



Yale University
School of Medicine

Novel Endovascular Retrieval Device for Inferior Vena Cava Filter

Yale
NewHaven
Health



*Cassius Iyad Ochoa Chaar MD,
Associate Professor
Vascular Surgery
cassius.chaar@yale.edu*



*Britt Tonnessen, MD
Associate Professor
Vascular Surgery
Yale School of Medicine*



*Juan Carlos Perez Lozada, MD
Associate Professor
Interventional Radiology
Yale School of Medicine*



*Valentyna Kostiuk, BS
MD, PhD candidate
Yale School of Medicine*



*Paula Pinto Martinez,
Post Graduate Research
Vascular Surgery
Yale School of Medicine*

Advisor: David Lewin, PhD, Director, Business Development, Yale Ventures

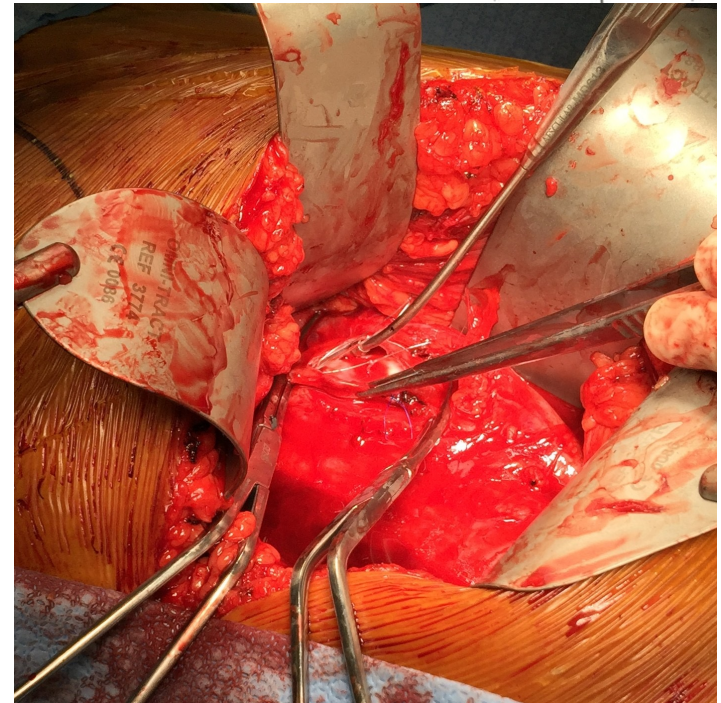
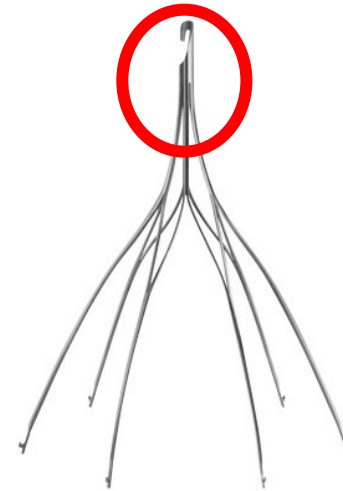


Yale University
School of Medicine

IVC filter

Yale
NewHaven
Health

- IVC filters save lives
- Conical design with a hook allows removal with a SNARE = Standard of care
- Real life: tilt, penetration, scarring
- At least 20 different endovascular techniques frequently using devices in off-label fashion with variable success and risk to the patient
- Open abdominal and thoracic surgery to remove filters





