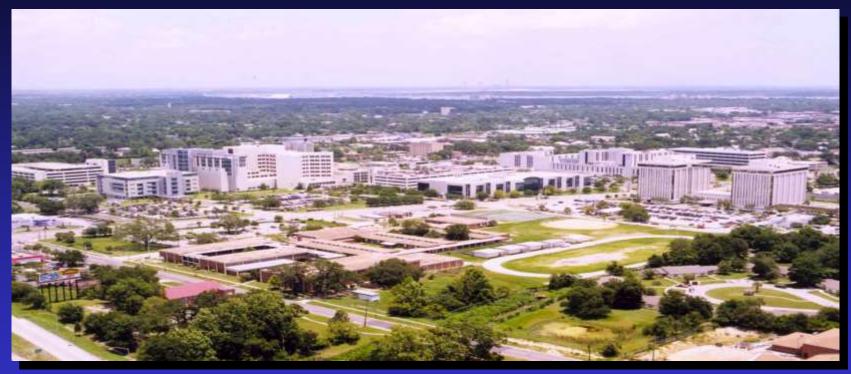
## Below the Knee Interventions and Angiosome Concept



Luis A Guzman, MD Director, Cardiovascular Cath Lab University of Florida-Jacksonville





Critical Limb Ischemia Treatment Goals

- Improve healing
- Limb salvage
- Improve functional capacity
- Improve quality of life
- Prolong life

# Critical Limb Ischemia Revascularization

### Revascularization is better Amputation 8-20% vs >50% if no revasc Revasc Strategy evolution

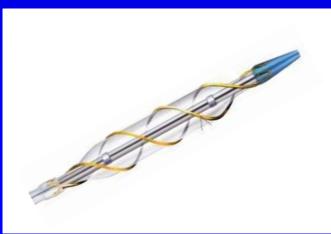
- Single line to the foot
- Two main vessel to foot
- As many vessels as possible
- Open inflow as source of collaterals
- Angiosome oriented revascularization

### **Balloon Devices**

### POBA



### Angiosculpt



#### **Cutting Balloon**



### **PolarCath Balloon**



## **Atherectomy Devices**

#### **Turbo-Laser**

### Silver Hawk

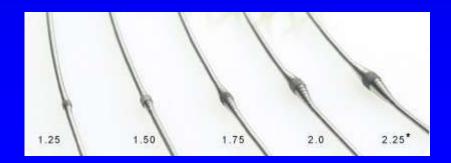


#### **Rotablator**





#### **CSI 360 Orbital Atherectomy**



### **Drug Eluting Devices**

### **Drug Eluting Stents**

### **Drug Eluting Balloon**





## **Critical Limb Ischemia**

**Total lesions Bellow the knee** CTO **Multilevel BK** alone Antegrade **Antegrade-Retrograde Non-CTO success CTO success** 

**907 (3.0 L/patient)** 406 lesion (1.9 L/patient) **57% of procedures 49% of procedures 33% of procedures** 40% 10% 99% 89%

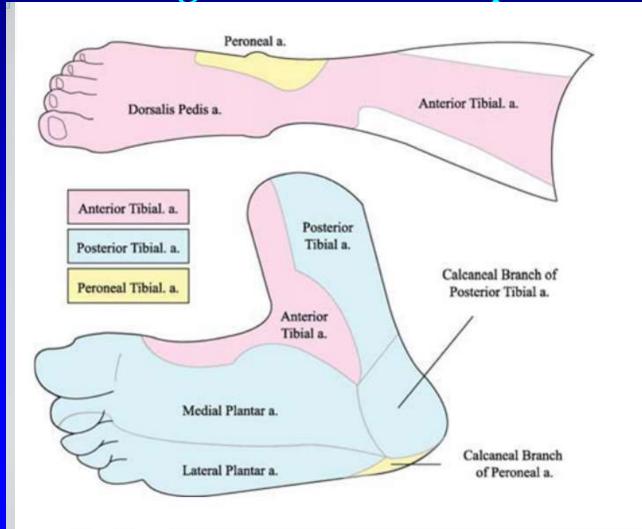




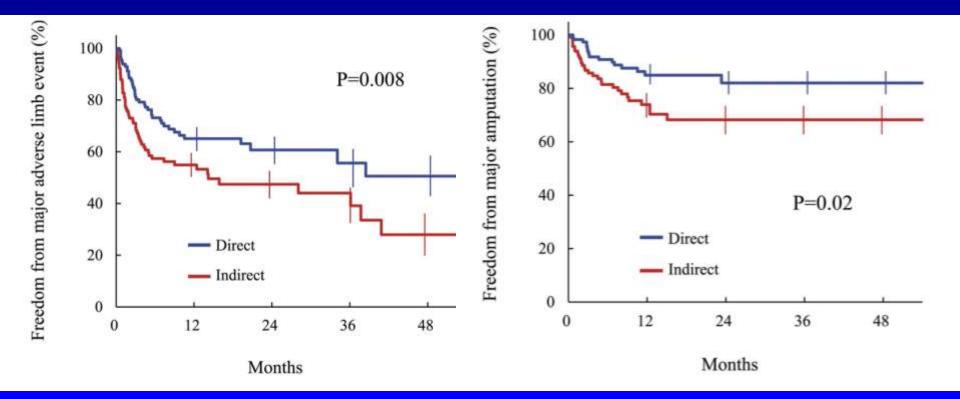
### **Pre and procedural preparation**

- Imaging (CTA, MRA and DA)
- Know the entire anatomy, including foot
- Understanding of entry and exit areas
- Presence of side branches
- Collateral circulation
- Distal target
- Use of road mapping
- Appropriate support
- Appropriate antithrombotic

