

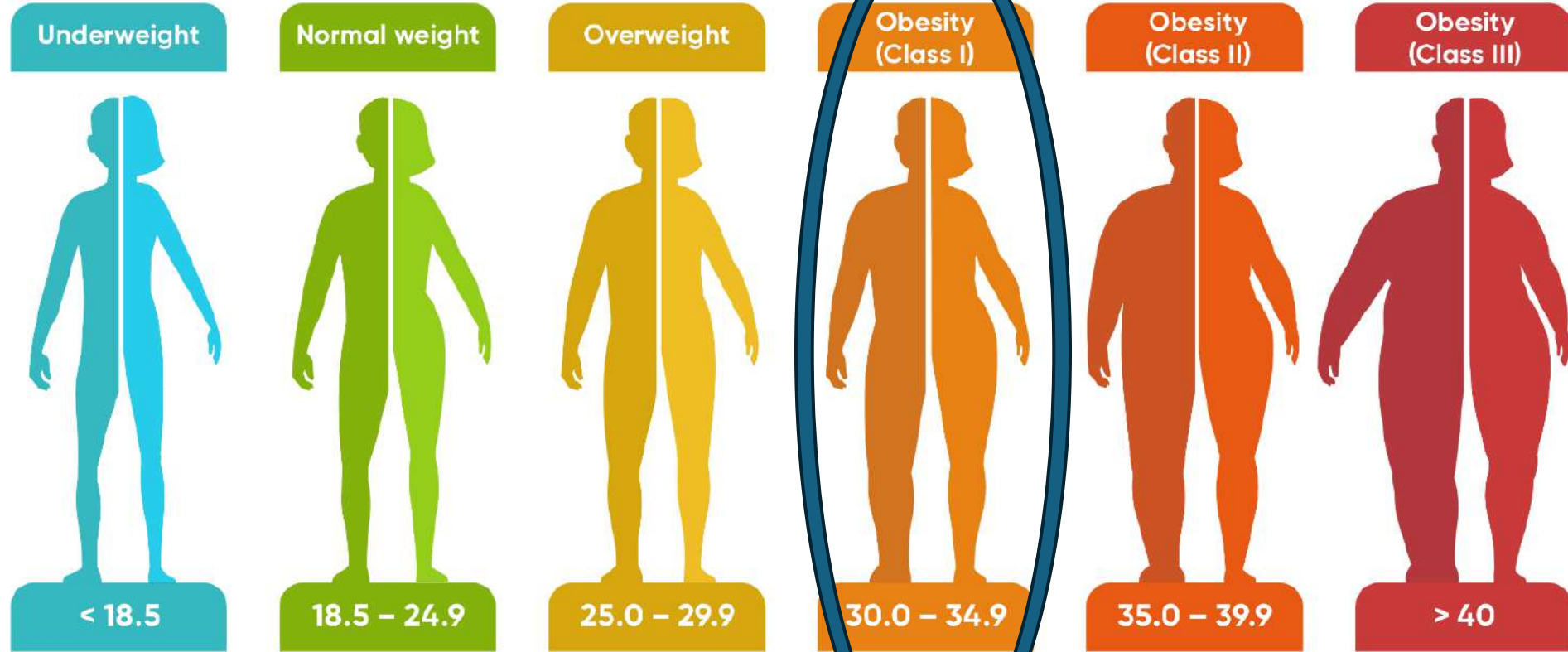
# 24. TÜRK KLİNİK MİKROBİYOLOJİ VE İNFEKSİYON HASTALIKLARI KONGRESİ

6-9 MART 2024  
PINE BEACH BELEK / ANTALYA

## OBEZİTE VE İNFEKSİYON RİSKİ

Dr. Buket Ertürk Şengel

Marmara Üniversitesi Pendik Eğitim ve Araştırma Hastanesi



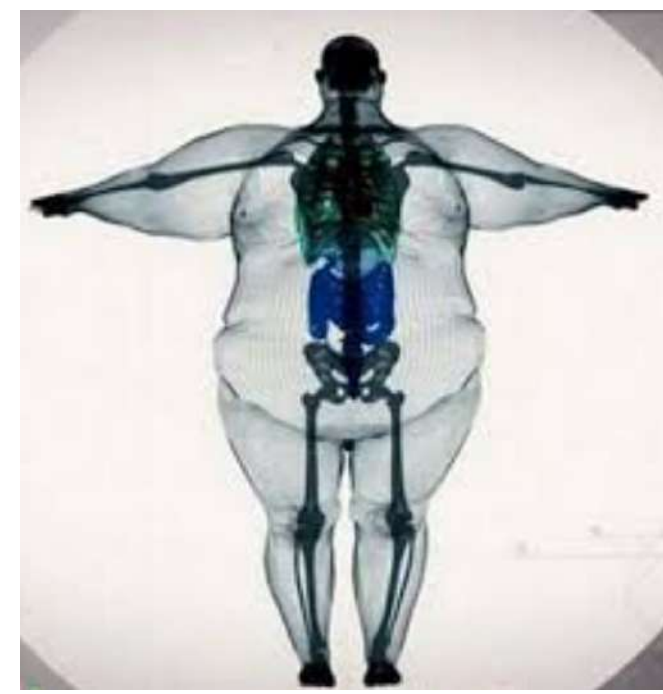
## Fazla kilolu & Obez

- Belirli bir boy için sađlıklı kabul edilenden yüksek kiloya sahip olma
- Tarama aracı: Vücut Kitle İndeksi (BMI);  $\text{kg/m}^2$

# Obezite

- Prevalansı son yıllarda artmakta
- Amerika'da erişkinlerin 1/3 ünden fazlası,  
çocuk ve adolesanların %17'si obez

\*CL Ogden et al. Prevalence of obesity in the United States, 2009–2010, NCHS Data Brief, 82 (2012), pp. 1-8