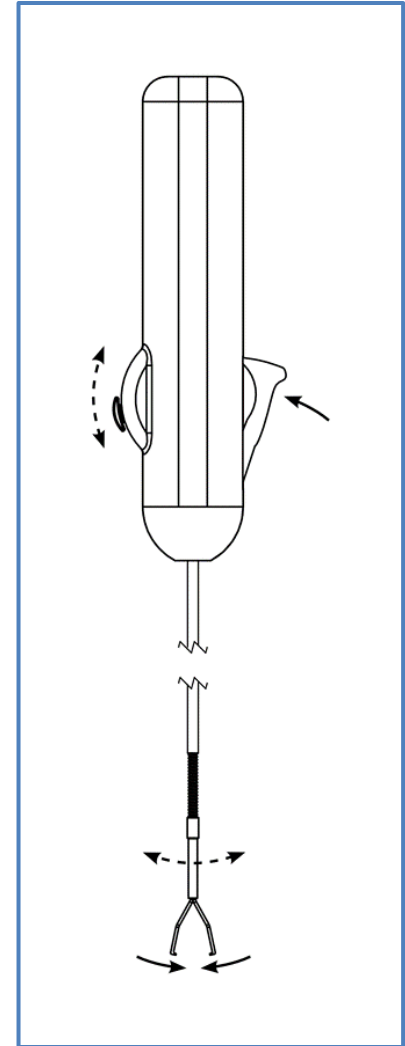
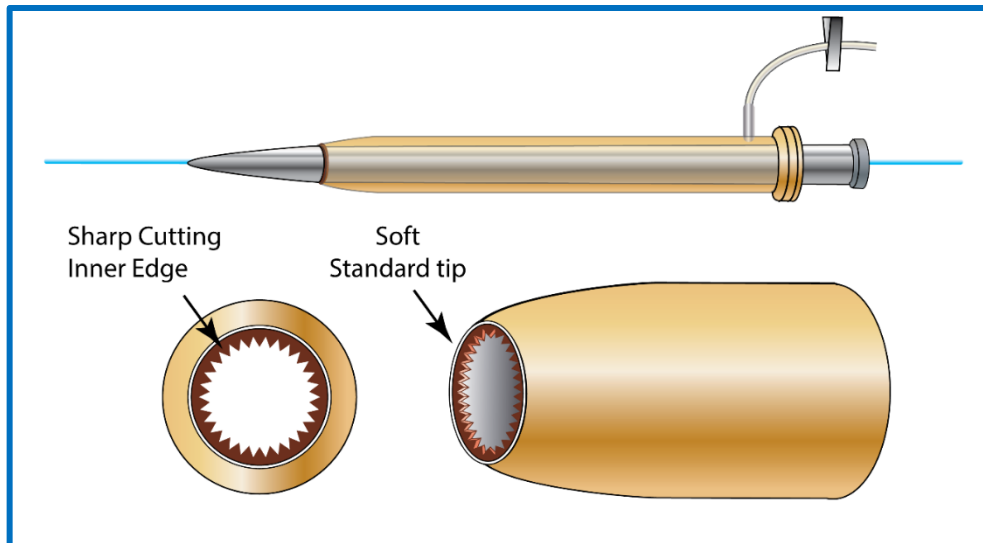
Yale University
School of Medicine

Dedicated Solution:

Endovascular Retrieval System

Yale
NewHaven
Health

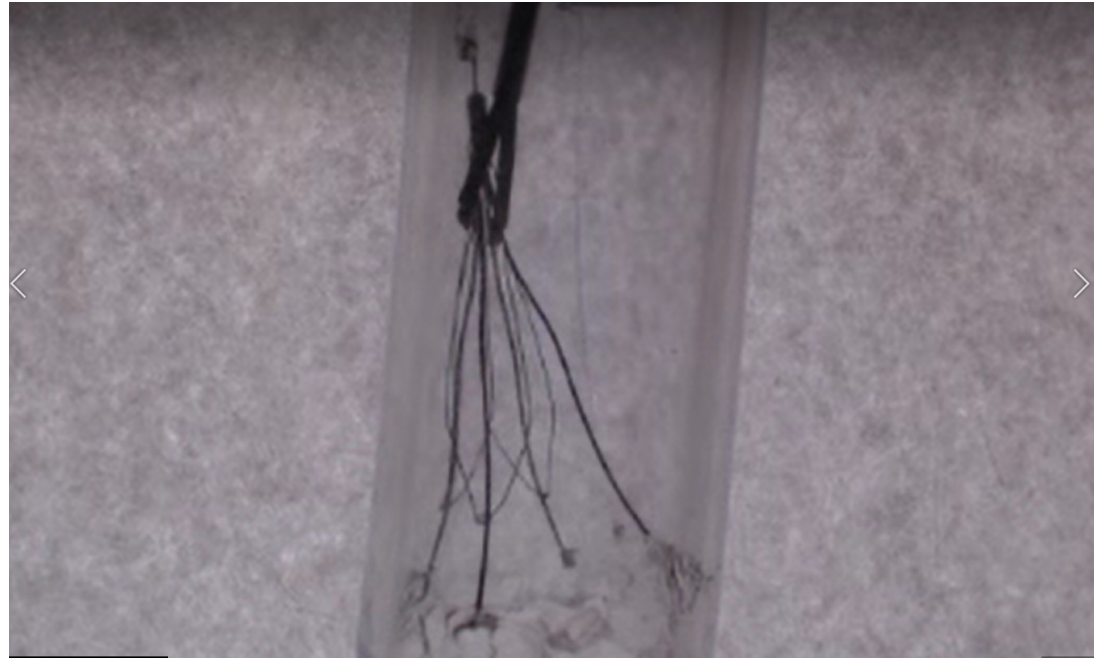
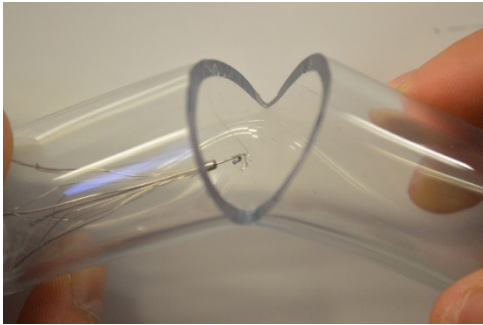
- Articulating Atraumatic Grasper with locking mechanism
- Low Profile (11F) atraumatic dissecting sheath
- Patent # U.S.S.N. 10,524,891