## Critical Limb Ischemia Angiosoma Concept

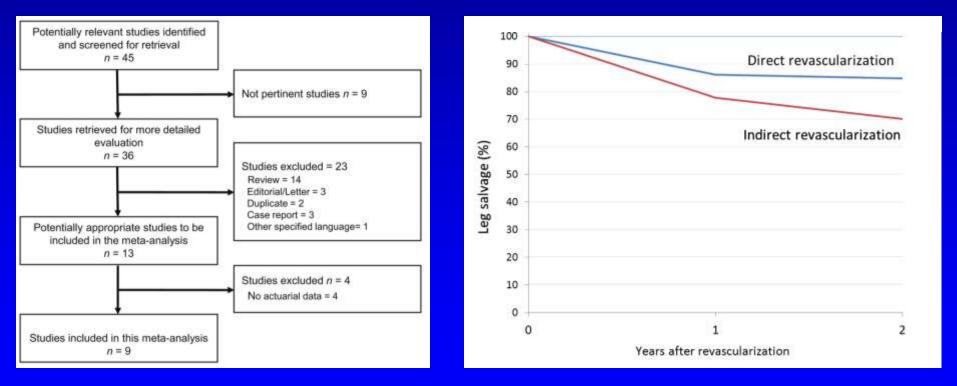


# **Direct vs Indirect Revasc in BK interventions for CLI (360 pts)**



lida O et al. Journal of Vascular Surgery : 2012;563

# **Metaanalysis of reported studies**



Biancari F et al. European Journal of Vascular and Endovascular Surgery May 2014

# **Limb Salvage**

...

10 4

					Hazard Ratio	
Study or Subgroup	Total	Total	IV, Random, 95% Cl	Year	IV, Random, 95% Cl	
Varela 2010	45	31	0.76 [0.28-2.01]	2010		
Alexandrescu 2011	134	98	0.52 [0.24-1.14]	2011		
Blanes Ortí 2011	18	16	0.55 [0.10-3.11]	2011		
Ferrufino-Mérida 2012	23	9	0.02 [0.00-0.09]	2012		
lida 2012	200	169	0.70 [0.43-1.14]	2012		
Kabra 2013	39	25	0.50 [0.13-1.86]	2013		
Lejay 2013	36	22	0.31 [0.14-0.71]	2013		
Söderström 2013	121	129	0.62 [0.31-1.25]	2013	-	
	616	499	0.44 [0.26-0.75]		•	
					0.005 0.1 1 10 200	
				Fá	avours direct revasc. Favours revasc.	

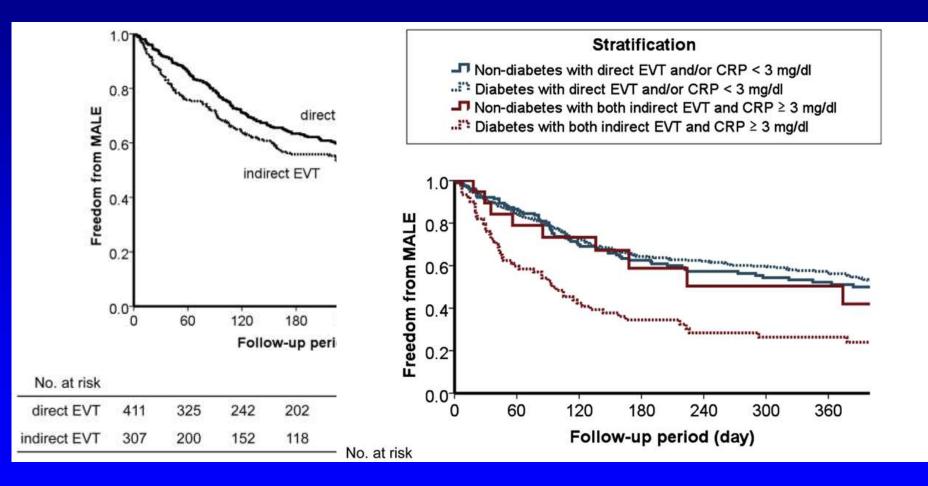
Biancari F et al. European Journal of Vascular and Endovascular Surgery May 2014

## **Wound Healing**

		1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 -	Hazard Ratio		Hazard Ratio		
Study or Subgroup	Total	Total	Total IV, Random, 95% Cl Year IV, Random		IV, Random, 9	5% CI	
Varela 2010	45	31	0.75 [0.44-1.27]	2010			
Azuma 2012 a	59	51	0.82 [0.55-1.21]	2012	-		
Azuma 2012 b	67	41	0.55 [0.36-0.85]	2012			
Kabra 2013	39	25	0.55 [0.31-0.97]	2013			
Söderström 2013	121	129	0.56 [0.39-0.81]	2013	-		
	331	277	0.64 [0.52-0.78]		•		
	1			H (	0.01 0.1 1	10 100	
					Favours direct revasc. Fav	ours indirect revasc.	

