

# Left Gastric Artery Embolization for the Treatment of Obesity

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# Disclosure

Speaker name:

Robert E. Beasley, MD, FSIR, FSCAI

I have the following potential conflicts of interest to report:

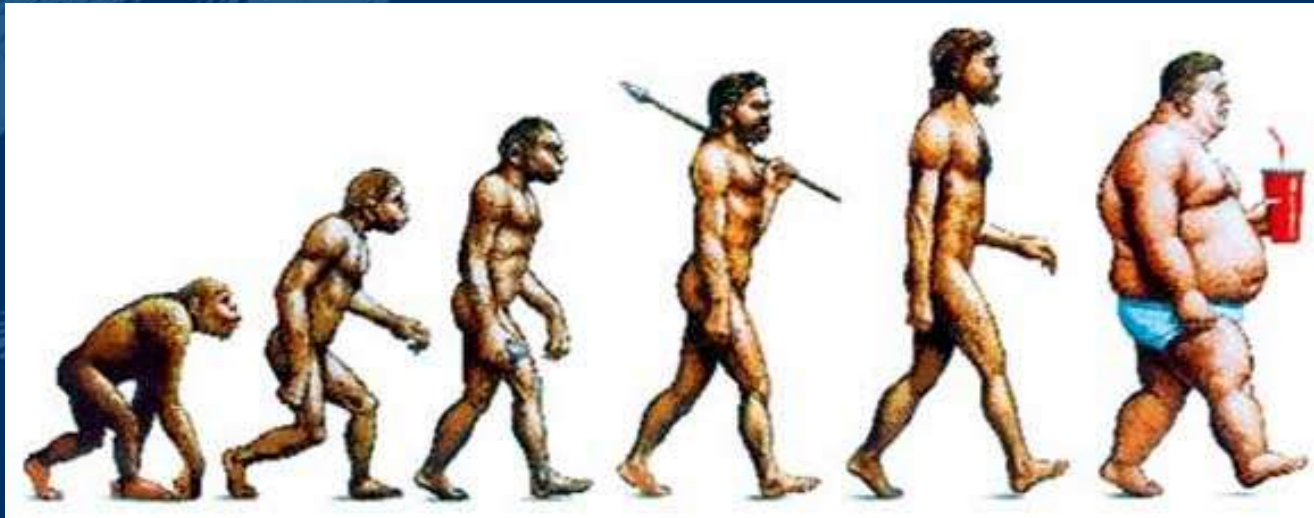
- Consulting
  - Employment in industry
  - Stockholder of a healthcare company
  - Owner of a healthcare company
  - Other(s)
- 
- I do not have any potential conflict of interest

# Disclosures

## **Consultant/Medical Advisory Board**

- Abbott
- BSCI
- Cardinal Health/Cordis
- Cook Medical
- CR BARD/Becton Dickinson
- CSI
- Endologix
- Inari
- Medtronic
- Micro Medical Solutions
- Philips/Volcano/Spectranetics
- Penumbra
- Terumo/Bolton
- WL Gore

