A New Partnership:
Improving Joint Replacement Outcomes by Managing Obesity

Derek F. Amanatullah, M.D., Ph.D.
Assistant Professor
Orthopaedic Surgery
Email: dfa@stanford.edu
Personal and Professional Disclosures

- **Consulting**
  - Stryker, Exactech, BlueJay Mobile Health, Omni, Fusion Tech, Sanofi

- **Intellectual Property**
  - Dynamic Tension PFS (#9,320,637)
  - Seven Patents Pending

- **Ownership**
  - Arthrology, LLC

- **Grants/Gifts**
  - Acumed, Stryker, BlueJay Mobile Health

- **Manuscript Preparation**
  - Medscape/WebMD

- **AAOS**
  - Basic Science Evaluation Committee
  - ASMBS – Obesity Summit Representative
A Weighty Epidemic

1985

1995

2005

2014

What is THE NEW (AB)NORMAL?

Think things never change?

CDC
MakingHealthEasier.org/NewAbnormal
Except the Airplane…
Lipotoxicity and Metabolic Syndrome

Inflammation
- Adipsin
- TNFα
- IL6
- EGF
- Adiponectin

Hypertension
- Angiotensinogen

Dyslipidemia
- FFA
- Insulin
- PAI-1

Type 2 Diabetes
- Prostaglandins

Arthritis
- Leptin
- Estrogen

Asthma

Cancer

Stroke, Heart Attack

PVD

Slide courtesy of Dr. Robert Kushner, Northwestern University
The Coming Epidemic of ARTHRITIS

THE BAD NEWS: Research shows that the disease starts attacking your joints long before middle age

THE GOOD NEWS: The latest treatments are more effective than ever
Demand Total Joint Replacement

Kurtz+ JBJS 2014
Prevalence of Arthritis in Patients with Obesity

Losina+ AC+R 2013
Complications with TJA in Obese Patients

- Deep Infection
- Dislocation (Component Positioning)
- Wound Healing – Superficial Infection
- Aseptic Loosening
- Revision for Any Reason
- Ligament Rupture
- Deep Venous Thrombosis
- Longer Length of Stay
- Higher Total Costs

Gino+ JBJS 2012
D’Apuzzo CORR 2015
Pulos JOA 2014

Watts+ CORR 2015
Haverkamp+ Acta Orthop 2011
Kremers+ CORR 2014
Increasing BMI Adversely Affects Survival

![Graph showing the impact of BMI on survival rate over years. The graph illustrates that as BMI increases, the survival rate decreases significantly over time.]
Implant Failure NOT Confined to the Obese

BMI ≤ 25  
BMI > 25

Percent Revised

Time to Revision (years)
Early Revision for Infection in Total Knee

<table>
<thead>
<tr>
<th>Reason for Revision</th>
<th>Normal BMI</th>
<th>Elevated BMI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loosening</td>
<td>8/20 (40%)</td>
<td>55/130 (42%)</td>
<td>1.000</td>
</tr>
<tr>
<td>Infection</td>
<td>8/33 (24%)</td>
<td>74/138 (54%)</td>
<td><strong>0.003</strong>*</td>
</tr>
<tr>
<td>Instability</td>
<td>7/16 (44%)</td>
<td>76/133 (57%)</td>
<td>0.425</td>
</tr>
<tr>
<td>Stiffness</td>
<td>6/10 (60%)</td>
<td>41/76 (54%)</td>
<td>1.000</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>6/12 (50%)</td>
<td>54/98 (55%)</td>
<td>0.767</td>
</tr>
</tbody>
</table>
Risk Increases EXPONENTIALLY!

All Hips: Deep Infection

Hazard Ratio

BMI (kg/m²)

Wagner+ JBJS 2016
Poor After Revision for Infection

Non-Obese

Obese

Percent Free of Revision

Follow Up (months)

B

Houdek+ JBJS 2015
Just Lose Weight...

Walk 1 Mile = 90-100 Calories in 20 Minutes
Run 1 Mile = 100-120 Calories in 6-10 Minutes
Calories in 1 Pound of Fat = 3,500
***Walk 35 Miles to Lose 1 Pound of Fat***
Total Joint Replacement ≠ Weight Loss

Fig. 1
Weight change distribution by BMI classification for total hip arthroplasty (THA).

Fig. 2
Weight change distribution by BMI classification for total knee arthroplasty (TKA).
Weight Loss Matters AFTER Joint Replacement

![Graph showing the relationship between weight change and time to revision after joint replacement.]
The Arthritis/Obesity Dilemma

• More and more overweight/obese patients are visiting the orthopaedic surgeon for joint replacement ➔ EXPONENTIAL DEMAND

• They have tried nearly everything to lose weight without success ➔ FRUSTRATION/DENIAL

• Doctors, hospitals, and payers will be reluctant to perform/approve joint replacement surgery for obese patients ➔ COSTS/COMPLICATIONS
A Question and A Partnership

• Hypothesis: Bariatric surgery prior to joint replacement will improve outcomes, reduce risks, and control costs.

• A Collaboration Across Three Fields
  Internal Medicine
  Bariatric Surgery
  Orthopaedic Surgery

Prospective, Pragmatic, Observational Study
THANK YOU