Biancari F et al. European Journal of Vascular and Endovascular Surgery May 2014

## **Diabetes vs Non-Diabetes Status**

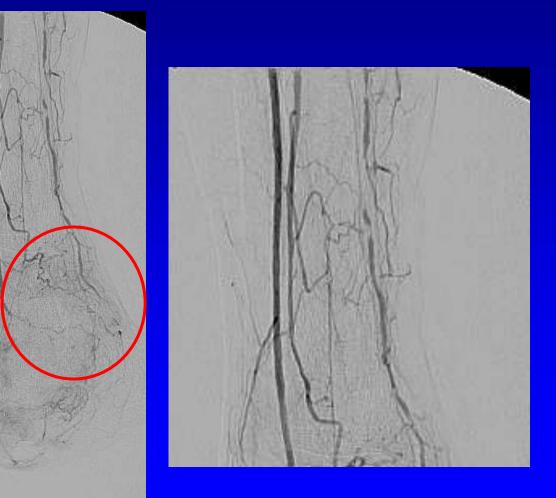


lida O et al. European Journal of Vascular and Endovascular Surgery : 2013;576

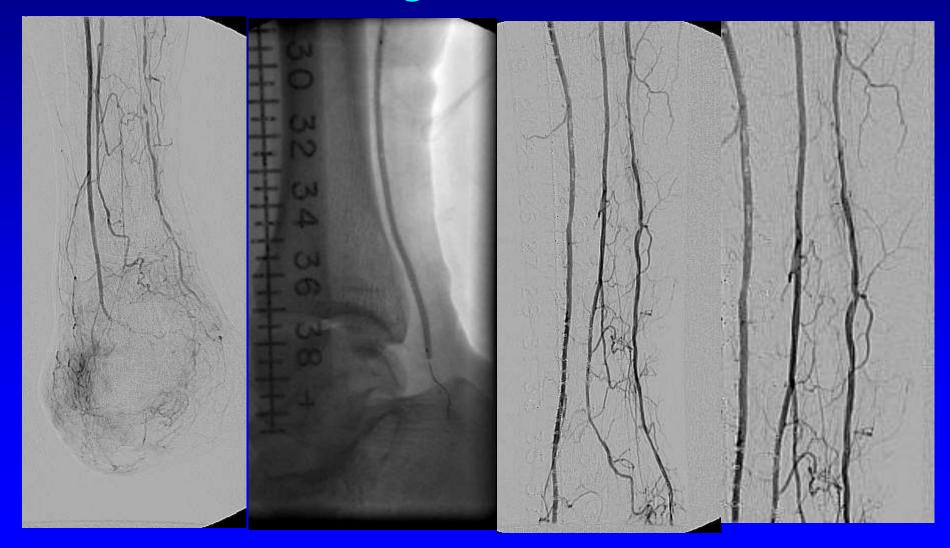
### **Below the knee Interventions**

### Adequate Imaging





# Below the knee Interventions Long Balloons



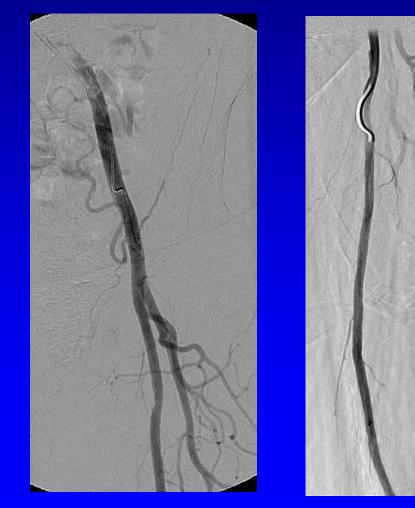
### **BK Interventions in CTO**

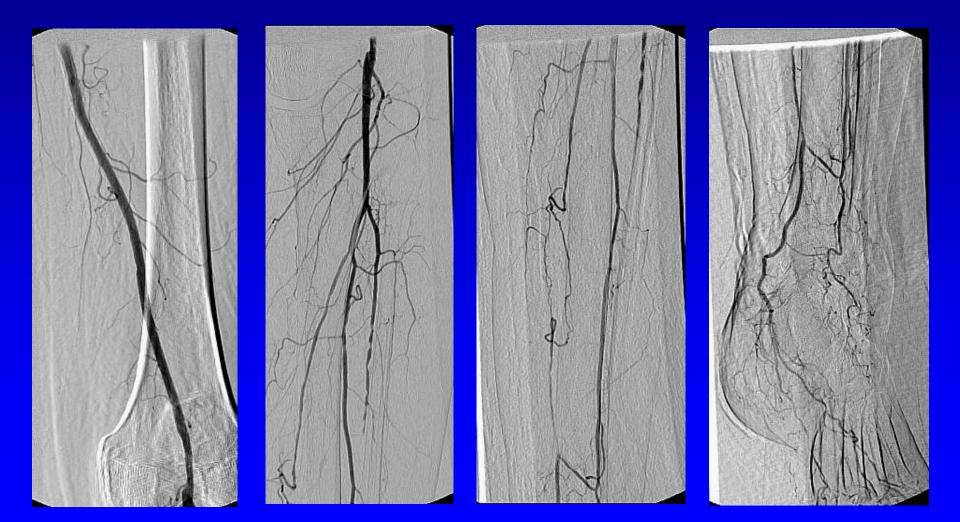
- Arterial Access
- Procedural imaging preparation
- Understand the anatomy
- Intraluminal approach
- Subintimal approach
- Assisted re-entry devices
- Antegrade-Retrograde approach