# Gastric Artery Embolization



# Worldwide Epidemic

USA, China and India

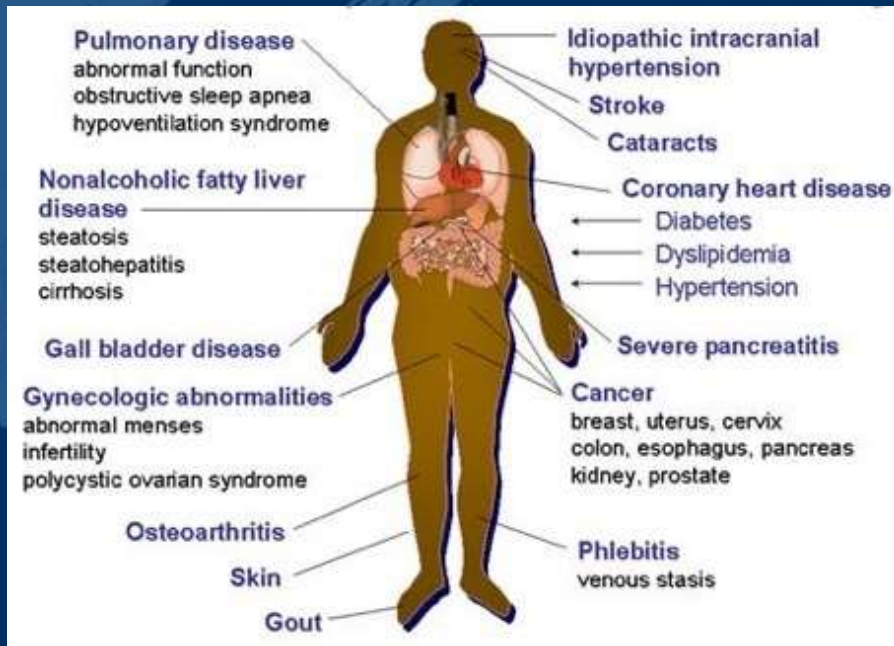
High Health system costs

Bariatric Surgery - High Morbidity

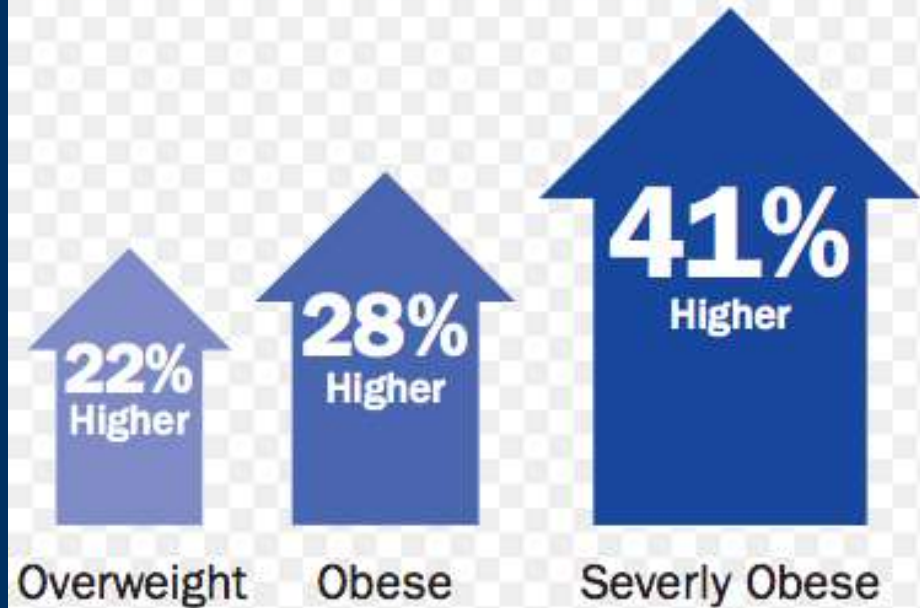
Lack of alternatives

# Medical Complications of Obesity

US Obesity-related healthcare costs:  
\$147 billion – \$210 billion per year