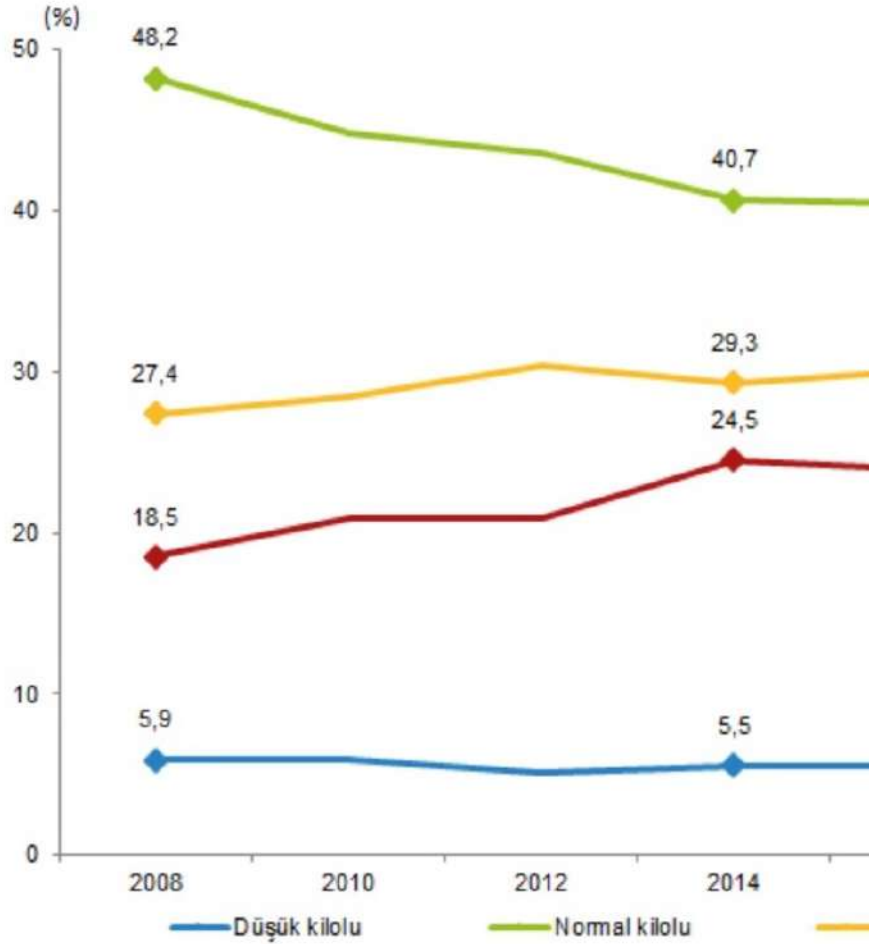


- Önlenebilir ölümlerin önde gelen nedeni

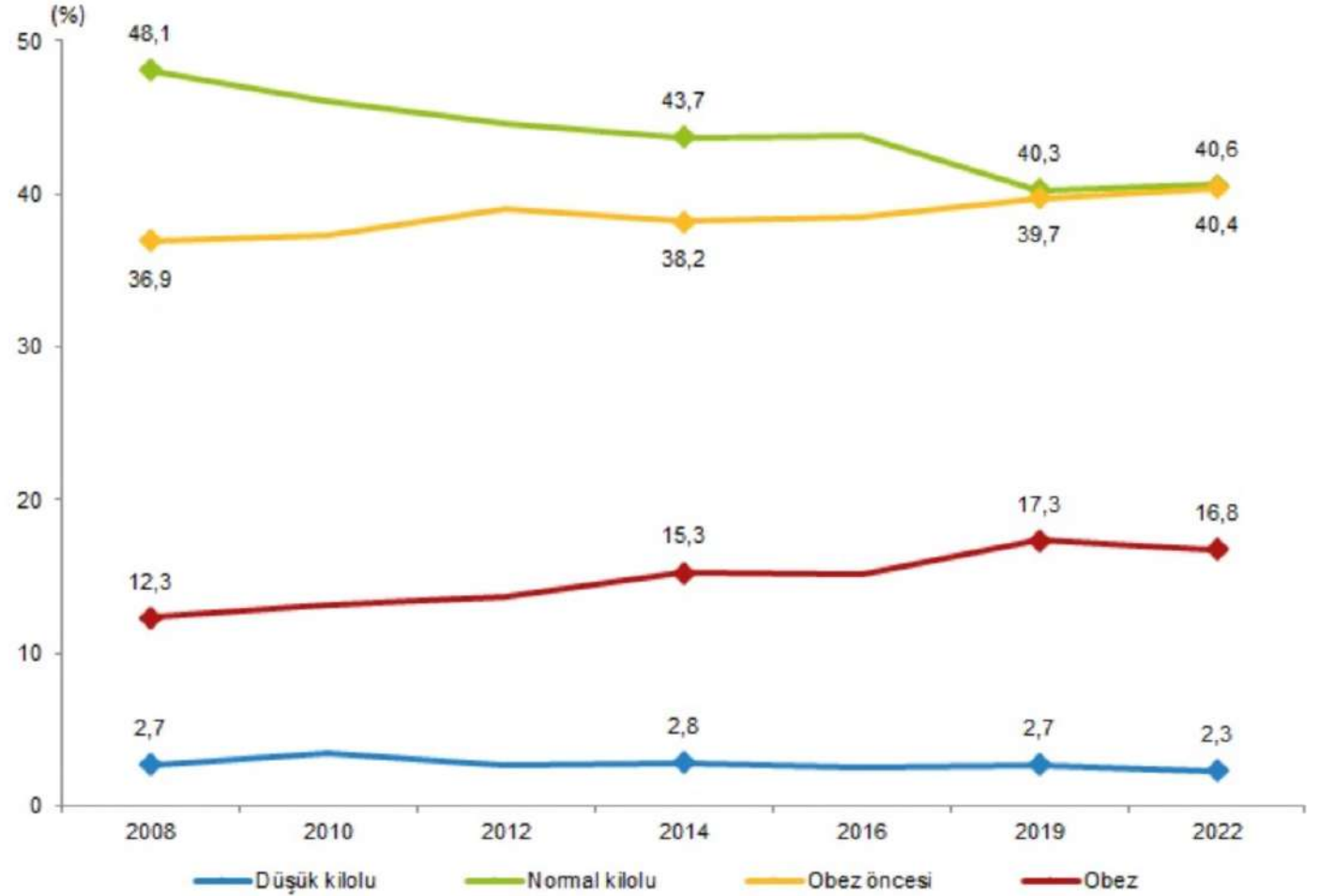
\*H Jia et al. Trends in quality-adjusted life-years lost contributed by smoking and obesity, Am J Prev Med, 38 (2010), pp. 138-144