In Vitro Proof of Principle

Yale University
School of Medicine



➤ In vitro results:

- Device comparable to standard of care (snare) for standard IVC filter without tilting
- Device Superior to standard of care
 - Tilted IVC filter
 - Permanent IVC filter (filter without hook)



Yale University
School of Medicine

In Vivo Experiments

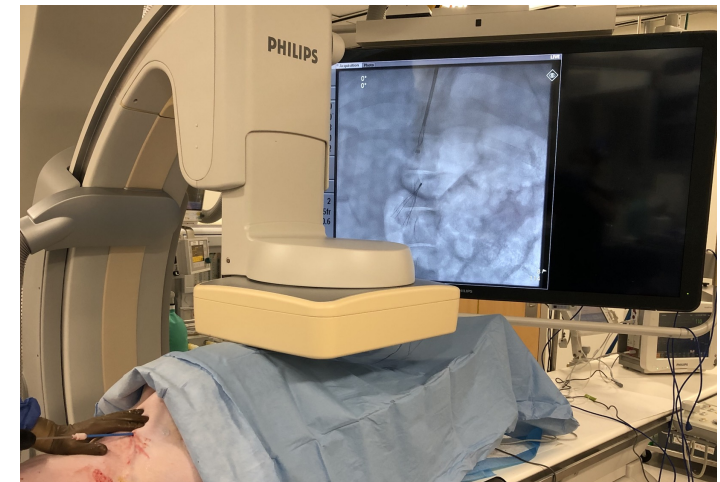
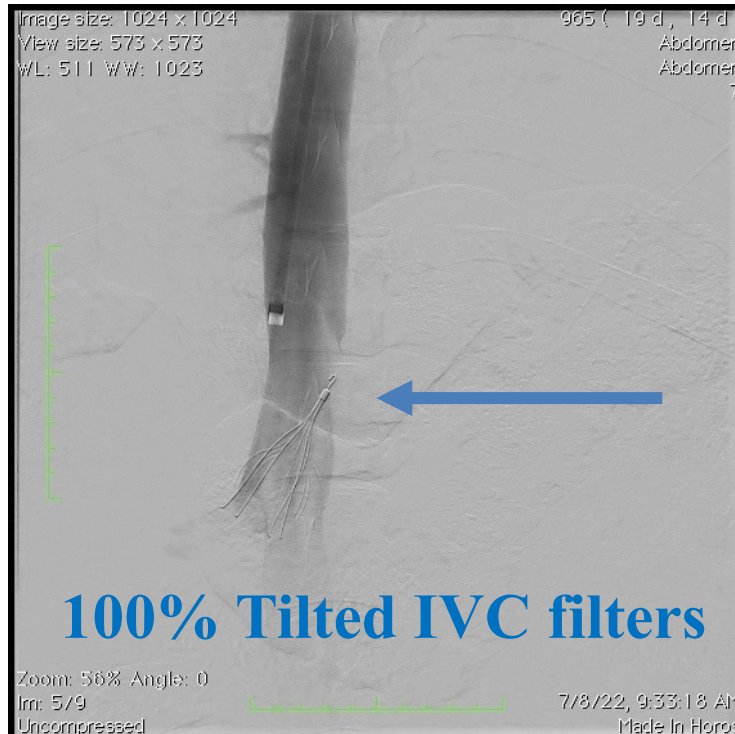
Yale
NewHaven
Health