**Difference in Emergency Room Costs for Patients Presenting With Chest Pains Compared with a Normal-weight Patient**





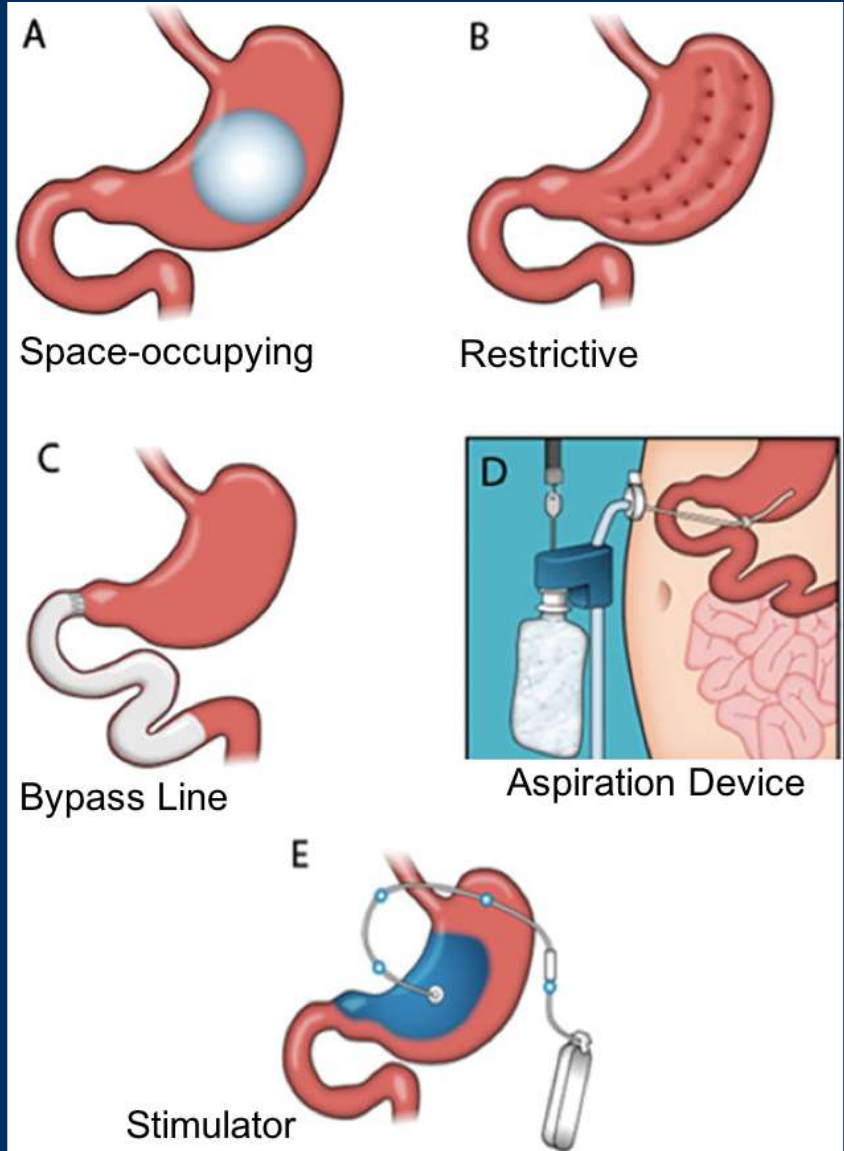
# Treatment Modalities

## Pharmacotherapy

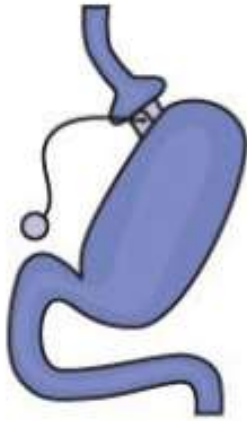


Lorcaserin  
Phentermine  
Phentermine / Topiramate  
Bupropion / Naltrexone  
Orlistat  
Liraglutide

