



# True Shape

AI solution to accurately classify lipedema and mitigate negative implications from misdiagnosis

Naleef Fareed, PhD MBA  
&  
Vincenza Cifarelli, PhD



# Today



- ▶ Mary, a 25 year old, visits her primary care doctor and is concerned about her weight and figure. After having put her through a weight loss regiment that was not successful, she is recommended to a endocrinologist.
- ▶ The endocrinologist prescribes drugs that were also not successful.
- ▶ She visits a bariatric physician and is recommended to go through expensive and life changing bariatric surgery.
- ▶ One year later, her problem persists. She experiences continued pain, cardiac complications from the surgery, along with with depression and stress.



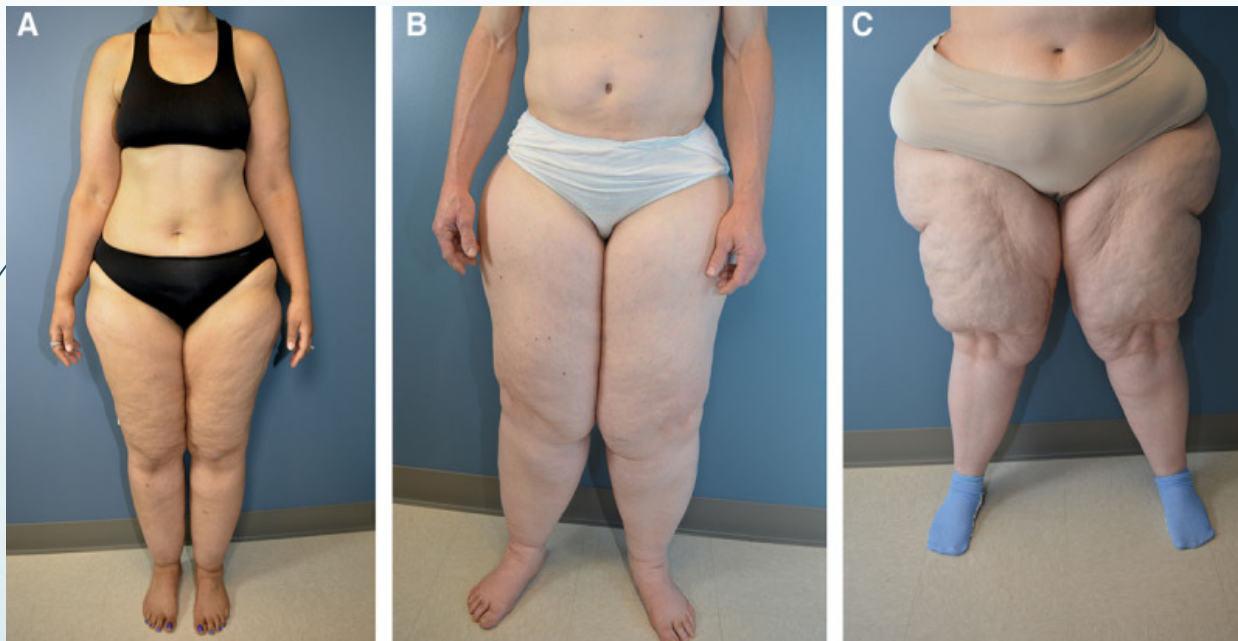
# The future



- ▶ Mary's primary care/specialist doctor recommends Mary to obtain sonograms and collects additional biological data. She inputs these key values about Mary in the True Shape prediction model and receives a high score for Mary.
- ▶ Mary is recommended treatment that is appropriate for her condition and is provided with life style modification options that help her manage her condition.
- ▶ Now that Mary is aware of her condition, she is able to manage it effectively – not purchasing risky treatments, avoiding being misdiagnosed, and asking the correct questions.