# Türkiye Sağlık Araştırması, TÜİK, 2022

**Kadınların vücut kitle indeksi dağılımı, 2008-2022**  
[15+ yaş]



**Erkeklerin vücut kitle indeksi dağılımı, 2008-2022**  
[15+ yaş]



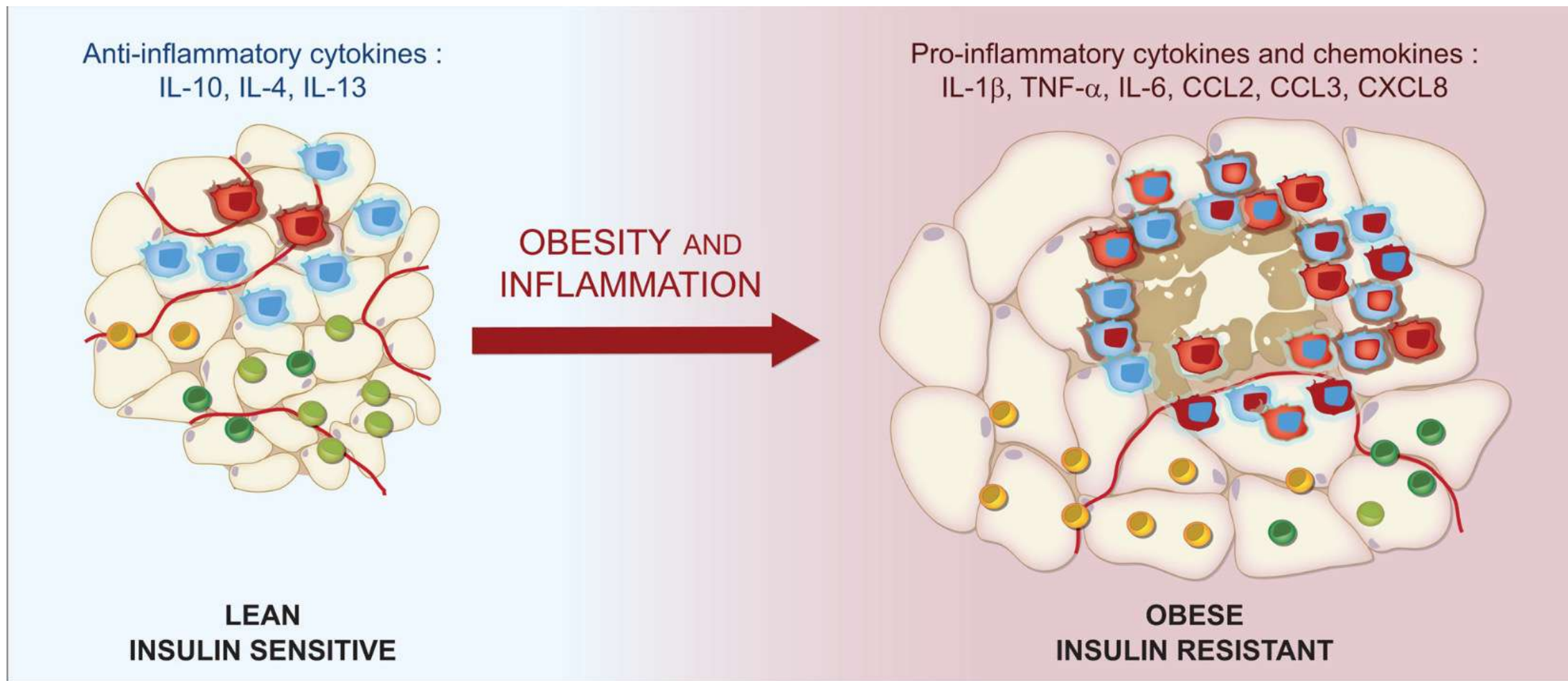
# Günlük tıbbi bakımda zorluklar



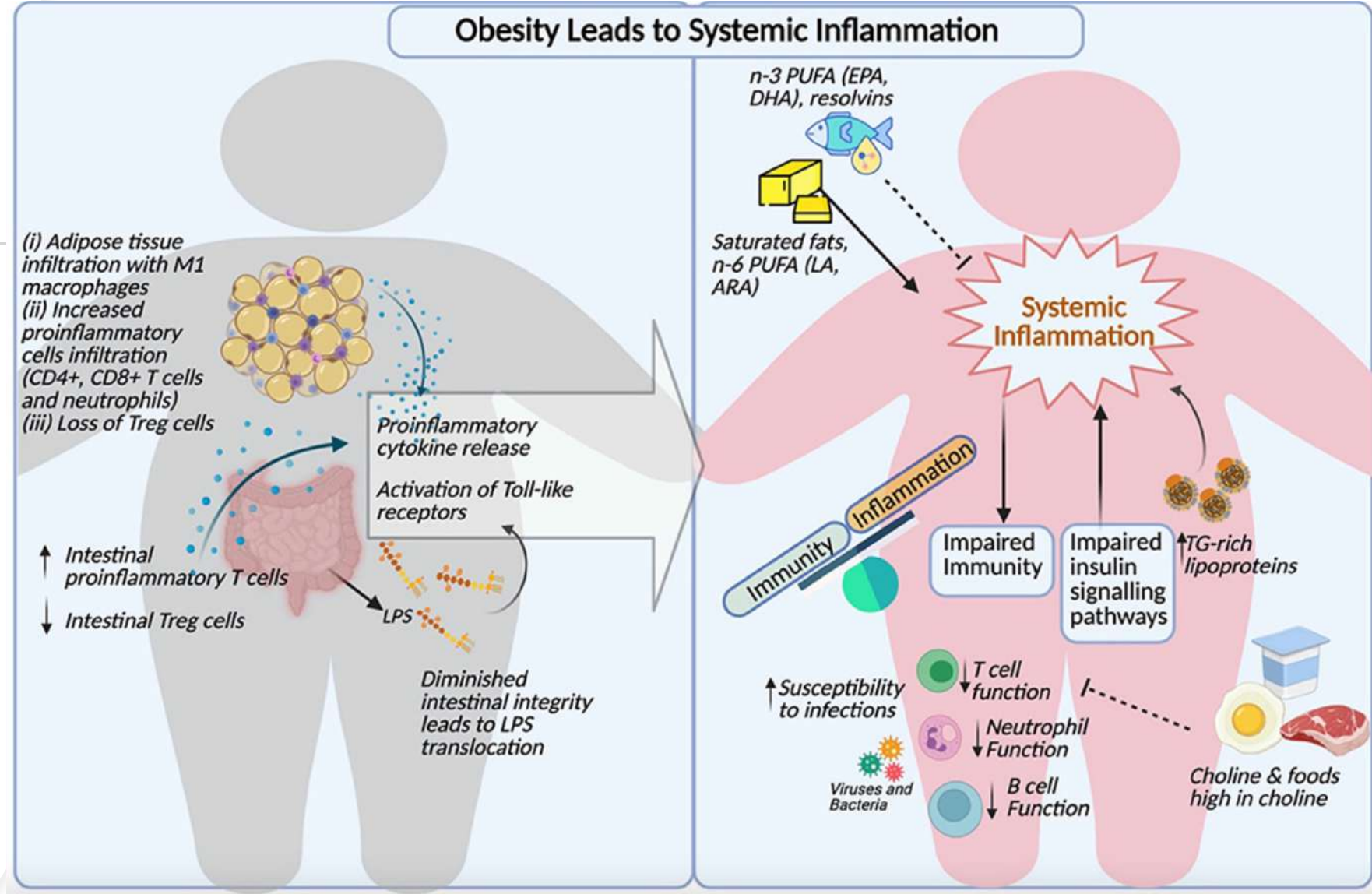
- Hareket ve banyo için ilave personel ihtiyacı
- Radyolojik cihazların obez hastalar için uygun olmaması
- İmmobiliteye bağlı cilt bütünlüğünün bozulmasına yatkınlık

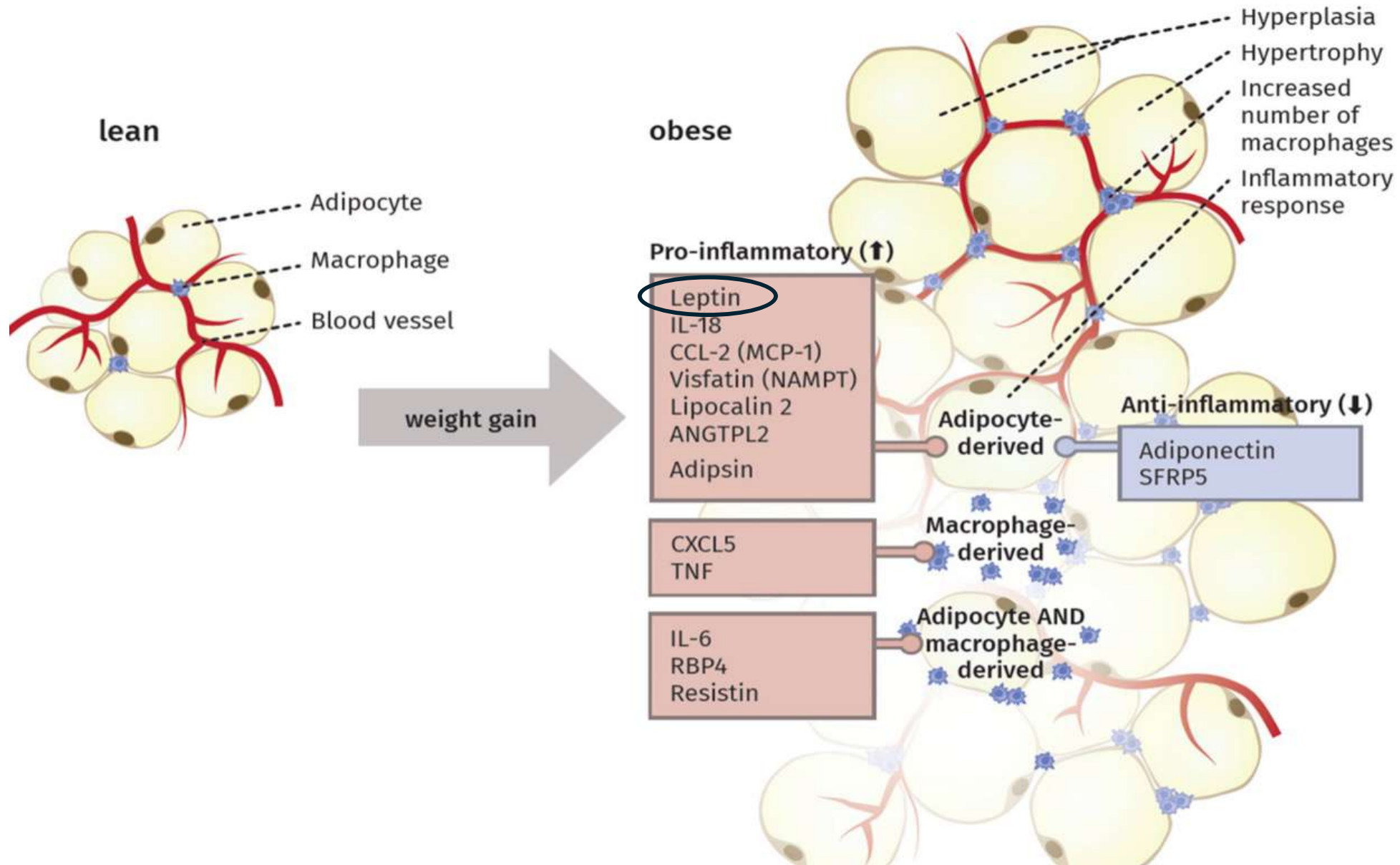
- Nozokomiyal infeksiyonlar
  - Özellikle cerrahi hastalar için
- Uzayan hastane yatışı
- Maliyet
- Mortalite

# Obezite & Infeksiyon



- **Treg hücreleri:** T-hücrelerinin özel bir alt grubudur
- T-hücre proliferasyonunu,
- Sitokin üretimini  
inhibe ederek anti-inflamatuar etkide rol oynarlar
- Otoimmüniteyi önleme,
- Kronik inflammatuar hastalıkları sınırlamada kritik bir rol öneme sahiptirler