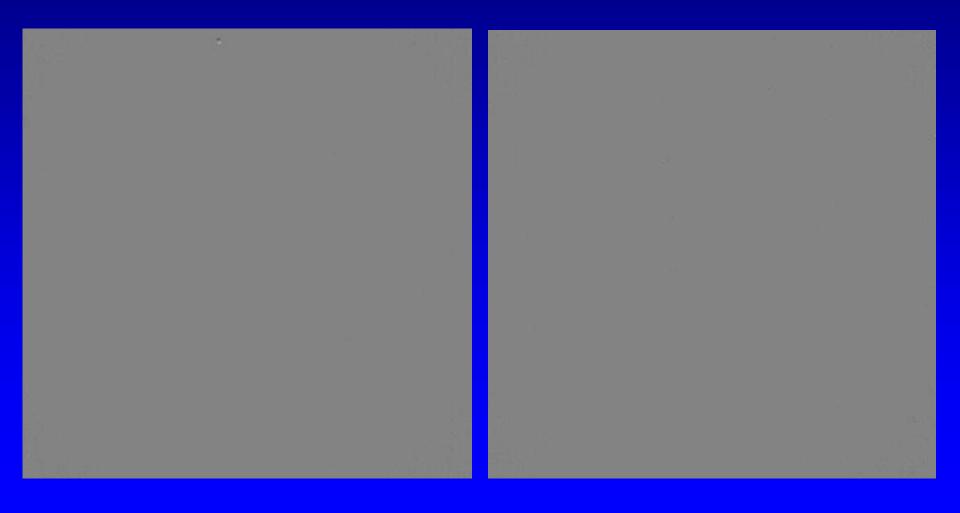
### **BK Interventions in CTO**

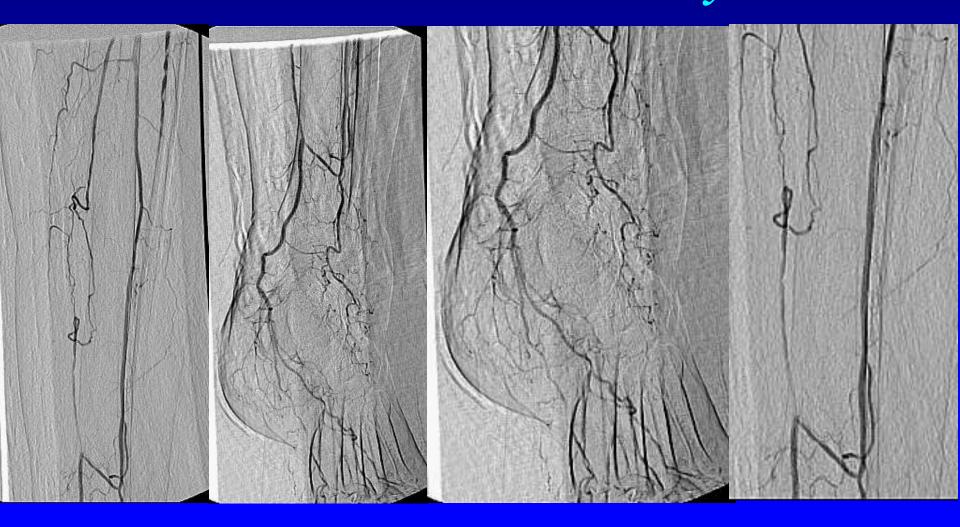
- Arterial Access
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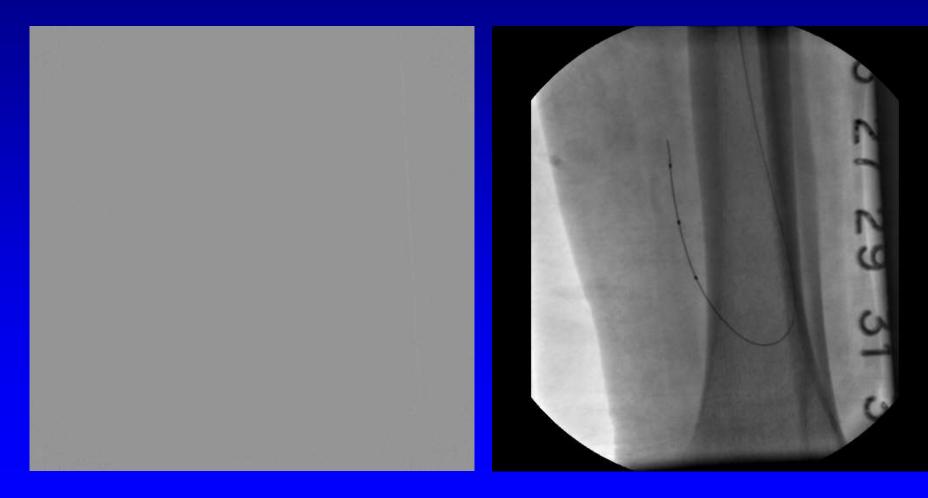


