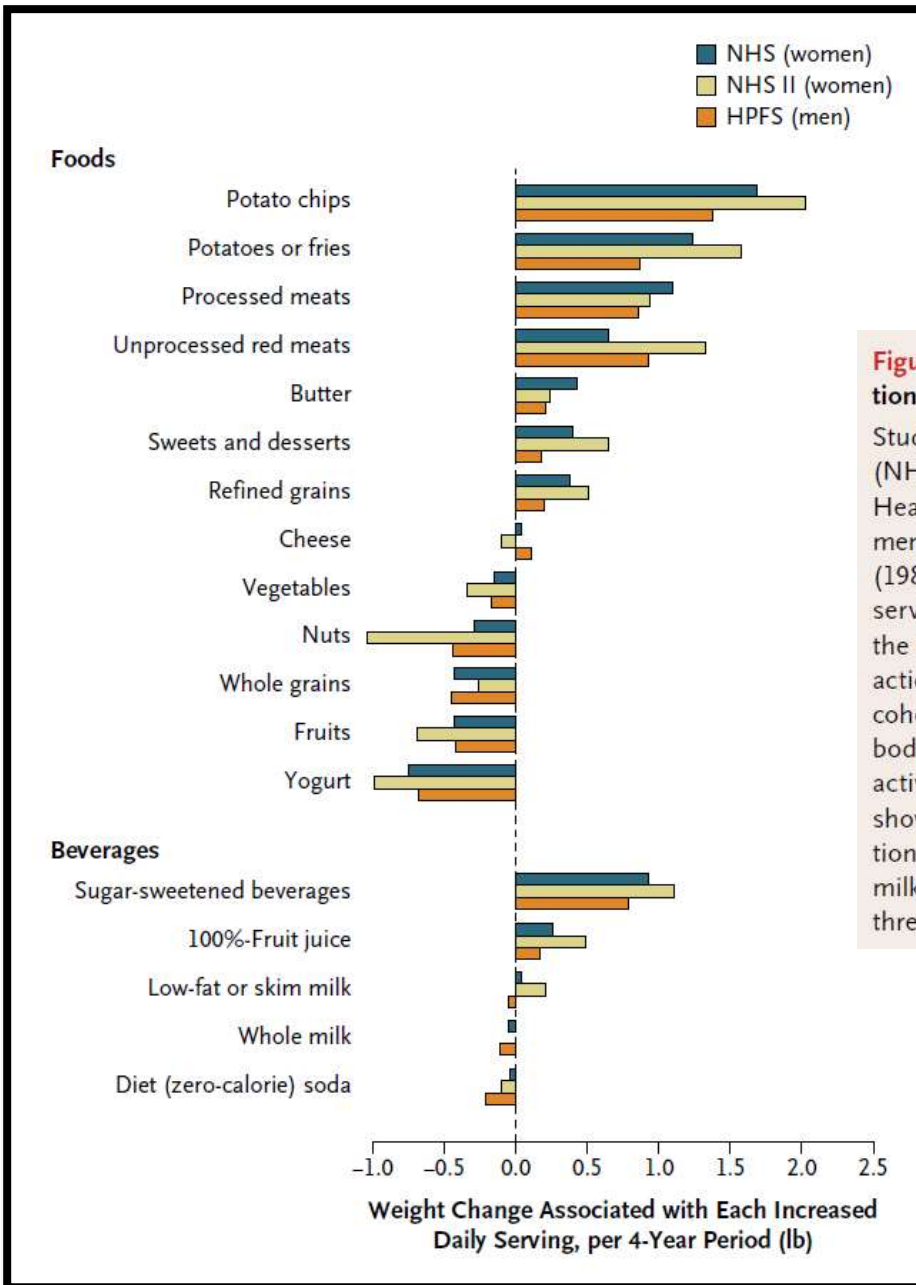
**Habitudes activité  
physique**

# « Diminuer le gras saturé »... le message a dérapé vers « diminuer le gras alimentaire »: CONFUSION!



# La qualité nutritionnelle basée sur les aliments: un nouveau paradigme

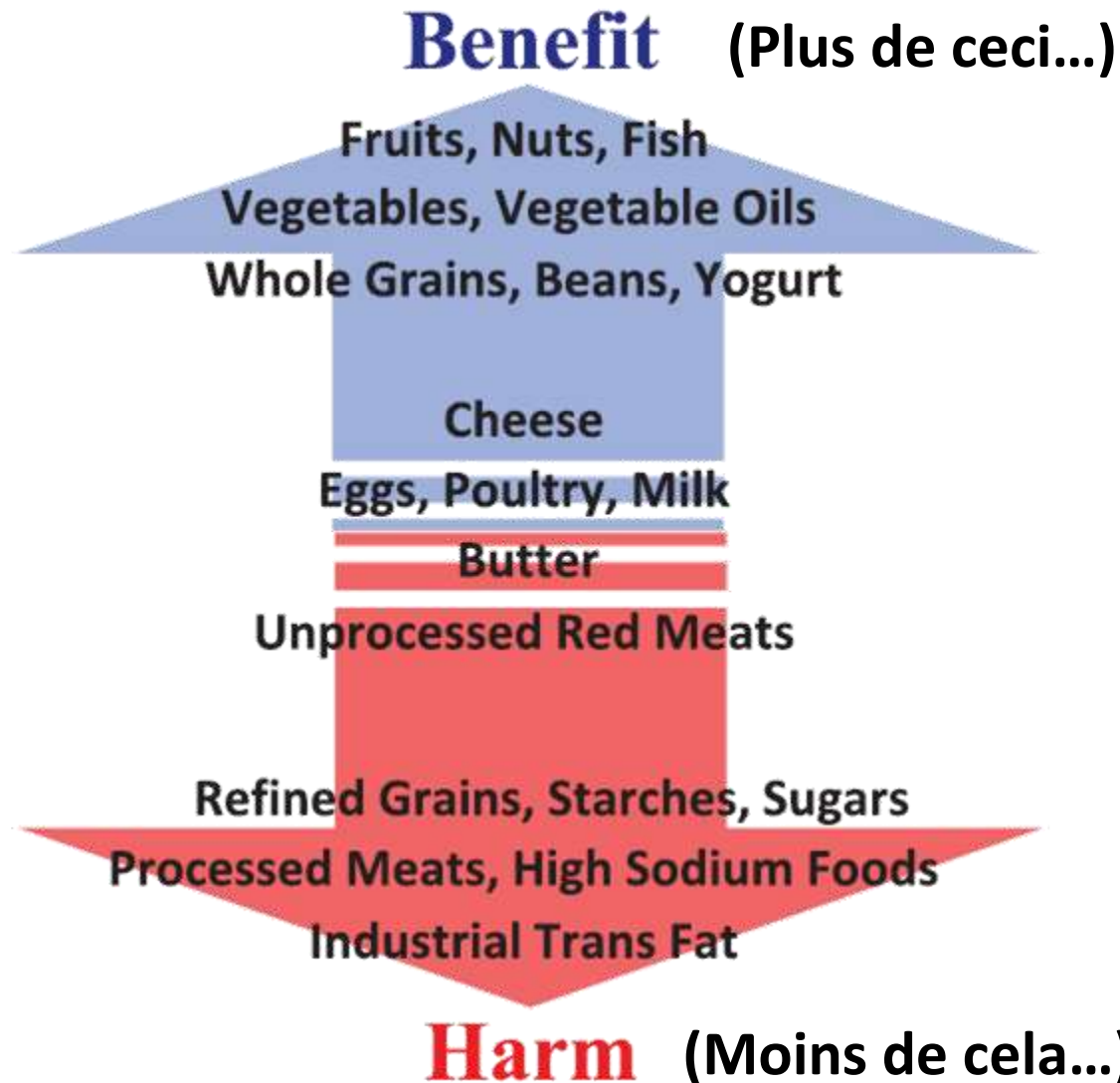




**Figure 1. Relationships between Changes in Food and Beverage Consumption and Weight Changes Every 4 Years, According to Study Cohort.**