## Endoscopic Weight Loss



# Bariatric Surgery



**Adjustable  
Gastric Band  
(AGB)**



**Roux-en-Y  
Gastric Bypass  
(RYGB)**



**Vertical Sleeve  
Gastrectomy  
(VSG)**

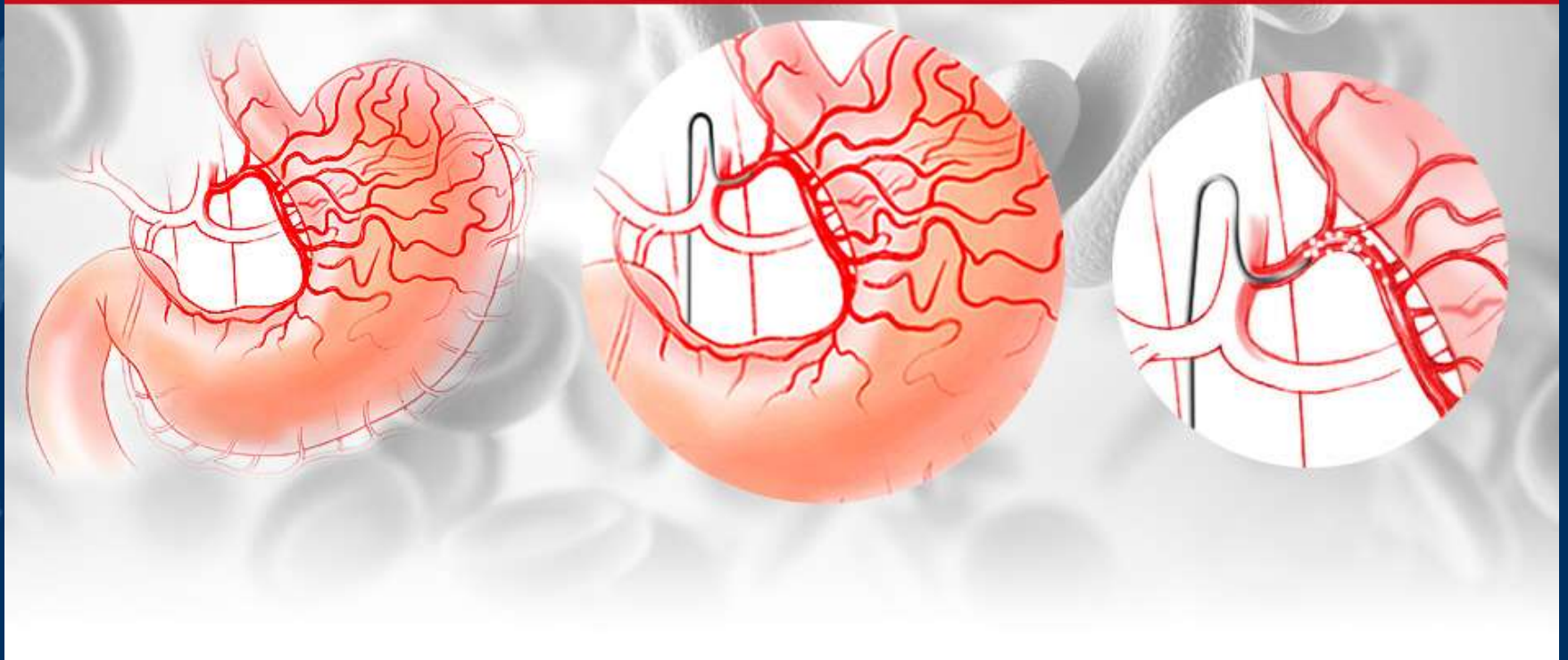


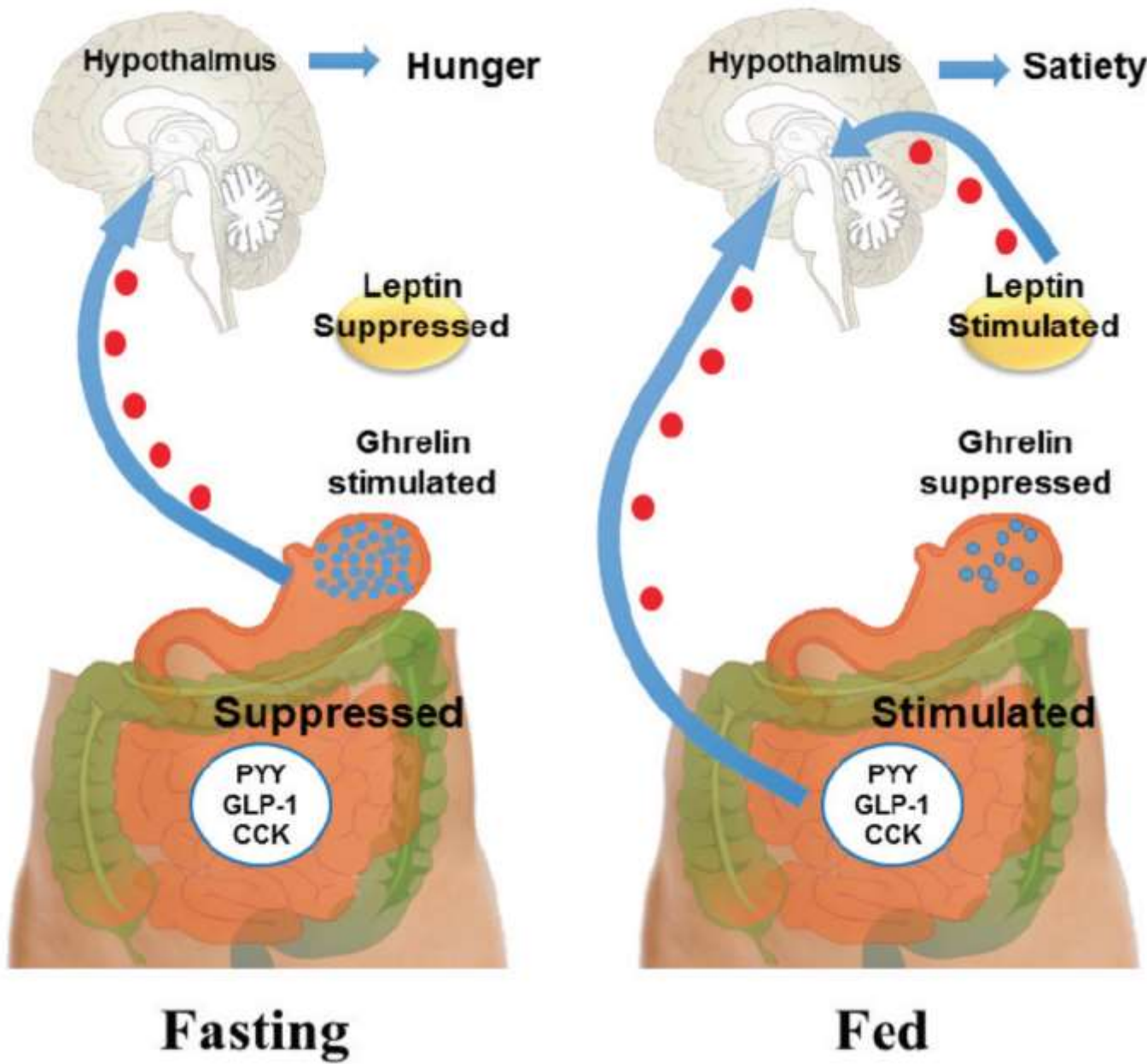
**Biliopancreatic  
Diversion With a  
Duodenal Switch  
(BPD-DS)**