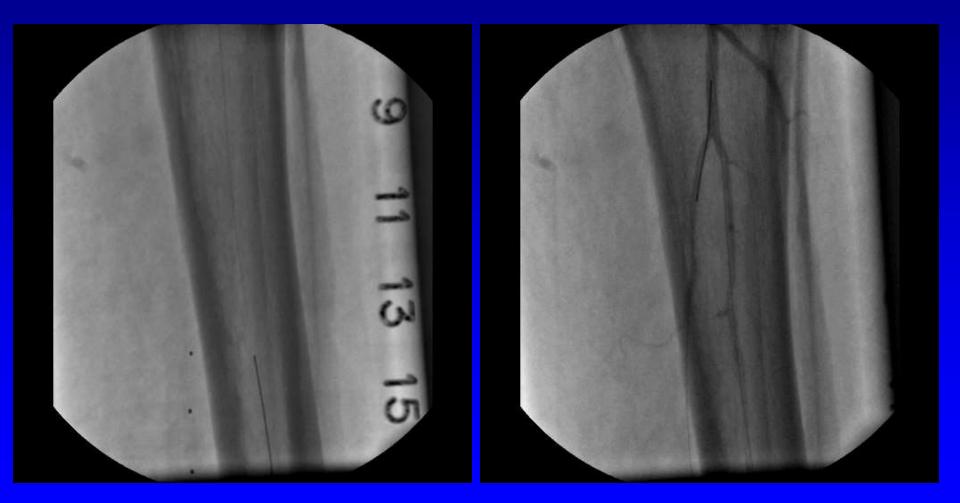


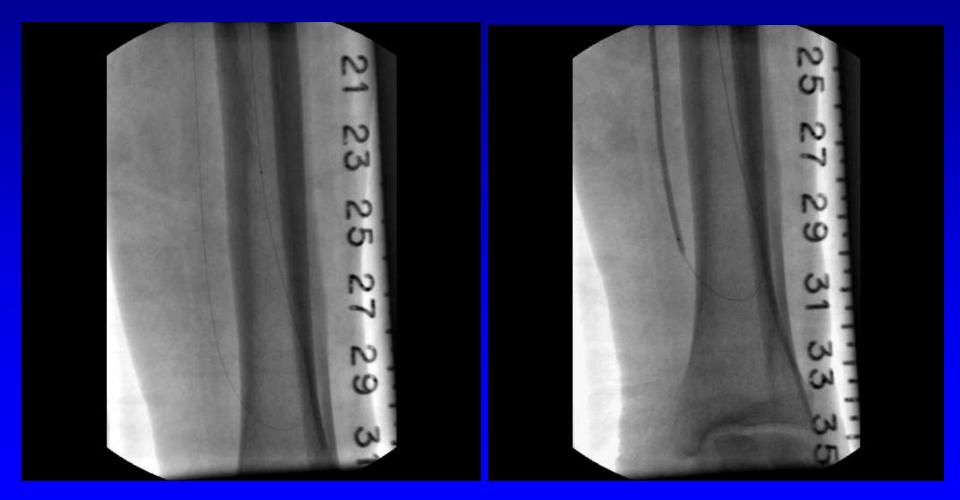


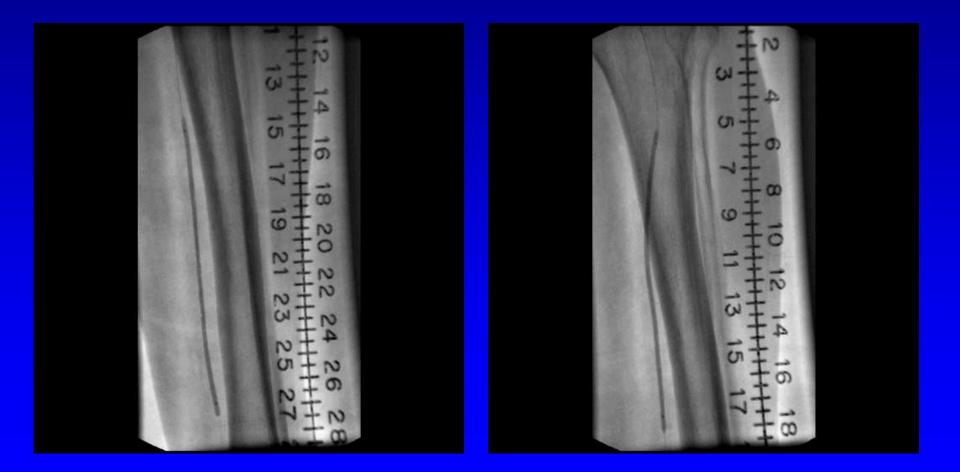


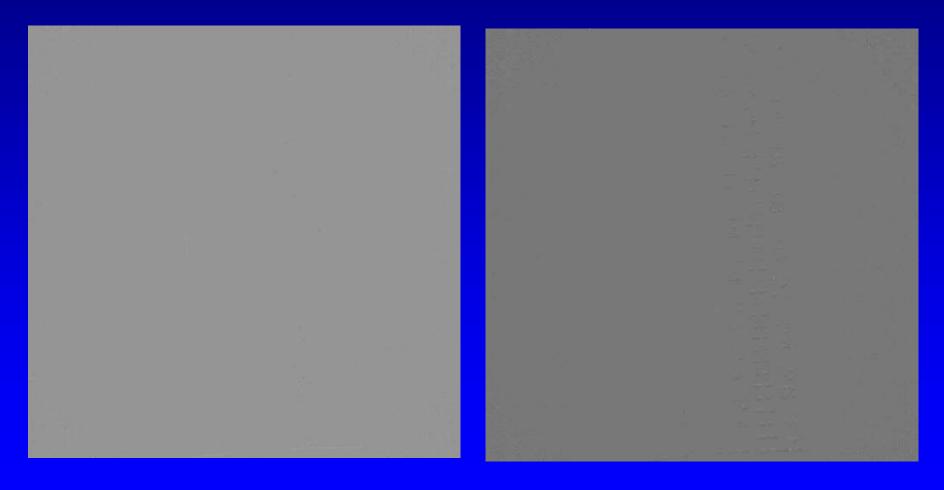


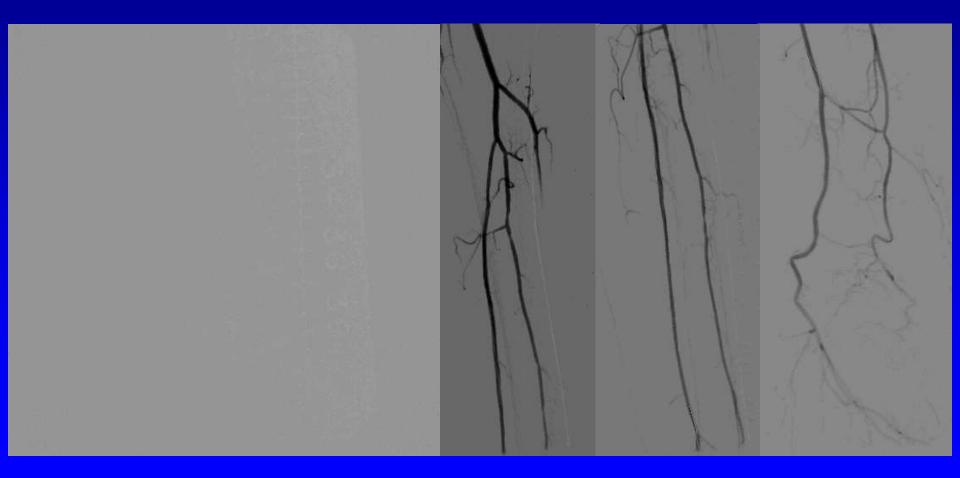








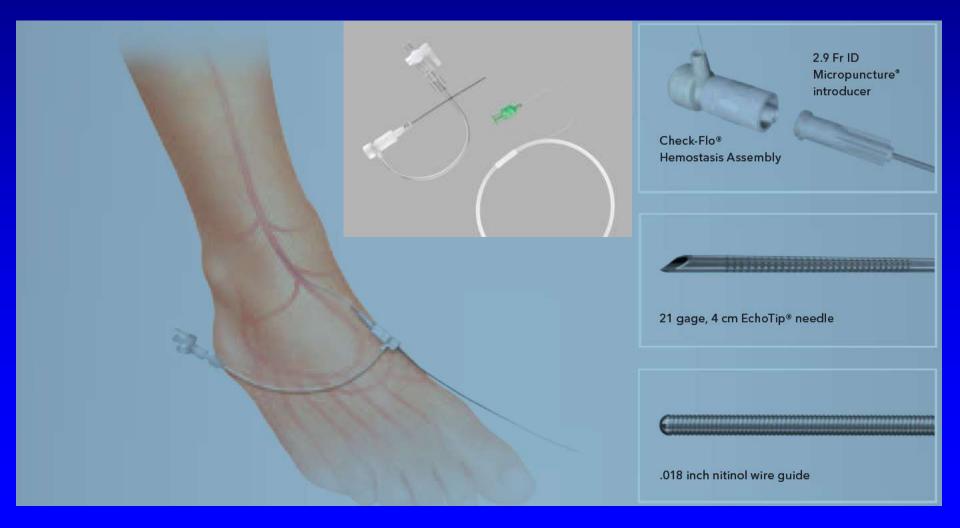