Study participants included 50,422 women in the Nurses' Health Study (NHS), followed for 20 years (1986 to 2006); 47,898 women in the Nurses' Health Study II (NHS II), followed for 12 years (1991 to 2003); and 22,557 men in the Health Professionals Follow-up Study (HPFS), followed for 20 years (1986 to 2006). Weight changes are reported for each increase in the daily serving of the food or beverage; decreased intake would be associated with the inverse weight changes. There was little evidence of a significant interaction between diet and physical activity ( $P > 0.10$  for the interaction in each cohort). All weight changes were adjusted simultaneously for age, baseline body-mass index, sleep duration, and changes in smoking status, physical activity, television watching, alcohol use, and all of the dietary factors shown. The P value is less than 0.001 for all dietary factors with the exception of butter in the NHS II, cheese in the NHS and NHS II, low-fat or skim milk in the NHS and HPFS, diet soda in the NHS, and whole-fat milk in all three cohorts.

# Recommandations basées sur les aliments

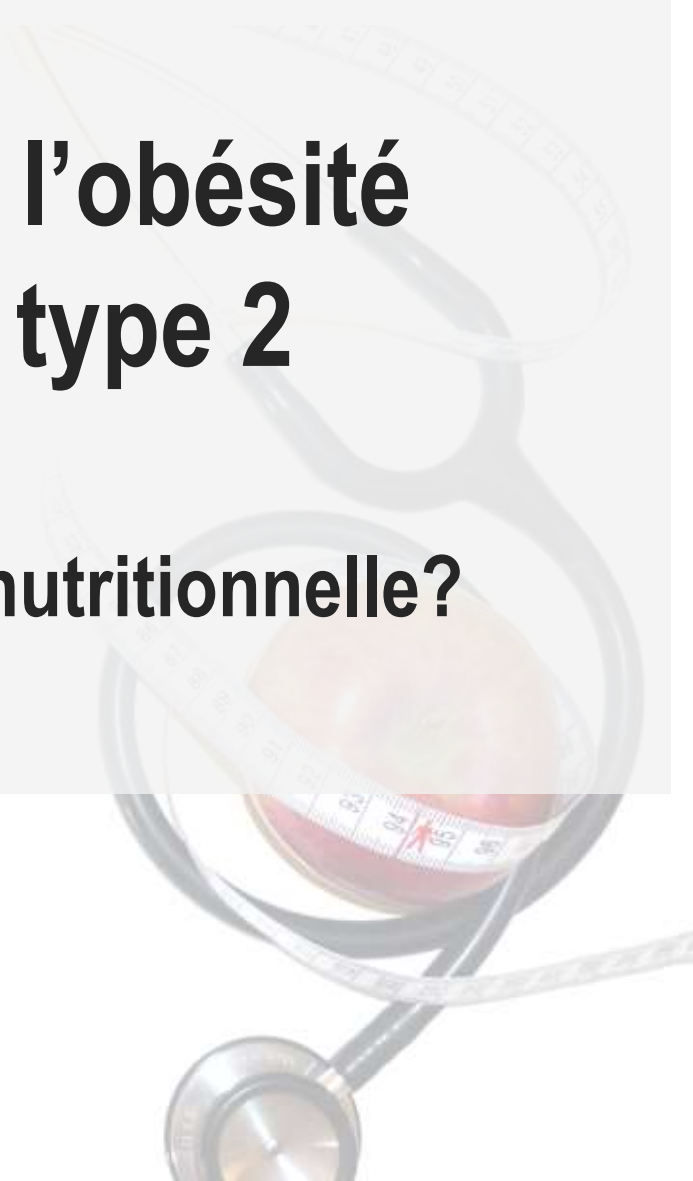


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Circulation (2016) 133: 187-225

# **Prise en charge de l'obésité et du diabète de type 2**

**Comment cibler la qualité nutritionnelle?**





# PREDIMED : Un exemple d'intervention nutritionnelle simple ne visant pas la perte de poids comme critère principal

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

## Primary Prevention of Cardiovascular Disease with a Mediterranean Diet

Ramón Estruch, M.D., Ph.D., Emilio Ros, M.D., Ph.D., Jordi Salas-Salvadó, M.D., Ph.D., Maria-Isabel Covas, D.Pharm., Ph.D., Dolores Corella, D.Pharm., Ph.D., Fernando Arós, M.D., Ph.D., Enrique Gómez-Gracia, M.D., Ph.D., Valentina Ruiz-Gutiérrez, Ph.D., Miquel Fiol, M.D., Ph.D., José Lapetra, M.D., Ph.D., Rosa Maria Lamuela-Raventos, D.Pharm., Ph.D., Lluís Serra-Majem, M.D., Ph.D., Xavier Pintó, M.D., Ph.D., Josep Basora, M.D., Ph.D., Miguel Angel Muñoz, M.D., Ph.D., José V. Sorlí, M.D., Ph.D., José Alfredo Martínez, D.Pharm, M.D., Ph.D., and Miguel Angel Martínez-González, M.D., Ph.D., for the PREDIMED Study Investigators\*

ABSTRACT

### BACKGROUND

Observational cohort studies and a secondary prevention trial have shown an inverse association between adherence to the Mediterranean diet and cardiovascular risk. We conducted a randomized trial of this diet pattern for the primary prevention of cardiovascular events.

N = 7447 sujets

Âge : 67 ans

(57% femmes)