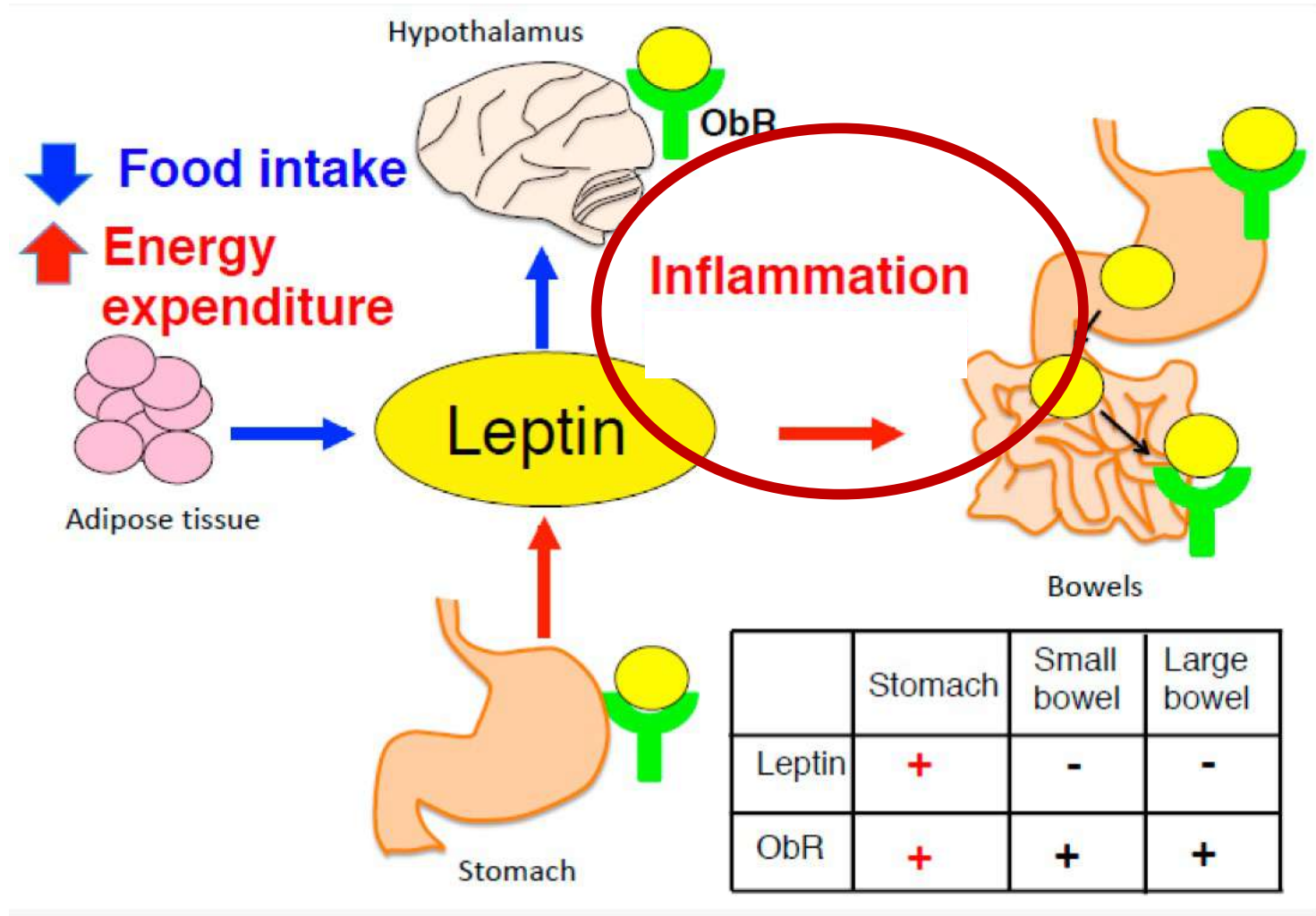




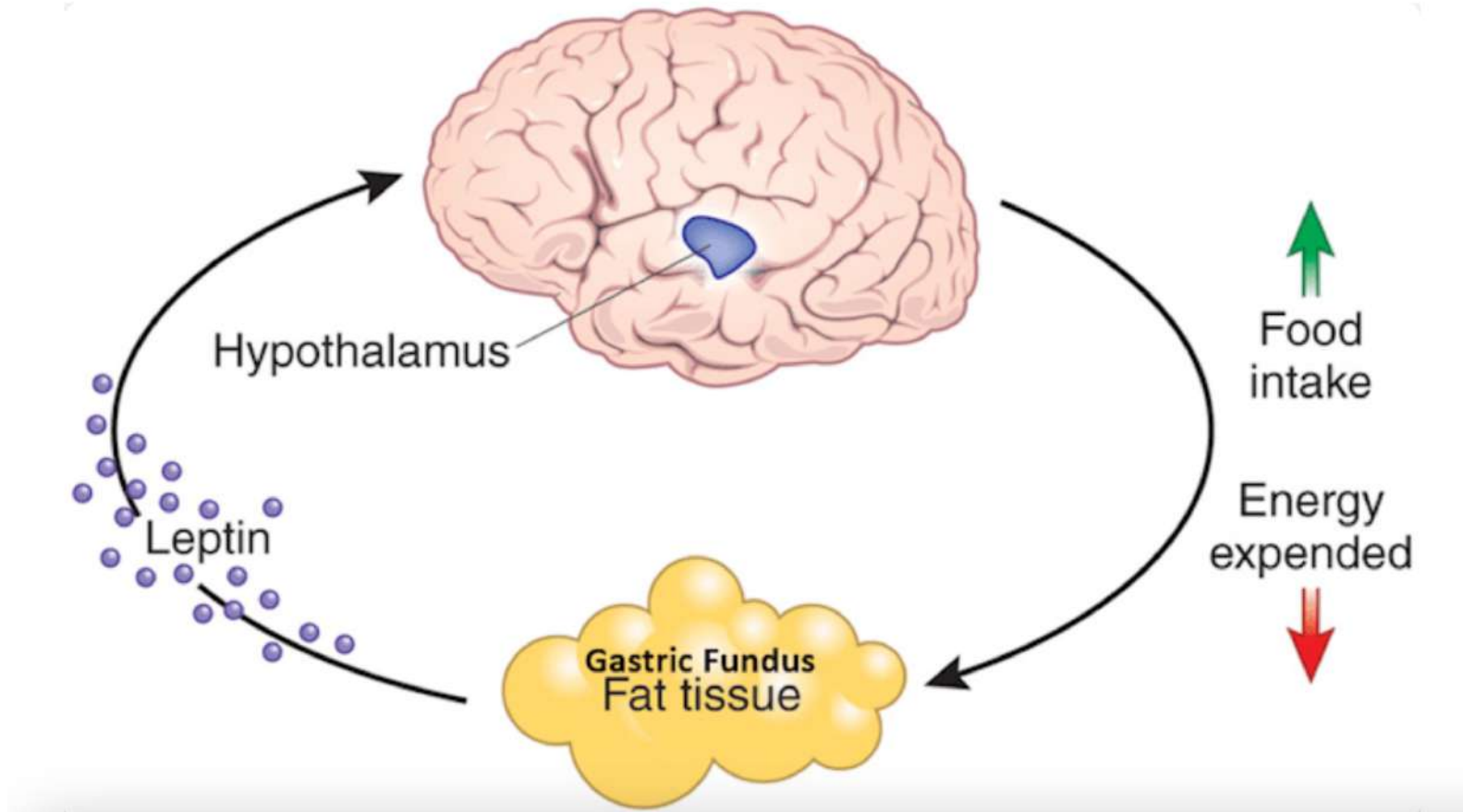


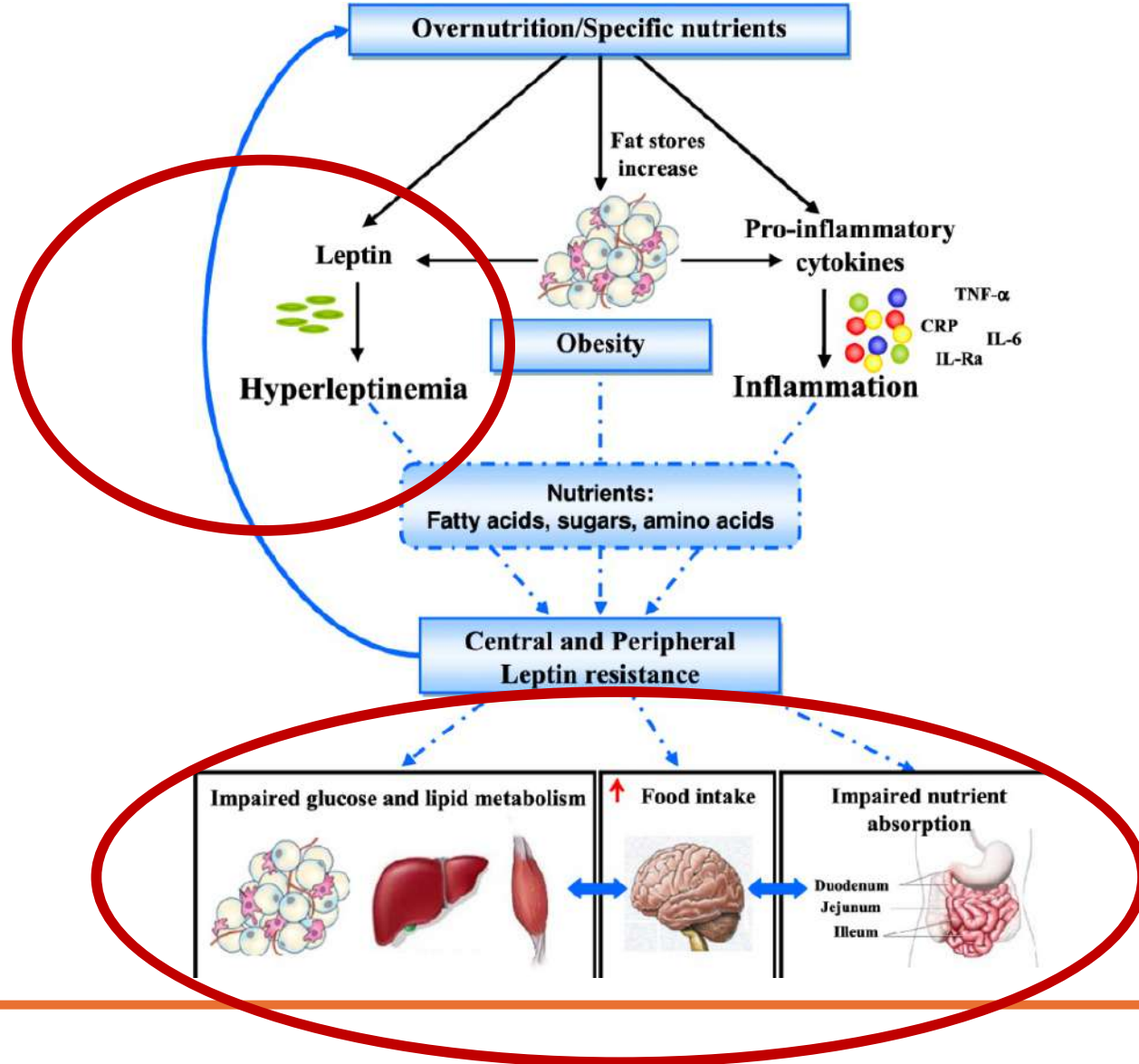
# Leptin: 'Leptos' --> zayıf (yunanca)