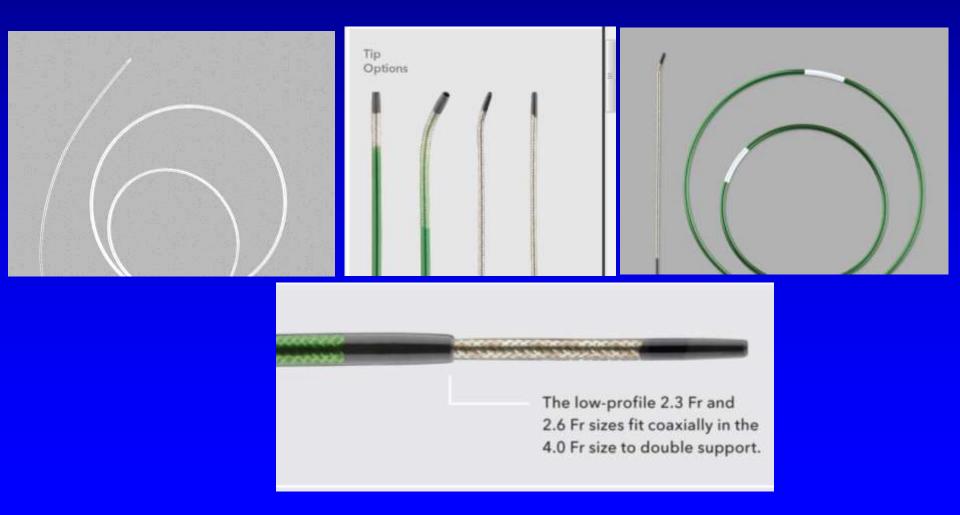
### **BK Interventions in CTO**

- Arterial Access
- Procedural imaging preparation
- Understand the anatomy
- Intraluminal approach
- Subintimal approach
- Assisted re-entry devices
- Antegrade-Retrograde approach