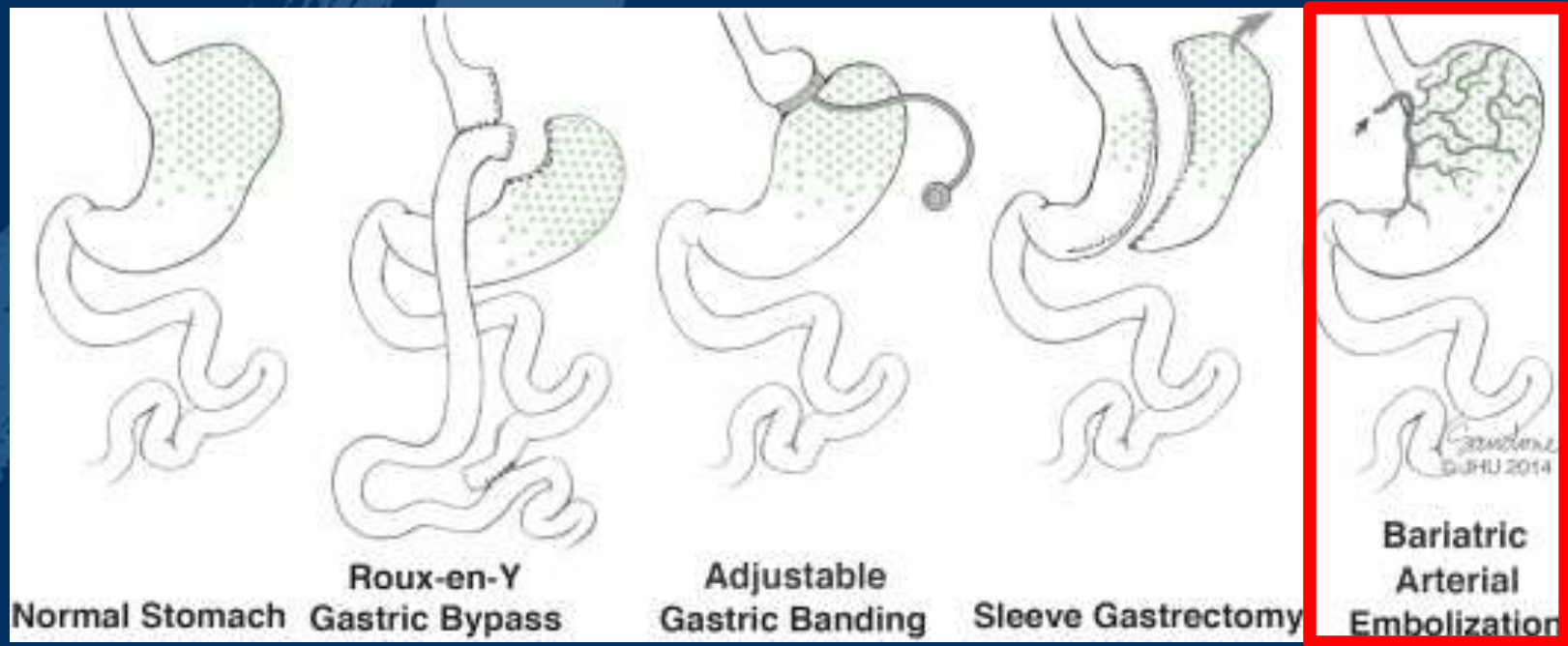
# Gastric Artery Embolization: GAE

## LEFT GASTRIC ARTERY EMBOLIZATION



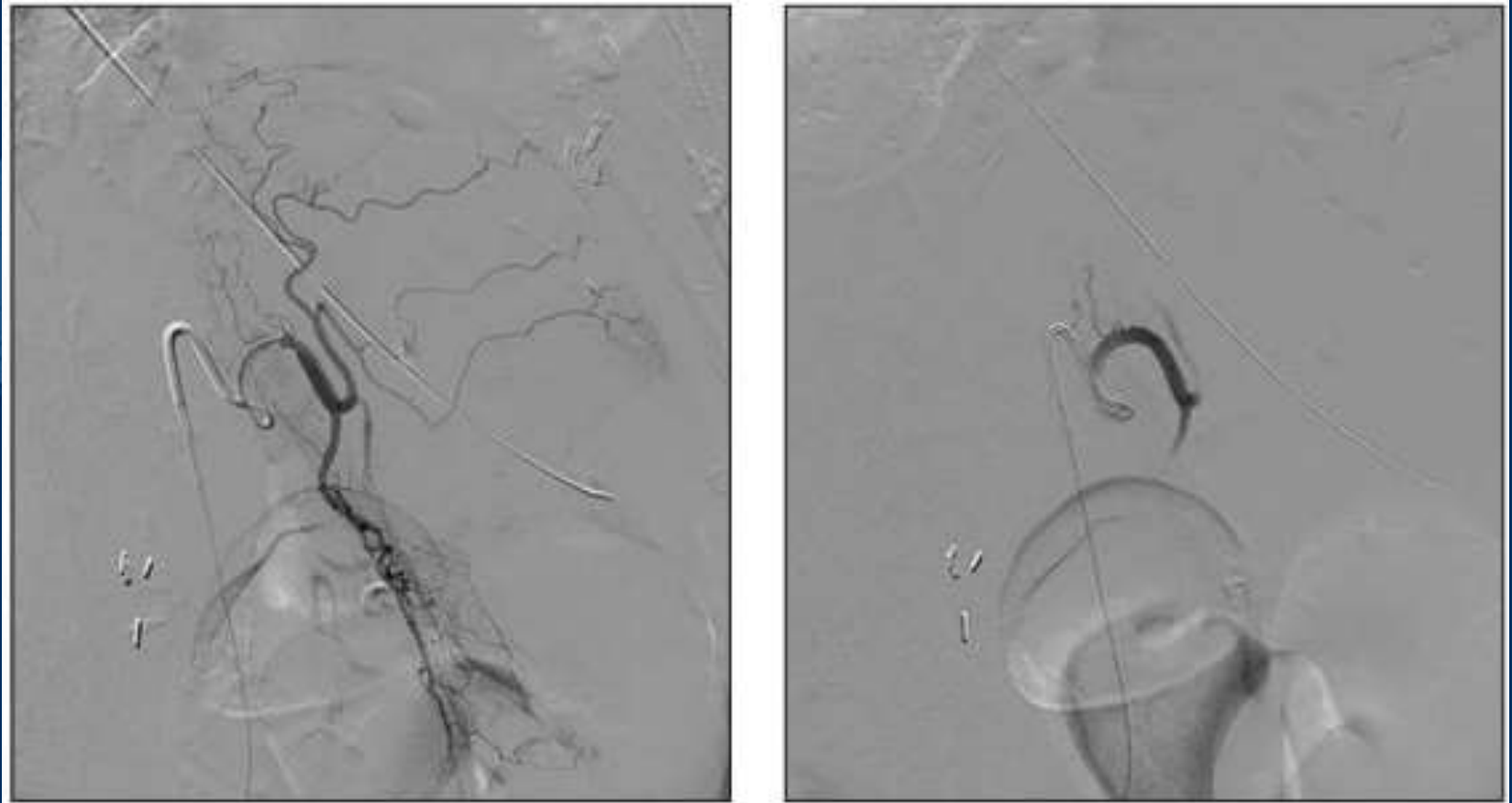