Primer olarak adi poz dokudan salınan peptid yapıli 'tokluk hormonu'



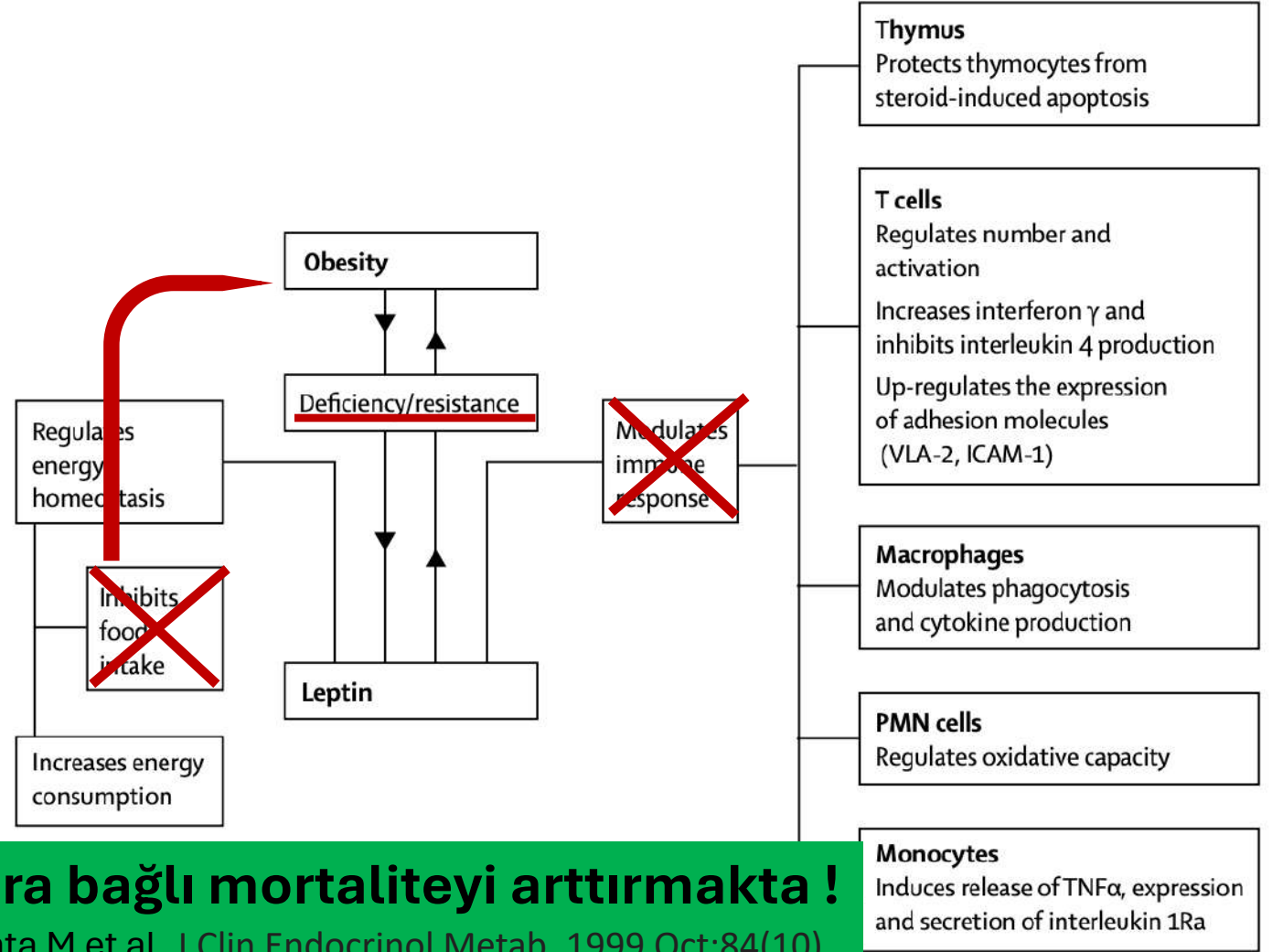
# Leptin direnci





# Leptin

- Timositleri steroid ilişkili apoptozisten korur
- **T lenfositlerin proliferasyon ve antiapoptotik etkisini artırır**
- Sitokin salınımını ve fagositozu düzenler
- Nötrofil aktivasyonu
- **Monosit/makrofaj aktivasyonunu regüle eder**
- Yara iyileşmesine katkıda bulunur

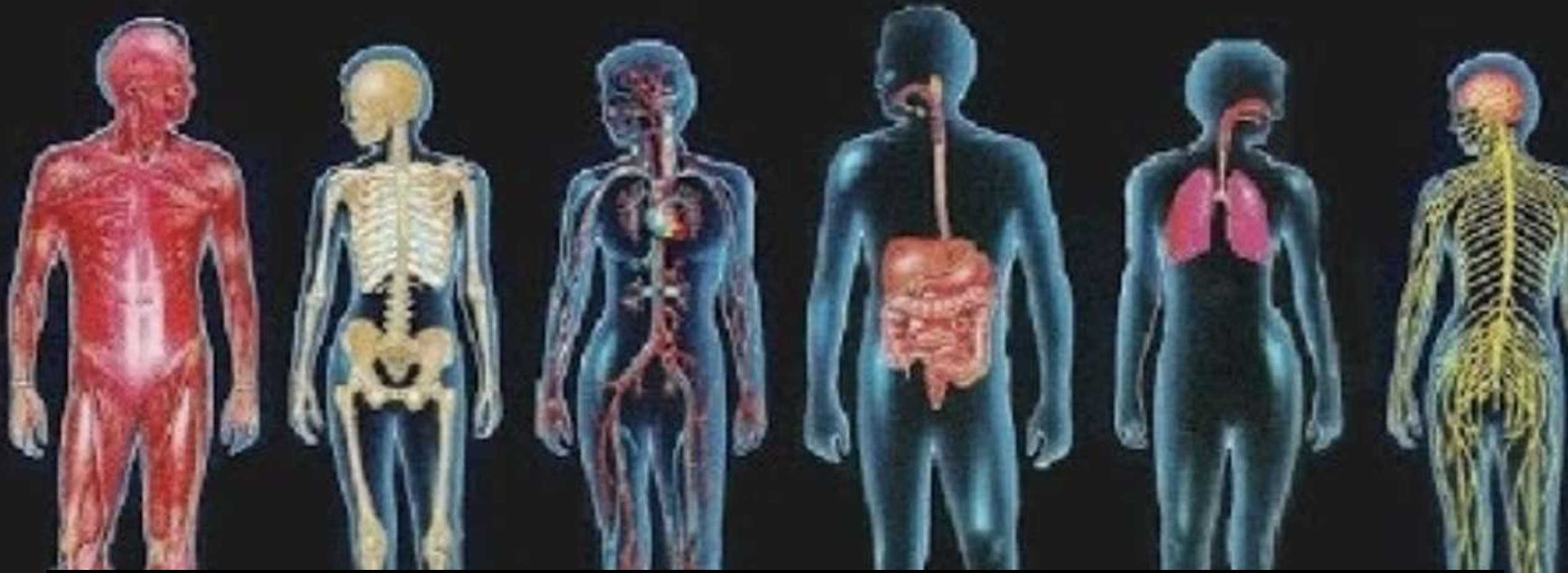


**Genetik leptin eksikliği infeksiyonlara bağlı mortaliteyi arttırmakta !**

Ozata M et al. J Clin Endocrinol Metab. 1999 Oct;84(10)

↑ ↑ Proinflatuar etki

Falagas ME, Lancet Infect Dis 2006; 6



Obezite & İnfeksiyon  
-sistemler-

# Surgical site infections at the National Cancer Institute in Mexico: A case-control study

Diana Vilar-Compte, MD, MsC<sup>a,b</sup>  
Alejandro Mohar, MD, ScD<sup>b,c</sup>  
Silvia Sandoval, RN<sup>a</sup>  
Margarita de la Rosa, RN<sup>a</sup>  
Patricia Gordillo, RN<sup>a</sup>  
Patricia Volk, MD<sup>a</sup>  
Mexico City,