IMC : 30 kg/m<sup>2</sup>

Circ.de taille : 100 cm

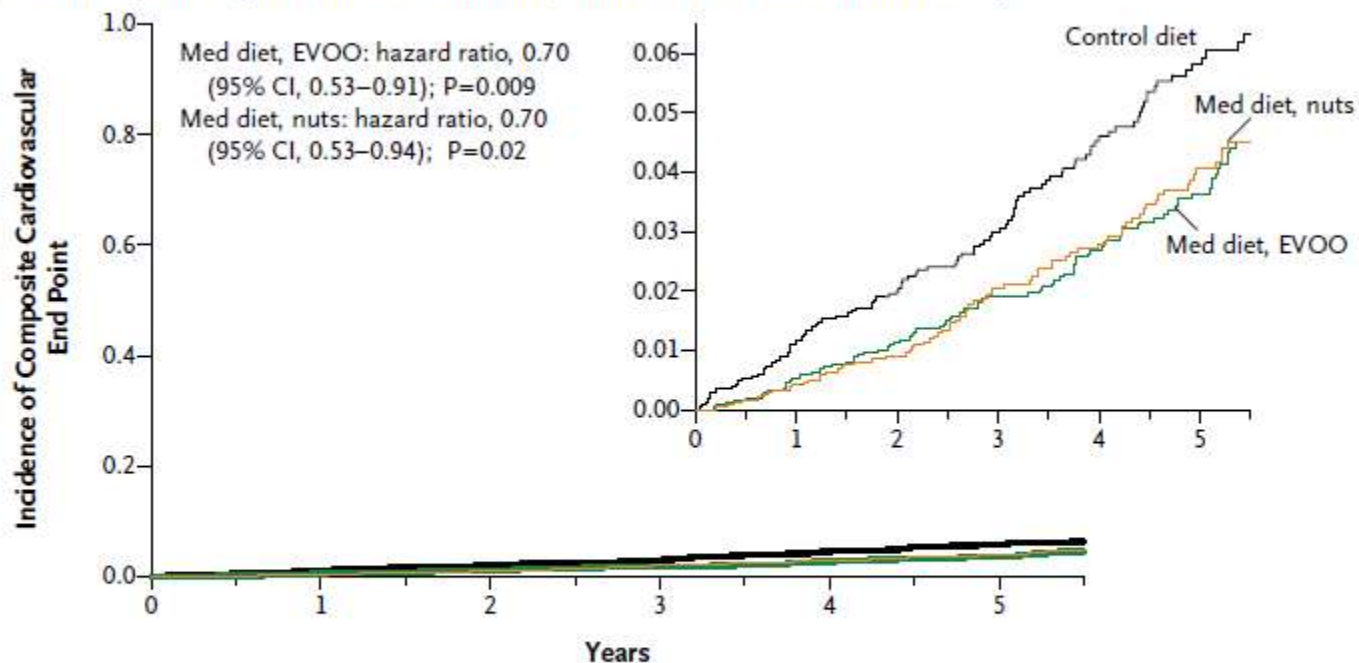
50 % avec diabète de type 2

Suivi : 4,8 ans



# Incidence cumulative des évènements cardiovasculaires

**A** Primary End Point (acute myocardial infarction, stroke, or death from cardiovascular causes)



**No. at Risk**

Control diet	2450	2268	2020	1583	1268	946
Med diet, EVOO	2543	2486	2320	1987	1687	1310
Med diet, nuts	2454	2343	2093	1657	1389	1031

Critère principal : infarctus du myocarde, accident vasculaire cérébral et décès dus aux maladies cardiovasculaires.

# L'évaluation clinique et gestion du risque cardiométabolique chez les patients avec diabète de type 2: de nouvelles cibles?

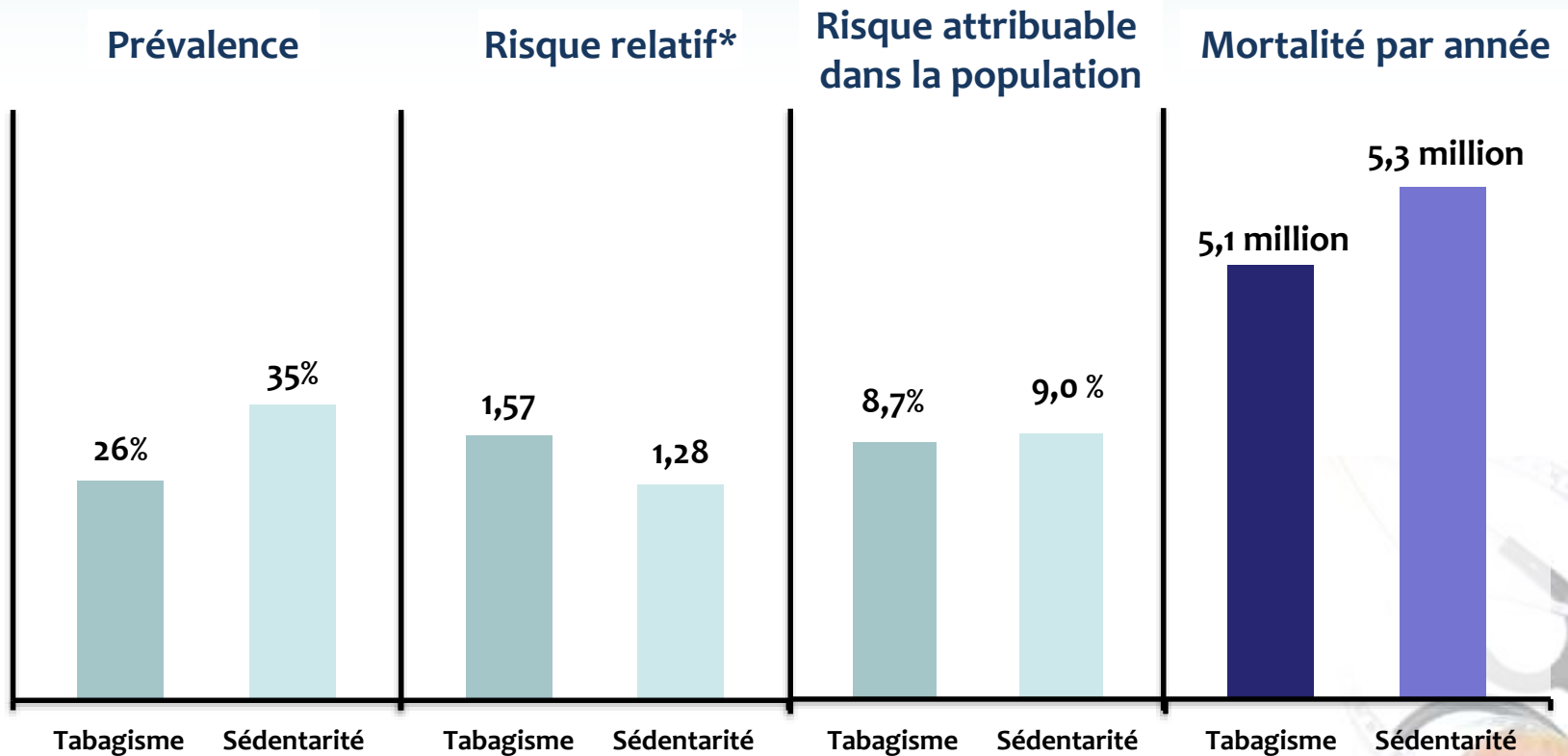
**Obésité  
abdominale**

**Condition  
cardiorespiratoire**

**Qualité  
nutritionnelle**

**Habitudes activité  
physique**

# Mode de vie sédentaire : La cigarette du 21<sup>e</sup> siècle?



Comparaison du fardeau attribuable au tabagisme et à la sédentarité (tiré d'une méta-analyse).

# « L'exercice est inutile pour perdre du poids »

Est-ce qu'on rend service au public lorsqu'on véhicule de tels messages?