**- CT Innovation
Grant \$\$**



**Porcine Model
Anatomy = Human IVC**

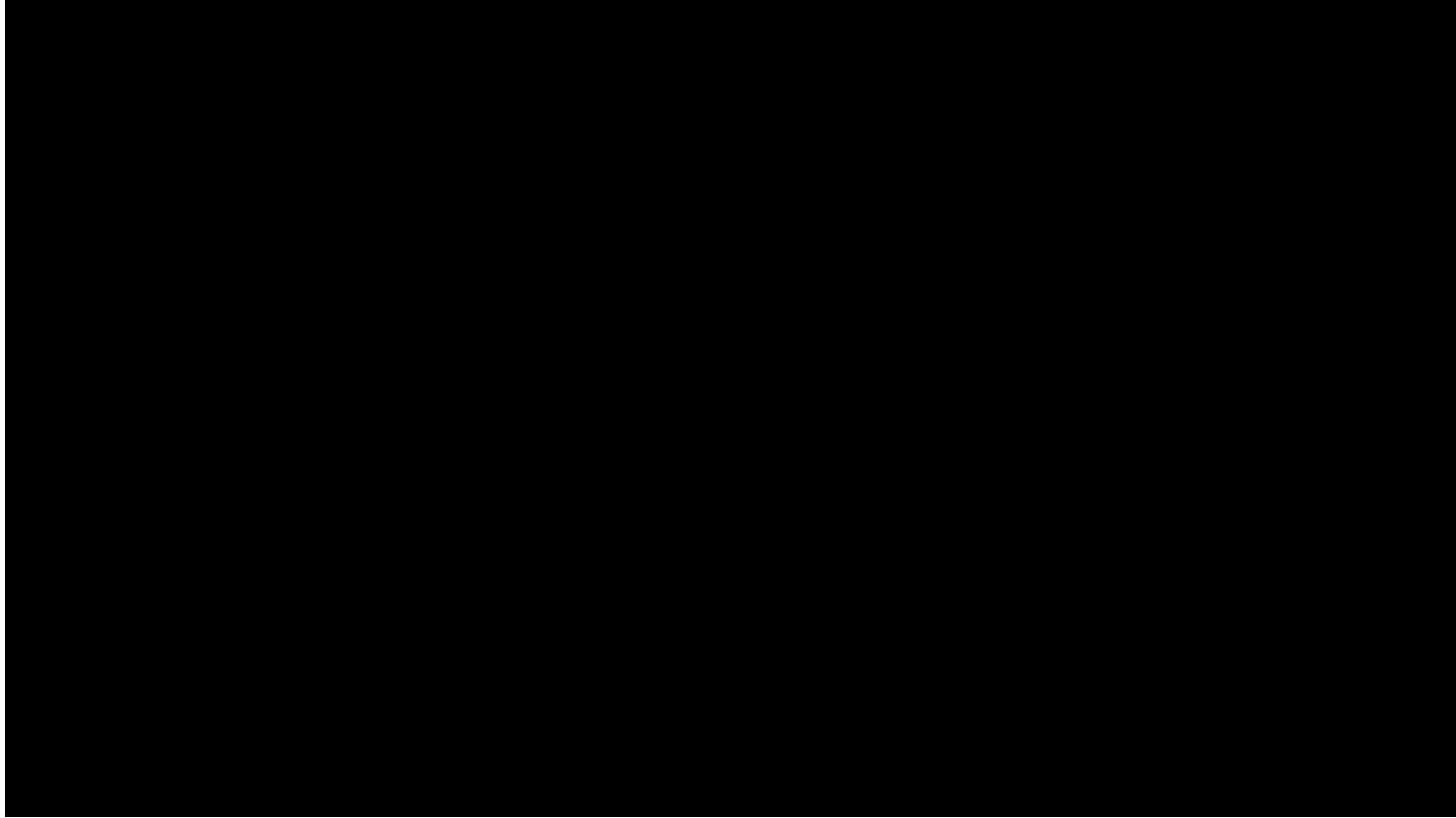




Yale University
School of Medicine

In Vivo Superiority

Yale
NewHaven
Health



- Filter retrieval in Pigs with the device was superior to the standard of care in patients *(Data under review for presentation at scientific meeting)*



What is the Market?

Estimated 250,000 placed per year

<i>Year</i>	<i>Hospitalizations with VCF, %</i>	<i>VCFs placed, No.</i>
1998	0.15	52,860
2001	0.17	65,070
2002	0.21	78,443
2003	0.22	83,657

100 Million Dollars in the US only

Potential Savings of 82.5 Million Dollars

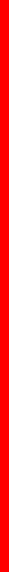
Moore et al., J Vasc Surg 2010;52:118-26

Kim et al., J Vasc Surg Venous Lymphat Disord. 2021 Mar;9(2):315-320

Brahmandam et al., J Vasc Surg Venous Lymphat Disord. 2019 Sep;7(5):653-659



Timeline and Budget



Task Description	Start	END	2023												2024						2025						
			Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Manufacturing of final prototype	Jun 23	Dec 23																									
Mechanical testing of prototype for human use	Jan 24	Mar 24																									
Assessing reliability of prototype in pigs	Apr 24	Jul 24																									
USA and international Market analysis	Jun 23	Dec 23																									
Pre-Sub to FDA and negotiation	Jun 23	Jul 24																									
Preparation of IDE	Jan 24	Jun 24																									
Human experiments at YNHH	Jul 24	Jun 25																									
Industry / Angel investors	Jul 24	Jun 25																									

Total = \$300k over 2 years



Device development at Veranex



External consulting



Yale Ventures



YCCI



Procedures at YNHH



Cost

Milestones of PHASE I : \$150k over period of 8-10 months

- 1- Refined Device for Human Use (near final)
- 2- FDA approval strategy
- 3- US and International Market Analysis



Yale University
School of Medicine

Our Vision

Yale
NewHaven
Health