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HHS Public Access

Author manuscript

Dis C

Aust N Z J Obstet Gynaecol 2022; 62: 234-240

DOI: 10.1111/ajog.13428

Published in final








ANZJOG

**Obes hastalarda cerrahi alan infeksiyon riskini yüksektir !!!**

The Obes  
and Outc

Tyler S. Wahl,  
Jayleen Gram  
Division of Gas  
Birmingham, B

**Incidence and predictors of surgical site infection in women who are obese and give birth by elective caesarean section: A secondary analysis**

Wendy Chaboyer<sup>1</sup> , David Ellwood<sup>2</sup> , Lukman Thalib<sup>3</sup> , Sailesh Kumar<sup>4,5</sup> ,  
Kassam Mahomed<sup>6</sup> , Evelyn Kang<sup>7</sup>  and Brigid M. Gillespie<sup>8</sup> 

From the Department of  
Am Surgery, 2016

Reference	Number of patients	Comparison groups according to BMI (kg/m <sup>2</sup> )	Type of infection	Odds ratio (95% CI)
Crabtree et al <sup>28</sup>	4004	Obese vs non-obese*	Superficial sternal infection Deep sternal infection	1.09 (1.06–1.12) 1.08 (1.04–1.11)
Löfgren et al <sup>24</sup>	3267	<25 25–28 >28	Postoperative infection	1.0 0.8 (0.6–1.1) 1.3 (1.0–1.8)
Lilienfeld et al <sup>29</sup>	1204	Obese vs non-obese*	Wound infection and/or endocarditis following coronary artery bypass grafting	6.2 (p<0.05)
Potapov et al <sup>30</sup>	22 666	26–26.9 28–28.9 34–34.9 ≥36	Infection following coronary artery bypass grafting	1.0 1.2 (1.1–1.7)† 1.8 (1.1–2.6) 3.7 (2.7–4.8)
Olsen et al <sup>25</sup>	222	Morbid obesity vs non-morbid obesity‡	Surgical-site infection following spinal surgery	5.2 (1.9–14.2)
Vilar-Compte et al <sup>20</sup>	3372	Obese vs non-obese*	Surgical-site infections	1.8 (1.1–2.7)
Harrington et al <sup>31</sup>	4474	Obese vs non-obese*	Surgical-site infection following coronary artery bypass grafting	1.8 (1.4–2.3)

\*Obese=BMI≥30 kg/m<sup>2</sup>. †Odds ratios were extracted from the relevant figure of the article (the exact odds ratios were not available). ‡Morbid obesity=BMI≥35kg/m<sup>2</sup>.

**Table: Risk of nosocomial infections in obese surgical patients**

# Neden cerrahi alan infeksiyonları?

- Lokal deęişiklikler; adipoz doku kalınlığı
- Retraksiyona baęlı lokal doku travması
- Uzamış cerrahi
- Hemostatik dengede bozulma

*Canturk, Z. Obes Res 2003*

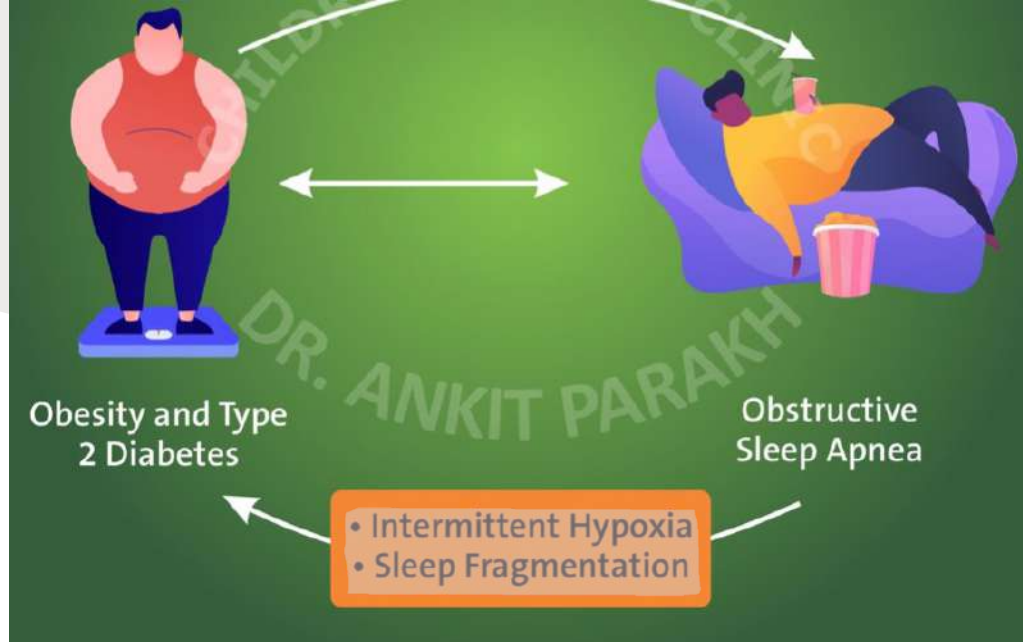
Obez kişilerde,

- Subkutanöz doku oksijenizasyonunun azalması
- Nazal MRSA kolonizasyon riskinin artması





# Obezite & Solunum sistemi infeksiyonları



- Akciğer mekanikleri değişir
  - Egzersiz kapasitesini bozular
  - Havayolu direncini arttır
  - Solunum kasları fonsiyonları bozular; gaz değişimi ve nefes kontrolü etkilenir
- Obstruktif sleep apne ile yakından ilişkili — aspirasyon riski ↑
- Açlıkta düşük mide ph, artmış abdominal basınç, GÖR riski-- pnm riski ↑

## Original Investigation

November 13, 2000

# A Prospective Study of Age-Related Factors in Relation to Community-Acquired Pneumonia in US Men and Women

Inkyung Baik, PhD; Gary C. Curhan, MD; Eric B. Rimm, ScD; et al

» [Author Affiliations](#) | [Article Information](#)

*Arch Intern Med.* 2000;160(20):3082-3088. doi:10.1001/archinte.

**Methods** The study population included 26,429 men aged 44 to 79 years from the Health Professionals Follow-up Study and 78,062 women aged 27 to 44 years from the Nurses' Health Study II. Information was collected by biennial mailed questionnaires and the main outcome was physician-diagnosed incident pneumonia.



**Results** There were 290 cases among men (6 years of follow-up) and 305 cases among women (2 years of follow-up). Age, smoking status, BMI, physical activity, and alcohol intake were taken into account in the multivariate logistic regression model. There was a dose-response relation between aging and risk of CAP among men. Compared with never smokers, current smoking was associated with risk of CAP among men (relative risk, 1.46; 95% confidence interval, 1.00-2.14) and women (relative risk, 1.55; 95% confidence interval, 1.15-2.10). In addition, BMI was directly associated with an increased risk of CAP among women. Compared with the participants who maintained their weight during adulthood, the risks were nearly 2-fold higher among men and women who gained 40 lb or more ( $\geq 18$  kg). The risk of CAP decreased with increasing physical activity among women. We also found no significant relation between alcohol intake and risk of CAP among men and women.

**Conclusions** Smoking and excessive weight gain are risk factors for CAP among men and women, and physical activity was inversely associated with risk of CAP only among women. The incidence of CAP could possibly be decreased by lifestyle factors.

ORIGINAL

# Obesity and risk of catheter-related infections in the ICU. A post hoc analysis of four large random



Niccolò Buetti<sup>1,11</sup> , Bertrand Ambre Loiodice<sup>6</sup>, Nicolas Mo and Jean-François Timsit<sup>1,12\*</sup> 

## Abstract

**Purpose:** Obesity increases the risk of nosocomial infection, but data regarding the role of body mass index (BMI) in catheter related infections are scarce. We used the data gathered from four randomized, controlled trials (RCTs) to investigate the association between body mass index (BMI) and intravascular catheter infections in critically ill obese patients.

**Methods:** Adult obese patients who required short-term central venous, arterial or dialysis catheter insertion in the intensive care unit (ICU) were analyzed. The association between BMI and major catheter-related infection (MCRI), catheter-related bloodstream infection (CRBSI) and catheter tip colonization was estimated using univariate and multivariate marginal Cox models. Exploratory analysis using dressing disruptions was added.

**Results:** A total of 2282 obese patients and 4275 catheters from 32 centers were included in this post-hoc analysis. Overall, 66 (1.5%) MCRI, 43 (1%) CRBSI and 399 (9.3%) catheter colonizations were identified. The hazard ratio (HR) for MCRI, CRBSI and colonization increased with BMI. After adjustment for well-known infection risk factors, the BMI  $\geq 40$  group had an increased risk for MCRI (HR 1.88, 95% CI 1.13–3.12,  $p = 0.015$ ), CRBSI (HR 2.19, 95% CI 1.19–4.04,  $p = 0.012$ ) and colonization (HR 1.44, 95% CI 1.12–1.84,  $p = 0.0038$ ) compared to the BMI  $< 40$  group. The mean dressing disruption per catheter was increased in the BMI  $\geq 40$  group (2.03 versus 1.68 in the BMI  $< 40$  group,  $p = 0.05$ ).

