ΚΑΠΝΙΣΜΑ ΚΑΙ ΜΕΤΑΒΟΛΙΚΟ ΣΥΝΔΡΟΜΟ

ΑΡΑΠΟΓΙΑΝΝΗ ΑΘΗΝΑ
Αναπληρωτρία Διευθύντρια Γ΄ Καρδιολογικής Κλινικής Ευρωκλινικής Αθηνών
Δεν υπάρχει σύγκρουση συμφερόντων
Evolution of the Metabolic Syndrome

World Health Organisation (WHO)

The Adult Treatment Panel of the National Cholesterol Education Program (NCEP ATPIII)

The International Diabetes Federation (IDF)

The European Group for the Study of Insulin Resistance (EGIR)

The American Association of Clinical Endocrinologists (AACE)

The American Heart Association (AHA/NHLBI)

Hanefeld and Leonhardt in 1981 were the first to use the term "Metabolic Syndrome"
## Revised ATP III (AHA/NHLBI) Metabolic Syndrome Definition 2005

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Defining Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal obesity† (Waist circumference‡)</td>
<td>≥102 cm (≥40 in) or ≥88 cm (≥35 in)</td>
</tr>
<tr>
<td>Men</td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td></td>
</tr>
<tr>
<td>TG</td>
<td>≥150 mg/dL or Rx for ↑ TG</td>
</tr>
<tr>
<td>HDL-C</td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>&lt;40 mg/dL</td>
</tr>
<tr>
<td>Women</td>
<td>&lt;50 mg/dL or Rx for ↓ HDL</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>≥130/≥85 mm Hg or on HTN Rx</td>
</tr>
<tr>
<td>Fasting glucose</td>
<td>≥100 mg/dL or Rx for ↑ glucose</td>
</tr>
</tbody>
</table>

*Diagnosis is established when ≥3 of these risk factors are present.
†Abdominal obesity is more highly correlated with metabolic risk factors than is ↑BMI.
‡Some men develop metabolic risk factors when circumference is only marginally increased.

Age-Specific Prevalence of the Metabolic Syndrome

Prevalence of the Metabolic Syndrome Among 8814 US Adults

Prevalence %

20-29: 8% Men, 6.8% Women
30-39: 13% Men, 15% Women
40-49: 25.5% Men, 21% Women
50-59: 35.5% Men, 34% Women
60-69: 46% Men, 45% Women
≥70: 42% Men, 44.5% Women

Results: The age-adjusted prevalence of the MetSyn was 23.6% [95% confidence interval (CI) = 22.4%-25.1%]; this was similar in men and women.
Mets and Cigarette Smoking Status

➢ Nicotine- one of the most heavily used addictive drugs (NIDA, 2009)

➢ >1 billion people are smokers (1/3 of adult world population)

➢ Many studies reported a higher incident of MetS in smokers
Active Smoking and Risk of Metabolic Syndrome: A Meta-Analysis of Prospective Studies

13 prospective cohort studies, 56,691 pts

Relative risks of metabolic syndrome for active smokers compared with nonsmokers.

Active Smokers: 26%↑ risk of MetS

http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0047791
Associations between smoking, components of metabolic syndrome and lipoprotein particle size

Sandra N Slagter†, Jana V van Vliet-Ostaptchouk†, Judith M Vonk, H Marike Boezen, Robin PF Dullaart, Anneke C Muller Kobold, Edith J Feskens, André P van Beek, Melanie M van derKlauw and Bruce HR Wolffenbuttel

Life Lines Cohort Study, N=59,467

Conclusions

Smoking is associated with an increased prevalence of MetS, independent of sex and BMI class. This increased risk is mainly related to lower HDL cholesterol, and higher triglycerides and waist circumference. In addition, smoking was associated with unfavorable changes in apoA1 and apoB, and in lipoprotein particle size.
Influence of cigarette smoking on MetS
Cigarette smoking/cessation and metabolic syndrome

Genovefa D. Kolovou, Vana Kolovou & Sophie Mavrogeni

Pages 6-14 | Received 16 Aug 2016, Accepted 22 Aug 2016, Published online: 12 Sep 2016
Release of nicotine

- Arginine vasopressin
- Corticotropin-releasing hormone
- Adrenocorticotropic hormone
- Growth hormone
- Dopamine
- Serotonin
- γ-aminobutiric acid
- Acetylcholine
- Epinephrine, norepinephrine
- Cortisol

Release of nicotine

Nicotine and Insulin Resistance: When the Smoke Clears
Diabetes 2012 Dec; 61(12): 3078-3080
Provoke inflammatory reaction

Mean values for CRP in sex, diabetes, and obesity subgroups, stratified by smoking status.