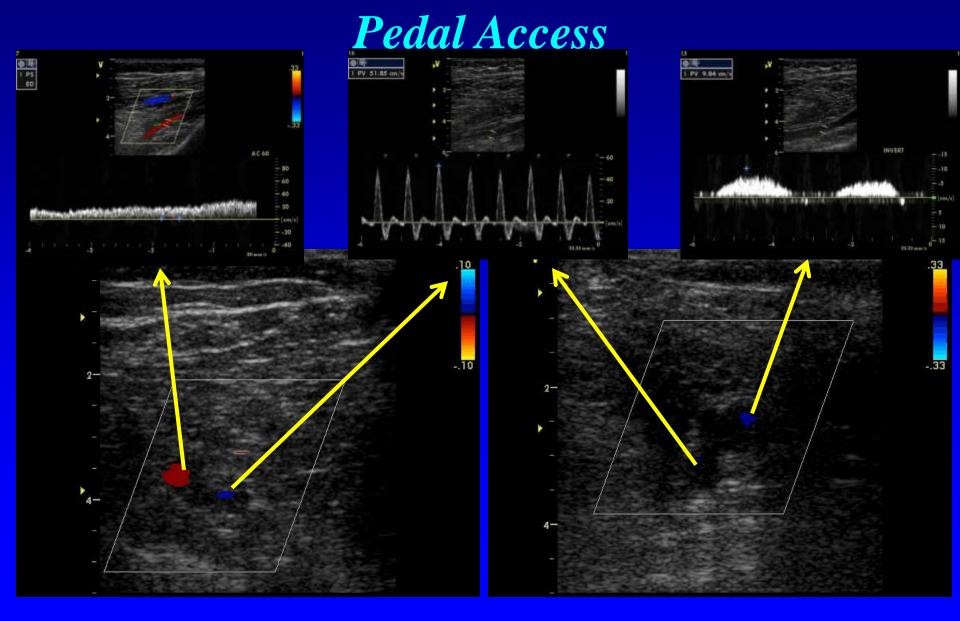
## Below the knee Interventions Pedal Access Tools