**Conclusions:** Using the largest dataset ever collected from large multicentric RCTs, we showed that patients with BMI  $\geq 40$  had an increased risk for intravascular catheter infections. Targeted prevention measures should focus on this population with a particular attention to catheter care and dressing disruption.

# Obeziteye baęlı riski artan dięer infeksiyonlar

- Odontojenik infeksiyonlar
  - Artan řeker tüketiimi, DM
- GiS, karacięer ve biliyer sistem infeksiyonları
  - Biriken yaę nedeniyle mekanik ve endokrin sebepler
- Urogenital sistem infeksiyonları
- Kemik eklem infeksiyonları





Obezite & İnfeksiyon  
-etkenler-

# Obezitede **VIRAL** infeksiyon riski

nature communications



Article

## Obesity dysregulates antiviral immune responses

Received: 22 June 2023

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Published online: 19 October 2023

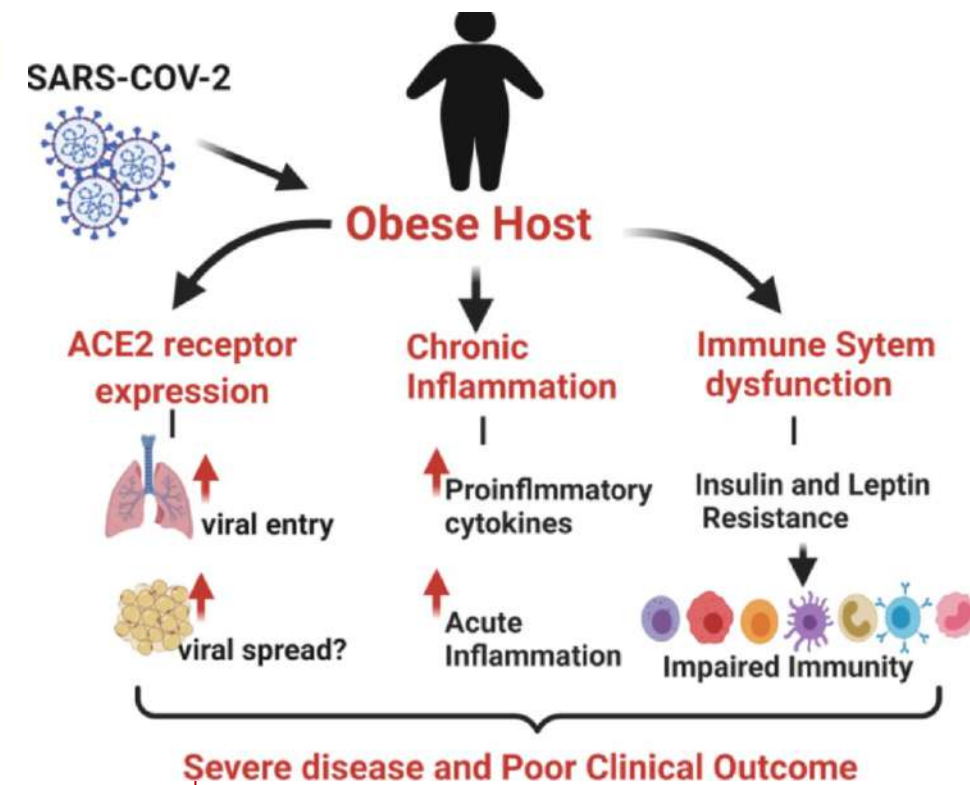
Check for updates

Mark Alr  
Orestis K  
Jake Dur  
Ken A. S  
Peter J. I  
Liam M.

Obesity is a well-recognized risk factor for severe influenza infections but the mechanisms underlying susceptibility are poorly understood. Here, we identify that obese individuals have deficient pulmonary antiviral immune responses in bronchoalveolar lavage cells but not in bronchial epithelial cells or peripheral blood dendritic cells. We show that the obese human airway metabolome is perturbed with associated increases in the airway concentrations of the adipokine leptin which correlated negatively with the magnitude of ex vivo antiviral responses. Exogenous pulmonary leptin administration in mice directly impaired antiviral type I interferon responses in vivo and ex vivo in cultured airway macrophages. Obese individuals hospitalised with influenza showed dysregulated upper airway immune responses. These studies provide insight into mechanisms driving propensity to severe influenza infections in obesity and raise the potential for development of leptin manipulation or interferon administration as novel strategies for conferring protection from severe infections in obese higher risk individuals.

# Overweight and obesity as risk factors for COVID-19-associated hospitalisations and death: systematic review and meta-analysis

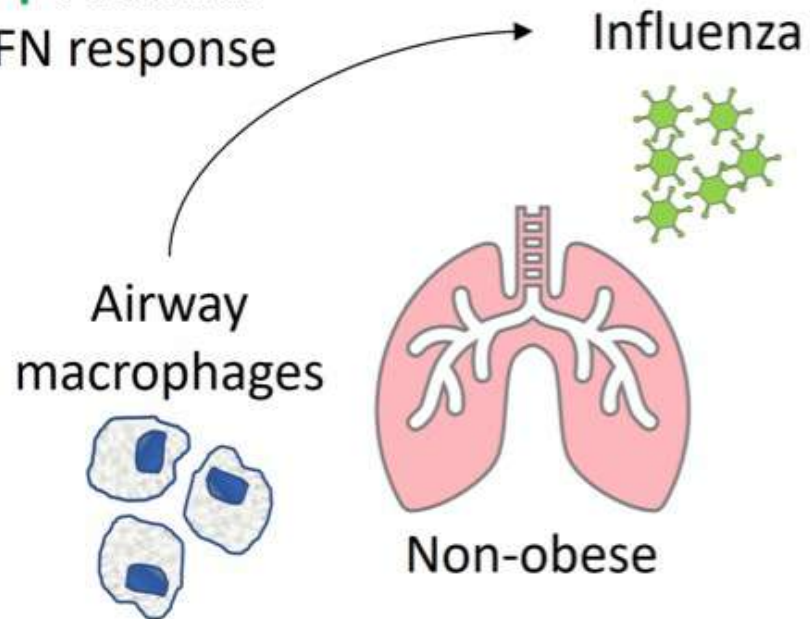
Wendemi Sawadogo , Medhin Tsegaye, Andinet Gizaw, Tilahun Adera



**Conclusion** Being overweight increases the risk of COVID-19-related hospitalisations but not death, while obesity and extreme obesity increase the risk of both COVID-19-related hospitalisations and death. These findings suggest that prompt access to COVID-19 care, prioritisation for COVID-19 vaccination and other preventive measures are warranted for this vulnerable group.