# Physical activity, metabolic syndrome, and coronary risk: the EPIC–Norfolk prospective population study

**Lysette N Broekhuizen<sup>1</sup>, S Matthijs Boekholdt<sup>1,2</sup>,  
Benoit J Arsenault<sup>3</sup>, Jean–Pierre Despres<sup>3</sup>, Erik SG Stroes<sup>1</sup>,  
John JP Kastelein<sup>1</sup>, Kay–Tee Khaw<sup>4</sup> and Nicholas J Wareham<sup>5</sup>**

European Journal of Cardiovascular  
Prevention & Rehabilitation  
18(2) 209–217  
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Cardiology 2011  
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DOI: 10.1177/1741826710389397  
ejcpr.sagepub.com



## **Abstract**

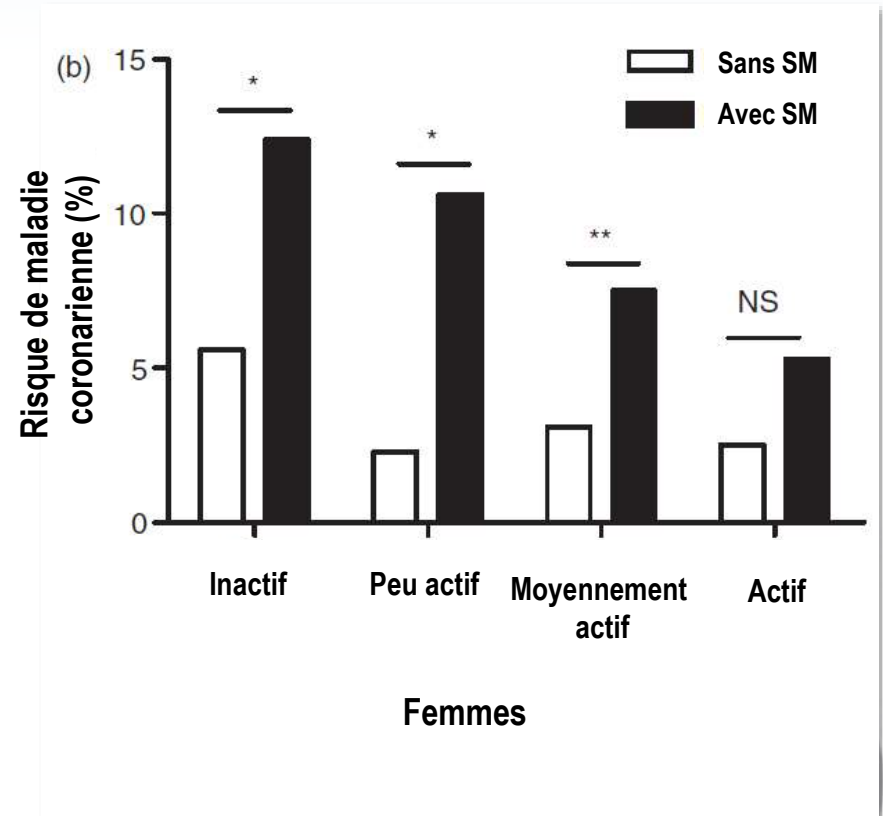
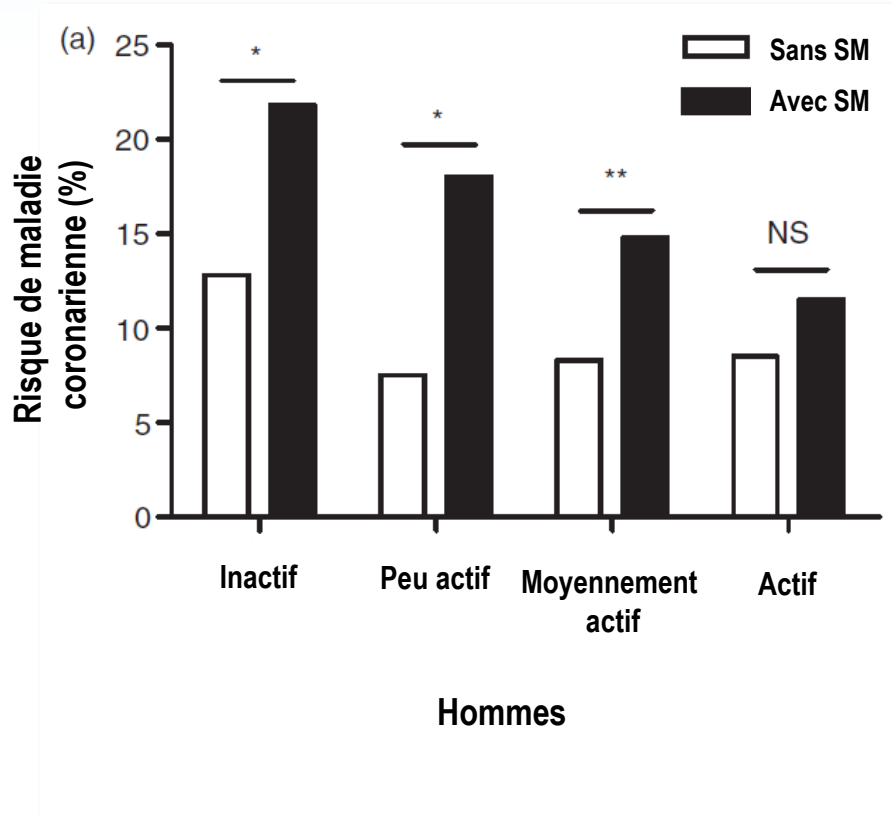
**Objective:** We investigated the association between physical activity, metabolic syndrome (MS), and the risk of future coronary heart disease (CHD) and mortality due to CHD in middle-aged men and women.

**Design:** Prospective cohort study.

**Subjects:** A total of 10,134 men and women aged 45–79 years at baseline, were selected from the European Prospective Investigation into Cancer and Nutrition (EPIC)–Norfolk cohort. Cardiovascular risk factors and physical activity levels were recorded at baseline. Rates of CHD and CHD mortality were recorded during a follow-up of 10.9 years.

**Results:** The prevalence of MS was 37.6% in men and 30.2% in women. Hazard ratios (HRs) for future CHD were 1.95 (95% CI 1.65–2.31) for men with MS and 3.17 (95% CI 2.53–3.97) for women with MS, compared to those without MS. HRs adjusted for age and smoking were 1.52 (95% CI 1.29–1.81) for men and 1.76 (95% CI 1.39–2.23) for women. Additional adjustment for physical activity did not attenuate these risk estimates further [HRs 1.51 (95% CI 1.27–1.79) and 1.74 (95% CI 1.38–2.21), respectively]. CHD risk associated with MS was substantially lower among participants who

# L'activité physique est associée à un risque de maladie coronarienne plus faible, même en présence d'obésité abdominale et des anomalies du syndrome métabolique!



**L'activité physique : un effet  
cardioprotecteur même en  
l'absence de perte de poids...**

**Un message important à  
communiquer !!!**





# L'évaluation clinique et gestion du risque cardiométabolique chez les patients avec diabète de type 2: de nouvelles cibles?