# GAE: How does it work?



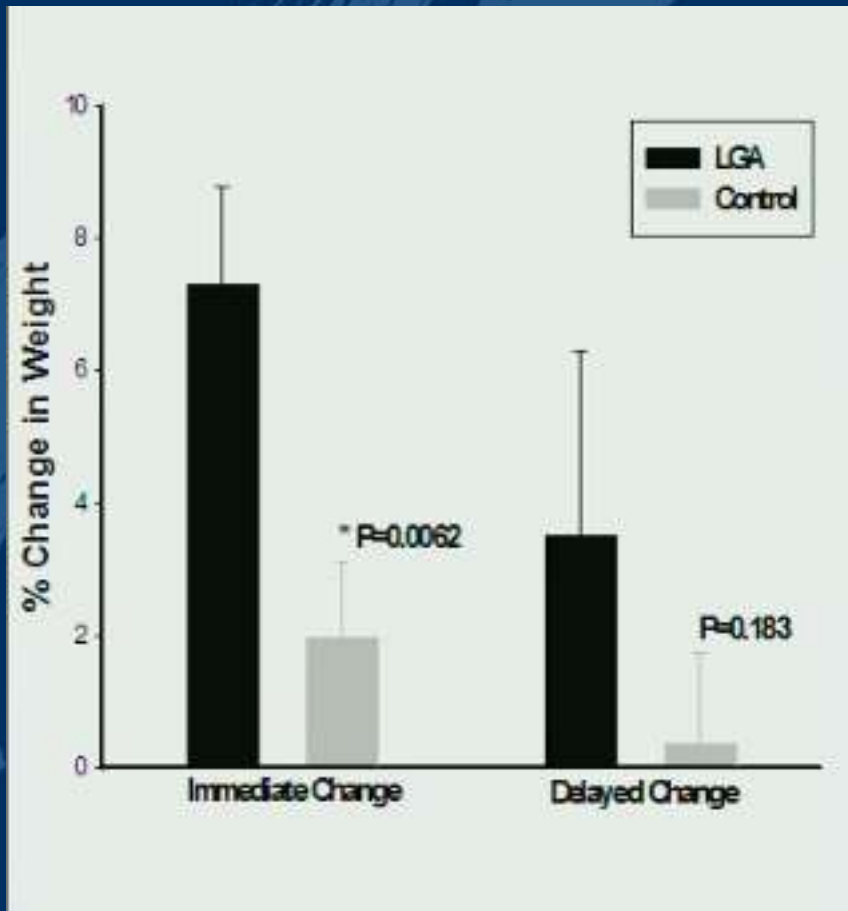
All bariatric surgeries effectively isolate fundal Ghrelin-producing cells