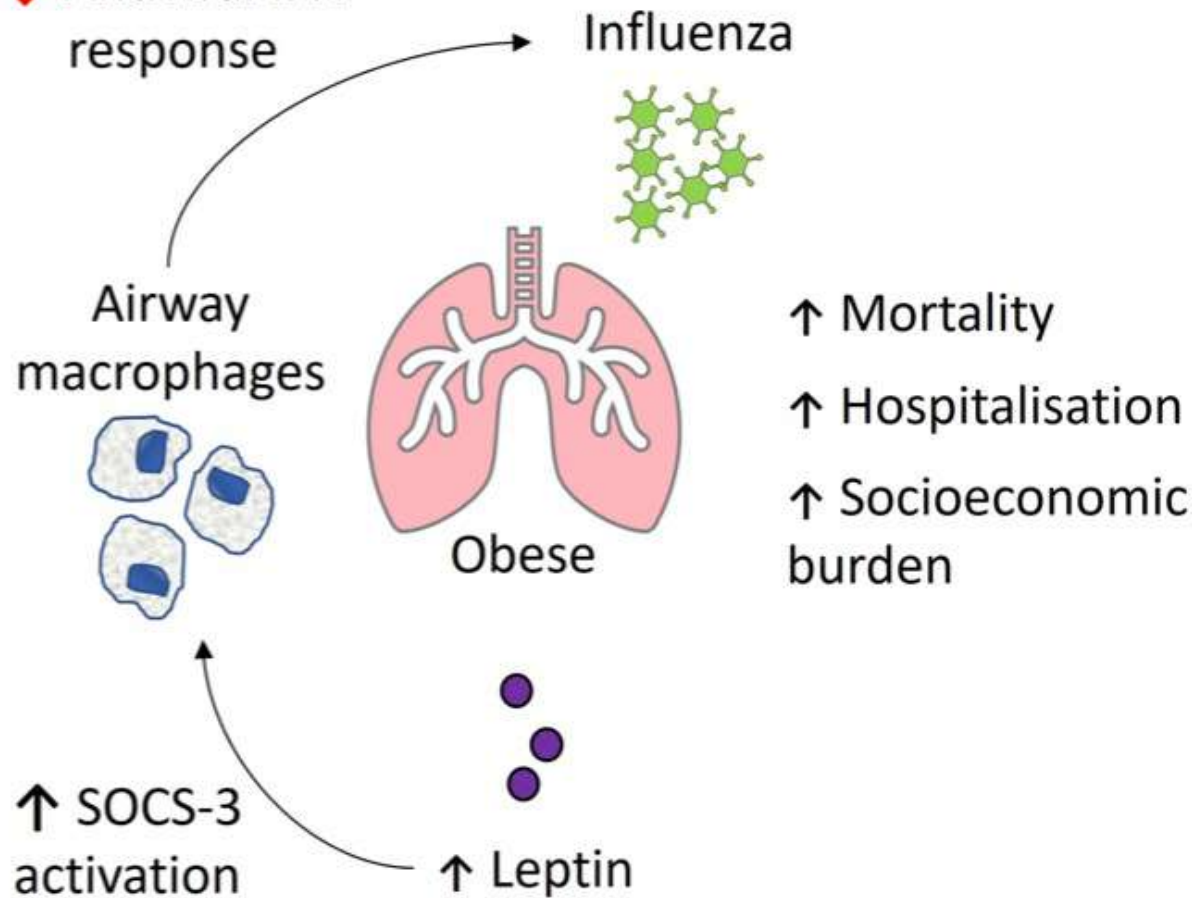
Brief self-limiting illness

↑ Antiviral IFN response



Life-threatening illness

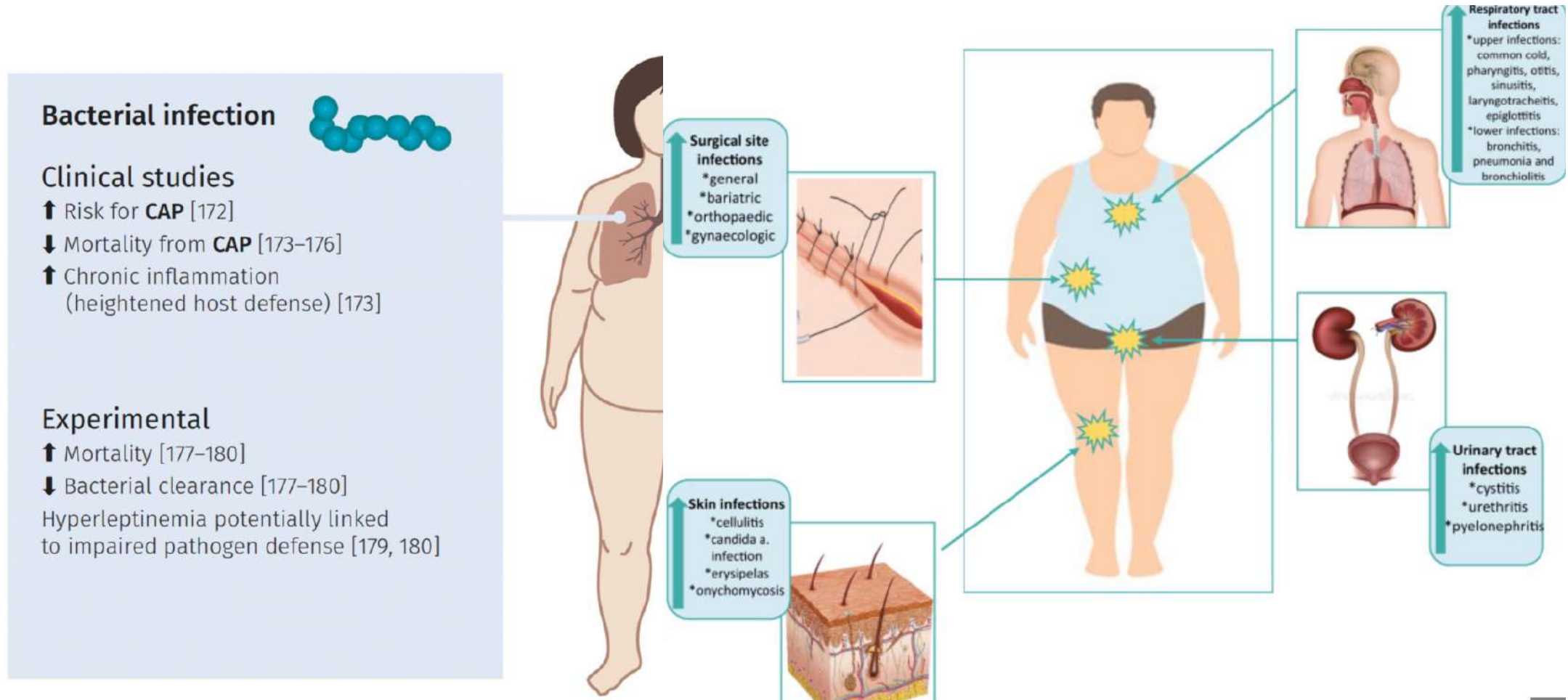
↓ Antiviral IFN response



SOCS-3; the suppressor of cytokine signalling



# Obezitede **BAKTERİYEL** infeksiyon riski



# Obez hastalarda antimikrobiyal tedavi

Obez hastalarda farmakolojik çalışmalarda;

- Body weight
- Lean body weight
- Ideal body weight
- Body surface area
- BMI
- Fat-free mass
- Percent ideal body weight
- Adjusted body weight
- Predicted normal body weight ölçümleri kullanılmıştır

## Comprehensive guidance for antibiotic dosing in obese adults: 2022 update

Lina Meng<sup>1,2,3</sup> | Emily Mui<sup>1,2,3</sup> | David R. Ha<sup>1,2,3</sup> | Christopher Stave<sup>4</sup> |  
Stan C. Deresinski<sup>1,2,3</sup> | Marisa Holubar<sup>1,2,3</sup>

Stanford, California

Standart dozlarla efektif serum konsantrasyonu sağlanamaz

- Yağ dengesi ve kas dengesi obez olmayanlara göre farklılık gösterir
  - **Dağılım hacmi ( $V_d$ )** artmasına sebep olur
  - $V_d$ , vücuttaki toplam ilaç miktarını plazma konsantrasyonu ile ilişkilendirir ve **yükleme dozunun temel belirleyicisidir.**
- Total vücut ağırlığı artar ancak lineer bir artış değil
- **Total vücut klirensi** de etkilenir (primer olarak KC ve böbrek)
- **CL, idame dozunun temel belirleyicisidir.**

## Body Mass Index (BMI), Body Surface Area (BSA), Ideal Body Weight (IBW), and Lean Body Weight (LBW)

Height:

Weight:

Sex:

Male  Female

**Body Mass Index = 35.38 kg/m<sup>2</sup>**

BMI = (weight in pounds \* 703) / height in inches<sup>2</sup>

**Body Surface Area = 1.91 m<sup>2</sup>**

Mosteller (BSA) m<sup>2</sup> =  $\sqrt{(\text{height in cm} * \text{weight in kg} / 3600)}$

**Ideal Body Weight = 52.35 kg**

Male = 50 kg + 2.3 \* (height in inches - 60)

**Adjusted Body Weight = 65.41 kg**

ABW = IBW + 0.4 \* (weight in kg - IBW)

**Lean Body Weight = 56.8 kg**

Male = (weight in kg \* 0.407) + (height in cm \* 0.267) - 19.2

**TABLE 2** Summary of antibiotic weight-based dosing scalars in obese patients.

<b>Antibiotics</b>	<b>Dosing weight scalar, suggested maximum dose</b>
Aminoglycosides	AdjBW
Colistin methanesulfonate	IBW; Maximum dose 300 mg daily to limit nephrotoxicity risk
Daptomycin	AdjBW
Eravacycline	TBW (No change to dosing weight)
Telavancin	AdjBW
Polymyxin B	AdjBW; Maximum 200–249 mg daily dose to limit toxicities
Trimethoprim-sulfamethoxazole,	AdjBW
Vancomycin	TBW Maximum loading dose 3000 mg Maximum maintenance dose 4500 mg daily

## Body Mass Index (BMI), Body Surface Area (BSA), Ideal Body Weight (IBW), and Lean Body Weight (LBW)

Height:

Weight:

Sex:

Male  Female

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**Lean Body Weight = 56.8 kg**

Male = (weight in kg \* 0.407) + (height in cm \* 0.267) - 19.2

- Terapötik ilaç izlemi!!!



# Obez kişilerde doz ayarı gerekmeyen antibiyotikler

- Seftarolin
- Seftazidim-avibaktam
- Seftolozon-tazobaktam
- Dalbavansin
- Doripenem
- İmipenem-silastatin
- Meropenem
- Moksifloksasin
- Tigesiklin



More is not better

- Teşekkür ederim....