**Obésité  
abdominale**

**Condition  
cardiorespiratoire**

**Qualité  
nutritionnelle**

**Habitudes activité  
physique**

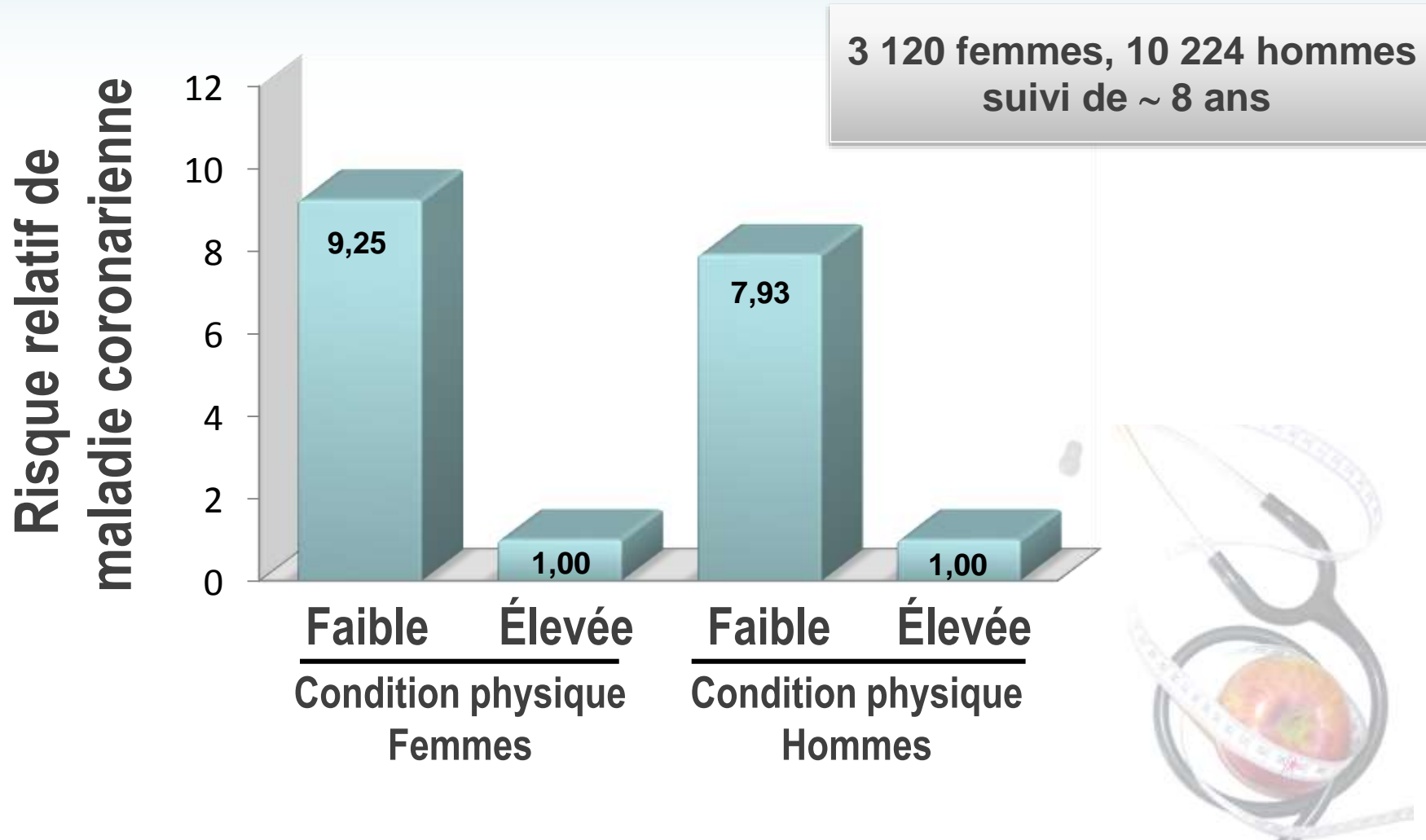
# Faible capacité cardiorespiratoire : le facteur de risque des maladies cardiovasculaires le plus puissant?



**Dr Steven N. Blair**



# Risque relatif de maladie coronarienne à la clinique Cooper en fonction de la condition physique



# Cardiorespiratory Fitness and Body Mass Index as Predictors of Cardiovascular Disease Mortality Among Men With Diabetes

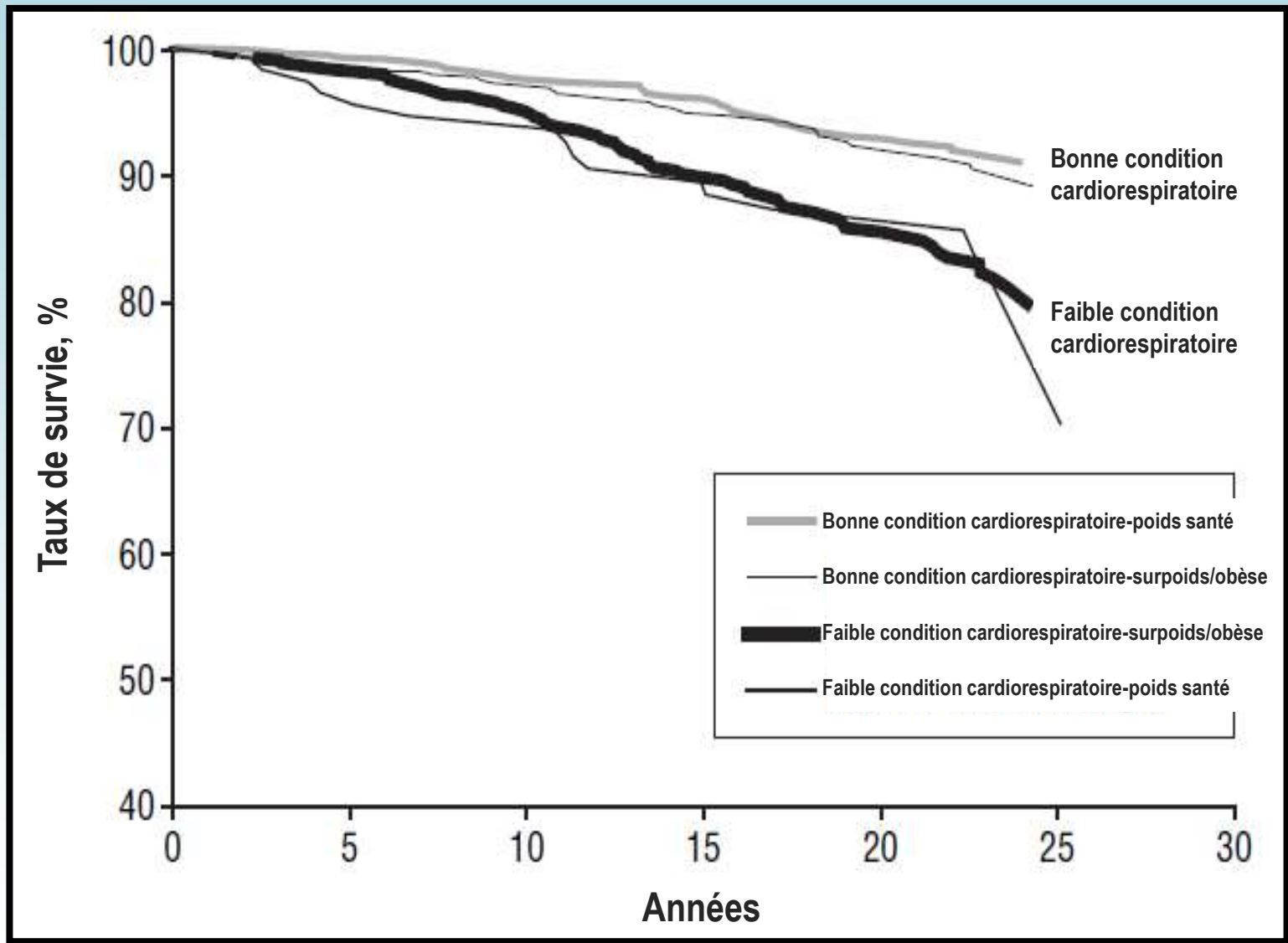
Timothy S. Church, MD, MPH, PhD; Michael J. LaMonte, PhD; Carolyn E. Barlow, MS; Steven N. Blair, PED

**Background:** Questions remain as to whether higher levels of cardiorespiratory fitness, a measure of regular physical activity, are associated with lower risk of cardiovascular disease (CVD) mortality in overweight and obese individuals with diabetes. Our objective was to quantify the independent and joint relations of cardiorespiratory fitness (hereafter, fitness) and body mass index (BMI; calculated as weight in kilograms divided by the square of height in meters) with CVD mortality in men with diabetes.