# 9%-11% of women worldwide have misdiagnosed obesity

Women with lipedema



*Buck et al. 2016*

Lipedema is a disorder characterized by abnormal deposition of subcutaneous adipose tissue leading to disproportional volume increase of lower extremities

# Lipedema has distinct clinical features and health implications

## **Clinical Presentation:**

- Abnormal deposition of subcutaneous adipose tissue
- Bilateral and symmetrical manifestation
- Occurrence almost exclusively in women and starts in puberty
- Fat is nodular, painful and tenderness on pressure
- Easy bruising
- Fat is resistant to diet and exercise
- It leads to considerable disability and daily function impairment

# Lipedema can be differentiated from obesity and/or lymphedema based on subjective criteria

**TABLE 2** Differential diagnosis of lipedema

	Lipedema	Lymphedema	Obesity
Increase in fat	+++	(+/+++)	+++
Disproportion	+++	+	(+)
Edema	+ / +++	+ / +++	(+)
Tenderness to pressure	+++	–	–
Easy bruising	+++	–	–

+ to +++, present; (+), possible; +/+++, variable severity; –, not present.



# Lipedema fat is resistant to diet and exercise

Lipedema misdiagnosed as obesity is costly and causes unnecessary pain and suffering for the patients

## **Current management:**

- Liposuction
- Decongestive therapy including compression garments, manual lymphatic drainage, movement therapy, dietary recommendation

# Estimated prevalence

- Hard to determine as the condition is not accurately diagnosed
- Approximately 40% prevalence of obesity among women 20 and over (~40,000,00 in the U.S.)
  - Of these women, four million may have lipedema and are incorrectly diagnosed as being obese





# The value proposition

We propose to build an AI based predictive model that translates objective imaging and biological data to identify and correctly treat Lipedema



# The value calculation

- ▶ The cost of not detecting lipedema:
  - ▶ Expensive but non-effective diet and exercise training
    - ▶ Estimated cost wastes per patient per month: (\$40 +)
  - ▶ Non-effective surgeries such as bariatric surgery:
    - ▶ Estimated cost per patient: \$20,000 (\$300 per month)
  - ▶ Patient's long-term health risks and insurance costs



# The value calculation



- ▶ Total cost of not detecting lipedema:
  - ▶ \$400 monthly cost of late detection
- ▶ Total cost of detecting lipedema:
  - ▶ \$1000 per year
  
- ▶ On average now, a patient with lipedema is detected after 18 months
  - ▶ \$7200



# Our value

- ▶ Our technology will detect lipedema for patients during month 6 with 80% recall and precision, which means we will save:
  - ▶  $0.8 * (\$400 * (18 - 12)) - 0.2 * \$1000 = \$3640$
- ▶ So the ROI for payer of using this technology is:
  - ▶ Charge \$50K 1<sup>st</sup> year
  - ▶ ROI for 100 patients = 73%



# Business Model/Strategy



- Algorithms will be intellectual property
- Build network of relationships with providers (physician practices), provider organizations (medical centers), and payers (Aetna, Highmark)
- Provide a portal version to generate risk prediction scores
- Additional services will include:
  - Retraining model on organization-specific data
  - Testing and UX design improvements
  - Training to use the tool



# Market Analysis



- ▶ Currently, there are no other applications being used in the market
- ▶ Main competitor is physician predisposition to diagnose patient as being obese and making recommendations for bariatric surgery
- ▶ There are models for obesity, but most of these are mainly logistical regressions based on strict assumptions
- ▶ Our model has the potential to be extended to sub-conditions related to lipedema upon successful validation of the first model



# Risk Assessment

Risk Factor	Risk Mitigation
Model is not a good classifier	We will implement AI/ML best practices to ensure multiple validation methods are used and access data from multiple sources to develop a robust classifier
Model is too complicated to use	We will engage in UX testing and training to ensure that the application's use is adopted over time
Provider buy-in	We will provide demonstrations and get buy-in from payers and patients to ensure provider use

# CUSTOMER VALIDATION

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*“True Shape provides an innovative and personalized approach to correctly identify and treat heterogeneity in obesity.”*

***Jordan Powell, Illinois Primary Health Care Association***

*“Very interested in partnership with True Shape”*