# GAE: Procedure



Two patients who underwent left gastric artery (LGA) embolization. (Presented in poster format at Image-Guided Intervention: 50th Anniversary meeting in Portland, OR, July 23–24, 2014)

# GAE: Early human data



- Retrospective
- UGIB patients
- LGA embolized (fundus)
  - N = 19
- Non-LGA embolized
  - N = 28

3 month TWL:

LGA embo = 7.3%

Controls = 2% TWL



# GAE: Clinical trial evidence



JACC: Cardiovascular Interventions  
Volume 8, Issue 12, October 2015, Pages 1641-1644



Letter to the Editor

## Endovascular Bariatrics: First in Humans Study of Gastric Artery Embolization for Weight Loss

Nickolas Kipshidze MD, PhD, Akaki Archvadze MD, Stefan Bertog MD, Martin B. Leon MD, Horst Sievert MD

CLINICAL STUDY



## Gastric Artery Embolization Trial for the Lessening of Appetite Nonsurgically (GET LEAN): Six-Month Preliminary Data

Mubin I. Syed, MD, Kamal Morar, MD, Azim Shaikh, MD, MBA, Paul Craig, MD, Omar Khan, MD, Sumeet Patel, and Hooman Khabiri, MD

### Original Research

#### Vascular and Interventional Radiology

## Clinical Safety of Bariatric Arterial Embolization: Preliminary Results of the BEAT Obesity Trial



Author List

Clifford R. Weiss, MD, Olaguoke Akinwande, MD, Kaylan Paudel, MD, Lawrence J. Cheskin, MD, Brian Holly, MD, Kelvin Hong, MD, Aaron M. Fischman, MD, Rahul S. Patel, MD, Eun J. Shin, MD, Kimberley E. Steele, MD, PhD, Timothy H. Moran, PhD, Kristen Kaiser, Amie Park, BS, David M. Shade, JD, Dara L. Kraitchman, VMD, PhD, Aravind Arepally, MD

Additional Information



OBES SURG (2018) 28:907-915  
<https://doi.org/10.1007/s11695-017-2979-9>



ORIGINAL CONTRIBUTIONS

## Bariatric Embolization of the Left Gastric Arteries for the Treatment of Obesity: 9-Month Data in 5 Patients

Zhi-Bin Bai<sup>1</sup> • Yong-Lin Qin<sup>1</sup> • Gang Deng<sup>1</sup> • Guo-Feng Zhao<sup>1</sup> • Bin-Yan Zhong<sup>1</sup> • Gao-Jun Teng<sup>1</sup>



# GAE: The Clinical Trial Evidence

**TABLE 1. CHARACTERISTICS AND RESULTS OF THE AVAILABLE PROSPECTIVE CLINICAL TRIALS**

Study	Sample Size	Embollic Agent	Embollic Size (µm)	Follow-Up (mo)	Primary Endpoint	Adverse Events	Mean Baseline BMI (kg/m <sup>2</sup> )	Absolute Weight Loss	Excess Weight Loss
Kipshidze et al <sup>34</sup>	5	Bead Block particles	300-500	24	Weight loss	Mild transient epigastric discomfort	42.2	17.2%	Unknown
Syed et al <sup>35</sup>	4	Bead Block particles	300-500	6	Safety	Mild nausea, occasional vomiting, mild epigastric discomfort	42.4	7.8%	17.2%
Weiss et al <sup>36</sup>	5	Embosphere microspheres	300-500	3	30-day adverse events	Transient pancreatitis, asymptomatic superficial ulcer	43.8	4.7%	9%
Bai et al <sup>37</sup>	5	PVA particles	500-710	9	Safety	Superficial linear ulceration, hematoma at puncture site	38.1	Unknown	12.64%

Abbreviations: BMI, body mass index; PVA, polyvinyl alcohol.