**Methods:** This study was conducted using prospective observational data from the Aerobics Center Longitudinal Study. Study participants comprised 2316 men with no history of stroke or myocardial infarction and who were diagnosed as having diabetes (mean [SD] age, 50 [10] years); had a medical examination, including a maximal exercise test during 1970 to 1997 with mortality surveillance to December 31, 1998; and had a BMI of 18.5 or greater and less than 35.0. The main outcome measure was CVD mortality across levels of fitness with stratification by BMI.

**Results:** We identified 179 CVD deaths during a mean (SD) follow-up of 15.9 (7.9) years and 36 710 man-years of exposure. In a model containing age, examination year, fasting glucose level, systolic blood pressure, parental history of premature CVD, total cholesterol level, cigarette smoking, abnormal resting, and exercise electrocardiograms, a significantly higher adjusted risk of mortality was observed in men with a low fitness level who were normal weight (hazard ratio, 2.7 [95% confidence interval, 1.3-5.7]), overweight (hazard ratio, 2.7 [95% confidence interval, 1.4-5.1]), and class 1 obese (hazard ratio, 2.8 [95% confidence interval, 1.4-5.1]) compared with normal weight men with a high fitness level.

**Conclusion:** In this cohort of men with diabetes, low fitness level was associated with increased risk of CVD mortality within normal weight, overweight, and class 1 obese weight categories.



**Si vous êtes diabétique,  
il vaut mieux être  
en bonne condition physique  
que de rester sédentaire  
et de perdre du poids...**



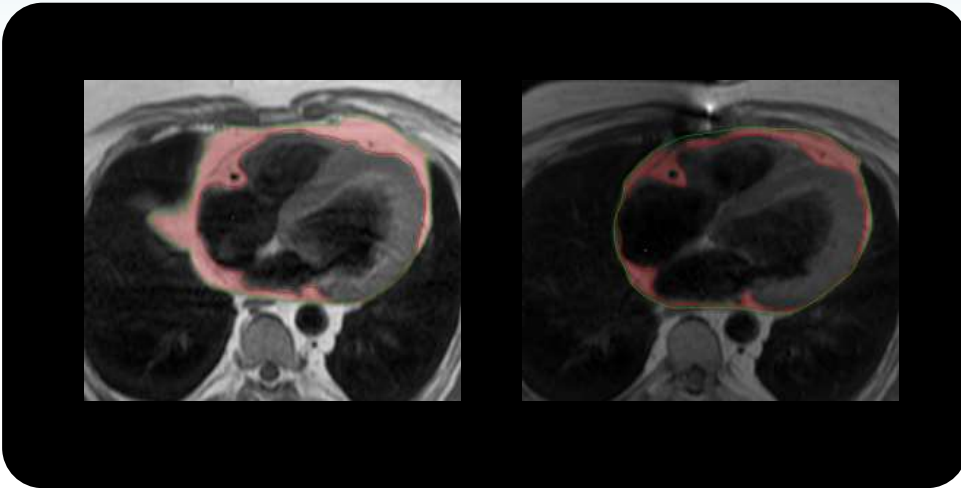
**Les individus**

**« gras et en bonne condition  
cardiorespiratoire »  
(fat and fit)**

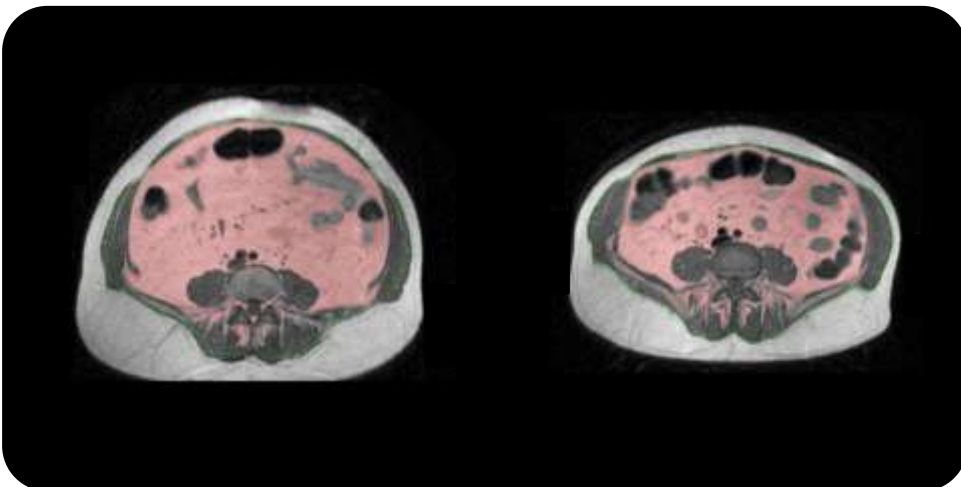
**Qu'y-a-t-il derrière ce concept?**



# Un an d'exercice en endurance induit une perte sélective de graisse viscérale et ectopique chez les patients coronariens diabétiques de type 2



Perte de graisse  
épicaudique et péricardique



Perte de graisse viscérale





# Nos messages cliniques et de santé publique



- **Risque associé à l'obésité :**  
(Plus qu'un excès de masse grasse chez les patients en surpoids et modérément obèses)
- **Nous devons également cibler les comportements clés**
- **Manque de ressources et de soutien en pratique clinique afin de cibler les comportements et la santé cardiorespiratoire**



**Le futur de la santé  
cardiovasculaire  
à l'IUCPQ,  
la Faculté de médecine  
et à l'Université Laval**



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ET DE PNEUMOLOGIE  
DE QUÉBEC



UNIVERSITÉ  
LAVAL

**Un duo remarquable  
en train de transformer  
notre société:  
Pierre Lavoie  
et  
Germain Thibault**



# Notre laboratoire mobile... ... pour évaluer et améliorer la santé cardiovasculaire en entreprise



Dre Natalie Alméras

## Le Grand Défi Entreprise...



### Unité mobile d'évaluation santé

- Unité cardiométabolique
- Unité cardiorespiratoire

## Unité cardiométabolique

### Questionnaire:

- Caractéristiques sociodémographiques
- Histoire familiale
- Histoire médicale
- Habitudes tabagiques
- Habitudes d'activité physique
- Habitudes alimentaires

### Tension artérielle de repos

### Analyses de laboratoire

- Profil lipidique
- Glucose sanguin
- Enzymes hépatiques

## Unité cardiorespiratoire

### Test sous-maximal sur tapis roulant

- Tension artérielle
- Fréquence cardiaque
- VO2 estimée



### Prélèvement sanguin



### Anthropométrie

- Poids
- Taille
- Circonférence de taille
- Indice de masse corporelle

### Composition corporelle

- Masse maigre
- Masse grasse



### Bilan de santé personnalisé



# Targeting Abdominal Adiposity and Cardiorespiratory Fitness in the Workplace

VALÉRIE LÉVESQUE<sup>1,2</sup>, MAGGIE VALLIÈRES<sup>1</sup>, PAUL POIRIER<sup>1,3</sup>, JEAN-PIERRE DESPRÉS<sup>1,2</sup>,  
and NATALIE ALMÉRAS<sup>1,2</sup>