Despite the well-known inverse association between smoking and body weight, there have been conflicting reports on the effects of smoking on serum leptin and adiponectin levels.
Impaired plasma lipid profile

➢ ↑TC, TG, LDL-C ↓HDL
➢ Smoking → oxidative stress → HDL undergo changes in structure or composition, losing normal biological behaviours.
➢ Smoking → ↑ cortisol levels → abdominal fat
➢ Low lipoprotein lipase activity → ↑ free FAs, ↑ hepatic synthesis of VLDL → ↑ TG
➢ Abdominal obesity, IR → sdLDL
➢ If fatty liver present (MetS) - ↑ de novo synthesis of TGs, affect LDL particle size

Smokers are more likely to have lower BMI.
Mechanisms by which cigarette smoking reduces body weight

Effect of Smoking on the Paradox of High Waist-to-Hip Ratio and Low Body Mass Index

Sun Ha Jee,* Soon Young Lee,† Chung Mo Nam,‡ Sang Yon Kim,* and Miyong T. Kim§

Figure 2: Prevalence of current smoking by combination group of body mass index and waist-to-hip ratio in men.

The Insulin Resistance Syndrome in Smokers Is Related to Smoking Habits

Björn Eliasson, Stig Attvall, Marja-Riitta Taskinen, Ulf Smith

Atheroscler Thromb. 1994;14:1946-1950
35 studies, 63,403 ex-smokers and 388,432 smokers

Individuals who stopped smoking had a significant association with absolute weight gain; among these individuals the mean weight gain was 4.10 kg (95% CI 2.69–5.51; \( P < 0.001 \) compared to those who continued to smoke) whereas the mean increase in BMI was 1.14 kg/m\(^2\) units over a 5-year period. (95% CI 0.50–1.79; \( P = 0.137 \) compared to those who continued to smoke).
Changes in BMI over 10 years with smoking status

The mean increase in caloric intake was 227 calories per day in those who quit smoking, which explains up to 69% of the weight gained at 3 months post-cessation.

Of those who stop smoking, 13% gained >10 kg in a year, with weight gain greatest in the first few months after cessation and continuing to increase for ≥6 months.
In all groups, weight increased by about 1 kg per month for the first three months.
The pattern or amount of weight gain was not reduced by pharmacotherapy. Similar weight gains occurred in individuals not receiving pharmacotherapy and in those using nicotine replacement, bupropion or varenicline.
those with a lower BMI gained more weight than those with a higher BMI
Younger participants gained more weight than older participants. For light smokers, men gained more weight than women, whereas for heavy smokers, women gained more weight than men. These findings suggest that young women who smoke heavily are at the highest risk of gaining weight after quitting smoking.
High nicotine dependence was also associated with the greatest weight gain after cessation.
Smoking Cessation without Educational Instruction could Promote the Development of Metabolic Syndrome

Shin Takayama¹, Hiroyuki Takase¹, Takamitsu Tanaka¹, Tomonori Sugiura², Nobuyuki Ohte² and Yasuaki Dohi³

N=9,018

Smoking Cessation →

✓ ↑ **BMI** and **fat mass**
✓ Marked fasting **hyperinsulinaemia**, fast insulin resistance
Mechanism-theories

➢ The ability of nicotine to suppress appetite is reversed

➢ Nicotine absence ↑ the rewarding value of food

➢ ↑ snacks high in carbohydrates and sugars

➢ Socioeconomic status. The majority of smokers - lower SES - ↓ physical activity, ↑ high-calorie, high-fat diets

➢ Marked changes of intestinal microbiota

Personalized weight-management programs
Conclusions

➢ Smoking cessation can lead to **weight gain**.

➢ Post-cessation-related obesity might contribute to **insulin resistance** (improvement in insulin sensitivity over time)

➢ The **number one reason for not wanting to quit smoking** or quitting and then relapsing is fear of post-cessation weight gain, especially in women and in individuals with obesity

➢ Future **smoking cessation programs** and therapies need to be designed with an emphasis on reducing post-cessation weight gain

➢ The **benefits** of smoking cessation **outweigh the risks**
Μια καλή ομιλία πρέπει να εξαντλεί το θέμα, όχι όμως και το ακροατήριο.

Winston Churchill