## Systematic Review of articles through 2017

- 62 patients
  - 53 Obese (BMI  $\geq$  30)
  - 9 Morbidly Obese (BMI  $\geq$  40)

# Followup

BMI ↓ (1-3 Months)

- 7% Obese
- 11% Morbidly Obese

BMI ↓ (1 Year)

2% BMI decrease in both groups

# Results

Ghrelin ( $\frac{4}{5}$ )

↓ 36% in 3 Months

Hemoglobin A1c

↓ 7.4% - 6.3% at 6 months

Improved Quality of Life ( SF-36 )

# New Developments



## Original Research

Vascular and Interventional Radiology

### Clinical Safety of Bariatric Arterial Embolization: Preliminary Results of the BEAT Obesity Trial

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#### Additional Information

One year results published online April 2, 2019.

# BEAT Obesity Trial

- Prospective Study with 2 sites (June '14 – Feb '18)
- 20 participants aged 27 - 68 (16 women)
- Mean body mass index of  $45 \pm 4.1$
- Transarterial embolization of gastric fundus
- 300-500 micron embolic microspheres



# BEAT Obesity Trial

- Primary endpoints
  - 30-day adverse events
  - Weight loss at 12 months
- Secondary endpoints
  - Technical feasibility
  - Health-related QOL
  - Impact of weight on QOL
  - Hunger/appetite using visual scale

# BEAT Obesity Trial

- Bariatric embolization - 100% technically successful
- No major adverse events
- 11 minor adverse events
  - 8 participants 11 events
    - Subclinical pancreatitis with transient elevation of lipase (1 patient)
    - Nausea, vomiting, epigastric pain - - supportive care
- All participants discharged home 24-48 hours after admission (resolution of all symptoms)

# BEAT Obesity Trial

- Mean excess weight loss /weight loss in lbs
  - 1 month: 8.2% (-12.1 lbs)
  - 3 months: 11.5% (-16.8 lbs)
  - 6 months: 12.8% (-19.4 lbs)
  - 12 months: 11.5% (-17.2 lbs)
- All Quality of Life Secondary Endpoints improved at 1 year.
- Hunger/appetite decreased for 4 weeks after embolization
  - increased thereafter but didn't reach pre-embolization levels.

# Bariatric Embolization

## Key Points

- Feasible with 100% technical success in 20 adults with severe obesity
- Well tolerated with NO major complications
- Substantial weight loss – 11.5% at 12 months
- Participants showed evidence of metabolic change
  - Decrease in hemoglobin A1C and total cholesterol
  - Increase in high density lipoproteins (HDL)

# BEAT Obesity Trial Summary

Bariatric Embolization is feasible and well tolerated in severely obese patients, inducing appetite suppression and weight loss up to 12 months.

# GAE: Summary

- Gastric Embolization with 300-500micron spheres in severely obese patients
  - Appears Safe + Effective in short and intermediate term
- Moving Forward
  - Need placebo-controlled trial
  - Need longer term follow up
  - Ancillary Effects:
    - Effect on future bypass?



<https://www.medicalnewstoday.com/articles/317442.php>



# Conclusions

- LGA embolization therapy has insufficient data to alter practice (Grade C, Level 3 of evidence according to Kordzadeh, et al.)
- Obesity treatment must have a multidisciplinary approach
- Psychologist, dietician and physical therapist must work together to sustain and enhance the results of any procedure
- Bariatric alternatives may have a place in the Interventionalist Practice if done as part of an integrative approach

# Where do we go from here?

- Development of clinical trials with multidisciplinary approach and long-term follow up
- Placebo-controlled trials
- Possibly combine with antiobesity medication treatment.

# References

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- 2. Kordzadeh A, Lorenzi B, Hanif MA, Charalabopoulos A. Left Gastric Artery Embolisation for the Treatment of Obesity: a Systematic Review. *Obes Surg*. 2018;28(6):1797-1802. doi:10.1007/s11695-018-3211-2
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- 6. Endovascular Today - Bariatric Embolization: Are Patients Actually Losing Weight? Endovascular Today. <http://evtoday.com/2018/04/bariatric-embolization-are-patients-actually-losing-weight/>. Accessed January 16, 2019.

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