<sup>1</sup>Québec Heart and Lung Institute, Québec, QC, CANADA; <sup>2</sup>Department of Kinesiology, Faculty of Medicine, Université Laval, Québec, QC, CANADA; <sup>3</sup>Faculty of Pharmacy, Université Laval, Québec, QC, CANADA

## ABSTRACT

LÉVESQUE, V., M. VALLIÈRES, P. POIRIER, J.-P. DESPRÉS, AND N. ALMÉRAS. Targeting Abdominal Adiposity and Cardiorespiratory Fitness in the Workplace. *Med. Sci. Sports Exerc.*, Vol. 47, No. 7, pp. 00–00, 2014. **Purpose:** The prevalence of numerous chronic metabolic diseases is increasing worldwide with considerable personal and societal consequences. The aim of our study was to test the hypothesis that assessment of waist circumference (WC) and of cardiorespiratory fitness (CRF) could be relevant clinical targets of a simple preventive approach designed to improve cardiometabolic risk (CMR) profile at the workplace. **Methods:** A total of 787 employees participated in a pilot project of the “Grand Défi Entreprise”. This challenge involved a 3-mo in-house competition to favor peer support in the adoption of healthier lifestyle habits. For that purpose, the participating companies offered a comprehensive cardiometabolic/cardiorepiratory health assessment performed at the workplace with a mobile risk assessment unit before and after the contest (nutrition/physical activity (PA) questionnaires, resting blood pressure (BP), anthropometric measurements, lipid profile, and submaximal treadmill test). **Results:** At baseline, more than 43% of workers were considered sedentary or moderately inactive ( $<3.5 \text{ h}\cdot\text{wk}^{-1}$  of physical activity). Furthermore, the proportion of subjects in the high-risk category of nutritional quality index (NQI) was high (49%). After 3 mo, NQI and PA level improved. Reductions in WC ( $-4.2 \pm 4.0 \text{ cm}$ ,  $P < 0.0001$ ), in heart rate at a standardized submaximal workload ( $-4 \pm 10 \text{ bpm}$ ,  $P < 0.0001$ ) as well as in resting systolic ( $-6 \pm 11 \text{ mm Hg}$ ) and diastolic ( $-4 \pm 7 \text{ mm Hg}$ ) blood pressure were also observed. Improvements in WC and CRF were associated with improvements in the CMR profile. **Conclusion:** Results of this study show the added value of measuring/targeting WC and CRF as a relevant approach to reduce CMR at the workplace. Results also suggest that putting in place a permissive “in-house ecosystem” within the company is relevant to promote the adoption of healthier lifestyle habits. **Key Words:** CARDIOMETABOLIC RISK, LIFESTYLE INTERVENTION, NUTRITION, PHYSICAL ACTIVITY, CARDIORESPIRATORY FITNESS, WAIST CIRCUMFERENCE

## Assessing and targeting key lifestyle cardiovascular risk factors at the workplace: Effect on hemoglobin A1c levels

Valérie Lévesque, Paul Poirier, Jean-Pierre Després & Natalie Alméras

**To cite this article:** Valérie Lévesque, Paul Poirier, Jean-Pierre Després & Natalie Alméras (2015): Assessing and targeting key lifestyle cardiovascular risk factors at the workplace: Effect on hemoglobin A1c levels, *Annals of Medicine*, DOI: [10.3109/07853890.2015.1091943](https://doi.org/10.3109/07853890.2015.1091943)

**To link to this article:** <http://dx.doi.org/10.3109/07853890.2015.1091943>

# Évaluation de la qualité nutritionnelle

- Questionnaire de fréquence **international** validé;
- 25 questions;
- Score sur 100;
  - QN **élevée**, score  $\geq 75$ ;
  - QN **modérée**, score 60-74;
  - QN **faible**, score  $< 60$ .



# Score de mode de vie

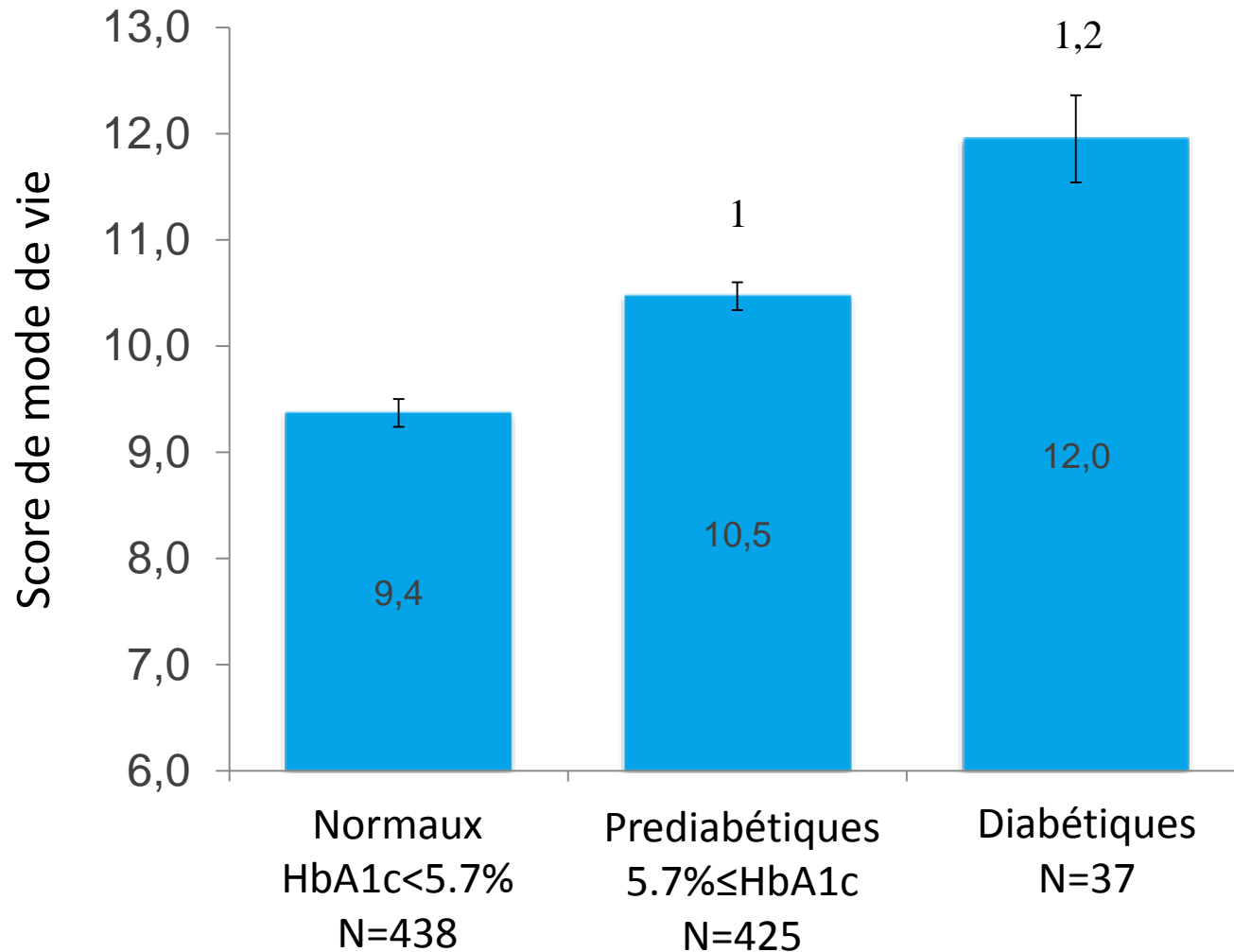


Variables	Quartiles	Points
Niveau d'activité physique	Q1	4
	Q2	3
	Q3	2
	Q4	1
Indice de qualité nutritionnelle	Q1	4
	Q2	3
	Q3	2
	Q4	1
Tour de taille	Q1	1
	Q2	2
	Q3	3
	Q4	4
VO <sub>2</sub> max estimé	Q1	4
	Q2	3
	Q3	2
	Q4	1

**Le score de mode de vie peut varier de 4 à 16 points...**

**... plus le score est élevé, plus le risque est élevé**

# Score de mode de vie



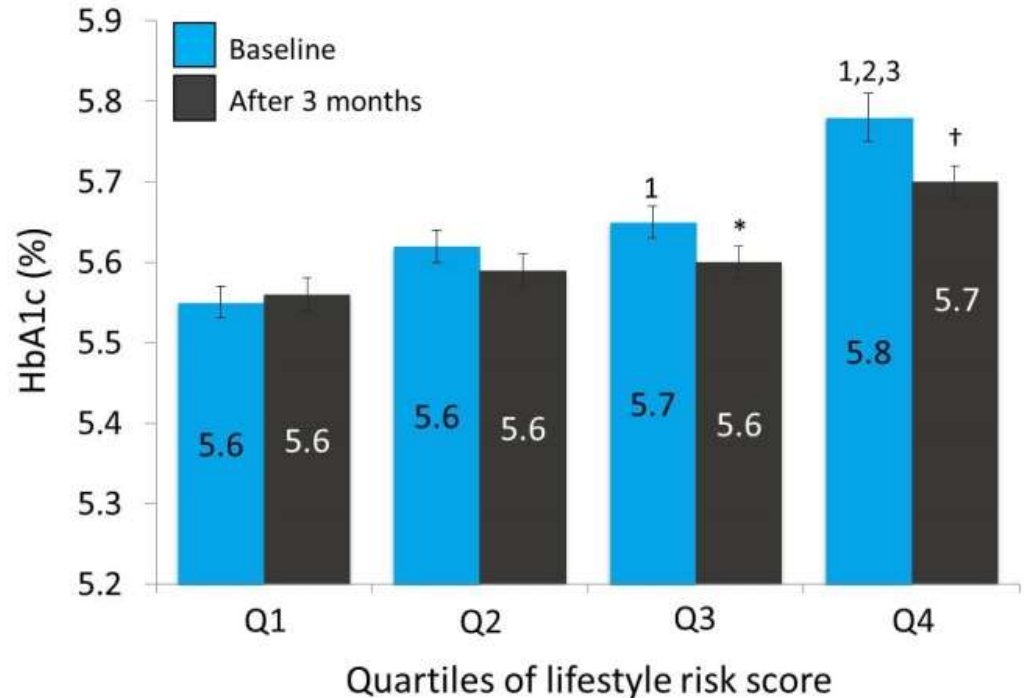
<sup>1,2</sup> Différent des groupes correspondants,  $p < 0.05$ .

# Effets du programme Grand Défi Entreprise

- 2 kg decrease in body weight
- 4 cm decrease in waist circumference
- 50% reduction in the prevalence of hypertension (from 30% to 15%)
- Absolute decrease of 0.7% in HbA1c levels
- Improved overall lipid profile
- Increased level of physical activity
- Improved nutritional quality
- 60% decrease in smokers (from 13.2% to 5.3%)
- Improved cardiorespiratory fitness
- 2.5-year decrease in vascular age

# Un « Lifestyle Risk Score » (score de mode de vie) Les comportements prédisent le risque de diabète

Variables	Quartiles	Points
Physical activity level	Q1	4
	Q2	3
	Q3	2
	Q4	1
Nutritional quality index	Q1	4
	Q2	3
	Q3	2
	Q4	1
Waist circumference	Q1	1
	Q2	2
	Q3	3
	Q4	4
Estimated VO <sub>2</sub> max	Q1	4
	Q2	3
	Q3	2
	Q4	1



<sup>1,2,3</sup> Baseline HbA1c levels significantly different from the corresponding quartiles. Significantly different from baseline: \*p<0.05, † p<0.01

# Prévention et prise en charge des patients avec diabète de type 2

## De nouveaux signes vitaux!!!

**Obésité abdominale**

**Condition cardiorespiratoire**

**Qualité nutritionnelle**

**Activité physique**

# Vers une véritable médecine préventive moderne

En conclusion, la médecine de première ligne devrait être mieux outillée pour mesurer la qualité nutritionnelle, le niveau d'activité physique, le tour de taille (comme marqueur d'adiposité abdominale) et la condition cardiorespiratoire, car ces 4 facteurs du mode de vie prédisent la présence ou l'absence des problèmes de santé qui sont associés à l'obésité. À cet effet, des résultats prometteurs d'une étude pilote conduite par des chercheurs de l'IUCPQ-UL (Grand Défi Entreprise) font la preuve de concept de la valeur ajoutée de mesurer les comportements au-delà des facteurs de risque classiques comme le cholestérol, la tension artérielle et la présence de diabète.



# Résumé (I)

1. La sédentarité, causée par notre mode de vie, est maintenant responsable d'autant de cas de maladies cardiovasculaires que le tabagisme;
2. La simple mesure du tour de taille est importante et constitue un signe vital aussi utile que, par exemple, notre taux de cholestérol ou notre tension artérielle;
3. La diminution du tour de taille et l'amélioration de la condition cardiorespiratoire constituent deux nouvelles cibles importantes dans la prévention des maladies cardiovasculaires;



# Résumé (II)

4. Nos comportements (la qualité nutritionnelle et l'activité physique) sont deux facteurs de risque très importants qui ne sont malheureusement pas pris en compte dans le suivi médical; pourtant, des outils simples pourraient permettre aux professionnels de la santé de mesurer et de cibler ces « signes vitaux ».
5. La diminution de la teneur en sel et en sucre ajoutés de notre alimentation constitue une recommandation simple permettant d'améliorer la qualité de notre alimentation et de réduire notre risque cardiovasculaire. Ceci peut se faire en se méfiant principalement des aliments transformés par l'industrie qui sont trop souvent riches en sel et en limitant notre consommation de boissons sucrées;





# Résumé (III)

6. L'activité physique vigoureuse et régulière pratiquée de façon quasi quotidienne (ex. : marche rapide de 45 minutes par jour) peut réduire considérablement notre risque cardiovasculaire, et ce, même en l'absence de perte de poids. Ainsi, il est contreproductif de véhiculer le message que l'exercice est inutile pour perdre du poids s'il n'est pas accompagné par un régime restreint en calories. Ce message n'est pas appuyé par des données scientifiques récentes;
7. Par ailleurs, la pratique de l'activité physique régulière peut engendrer une perte de graisse abdominale/ectopique, et ce, parfois sans perte de poids;