# Below the knee Interventions Pedal Access Tools



### **Below the knee Interventions**

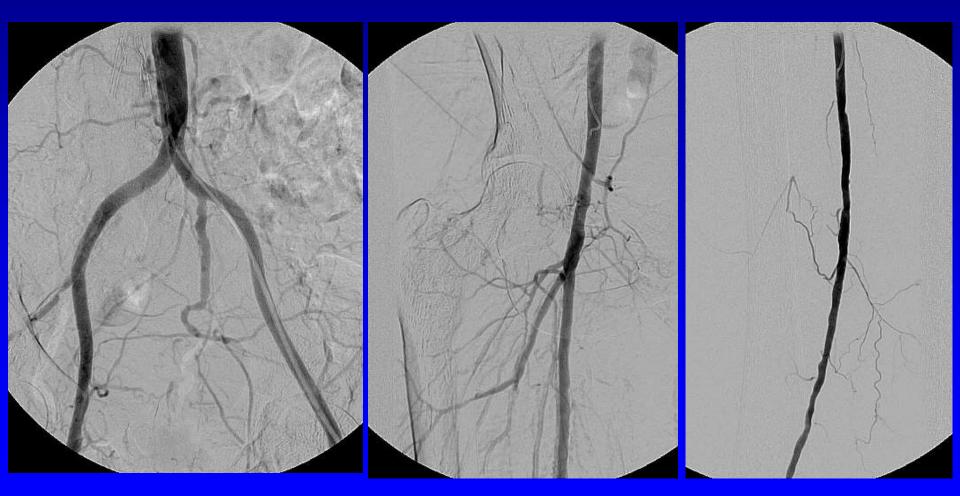


# Below the knee Interventions *Pedal Access*



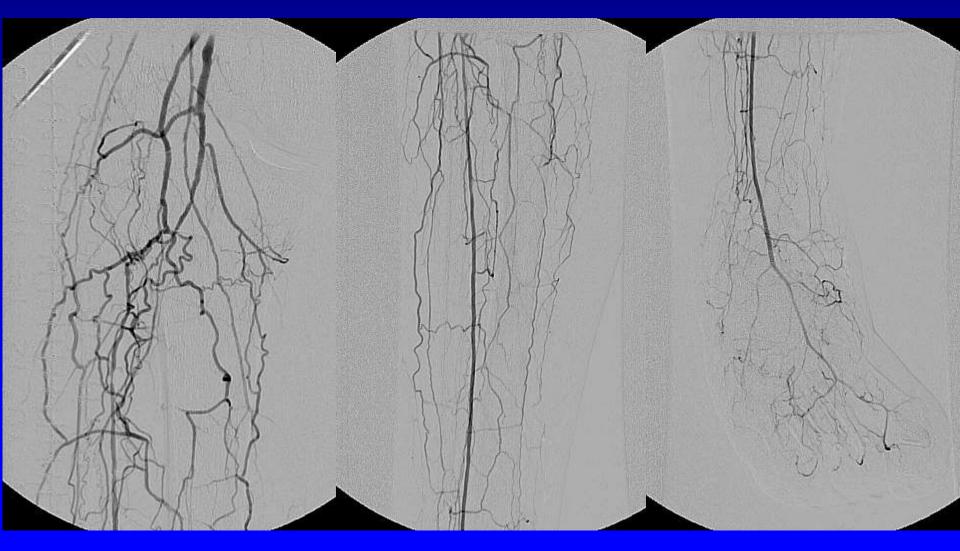
# **Below the knee Interventions**

### **Pedal Access**

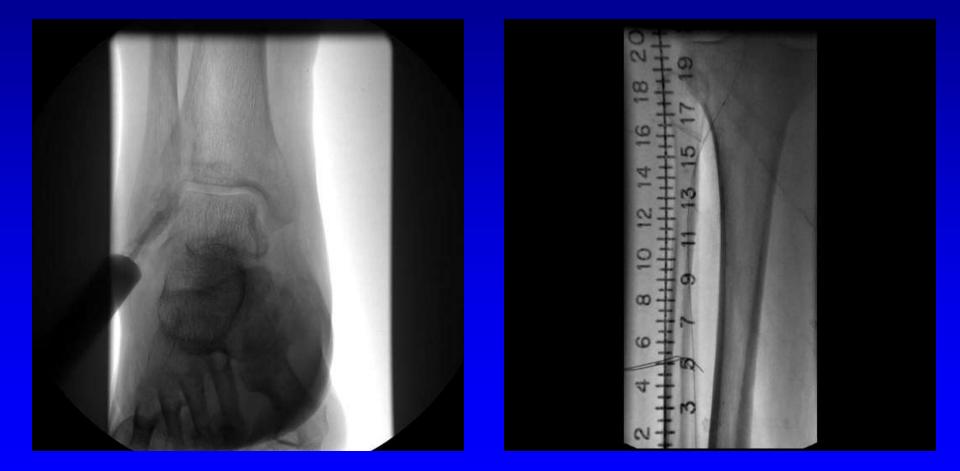


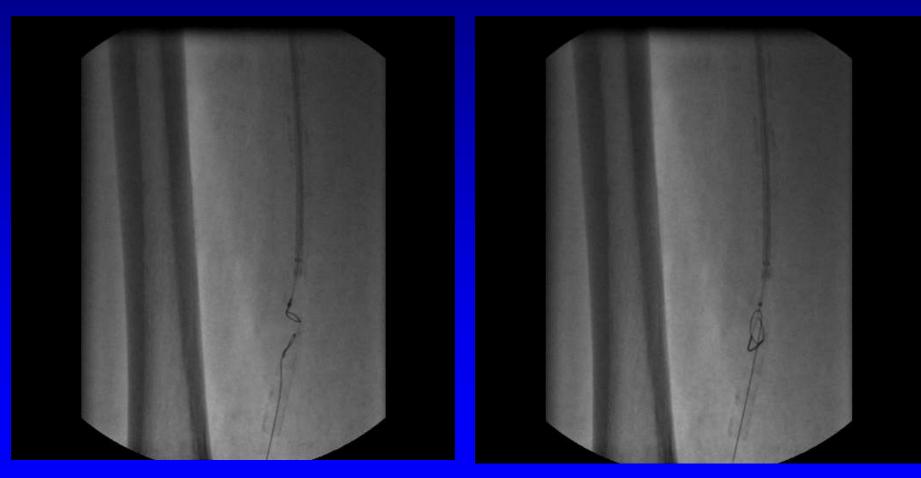
## **Below the knee Interventions**

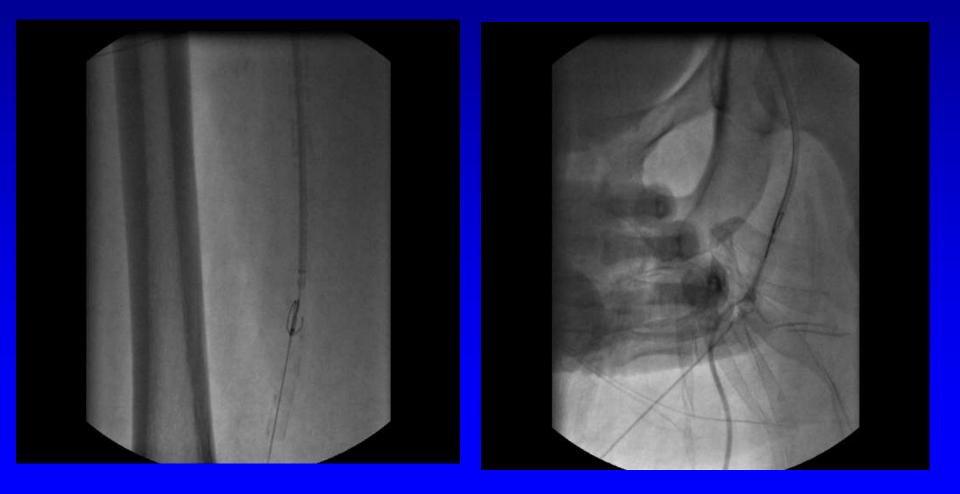
### Pedal Access

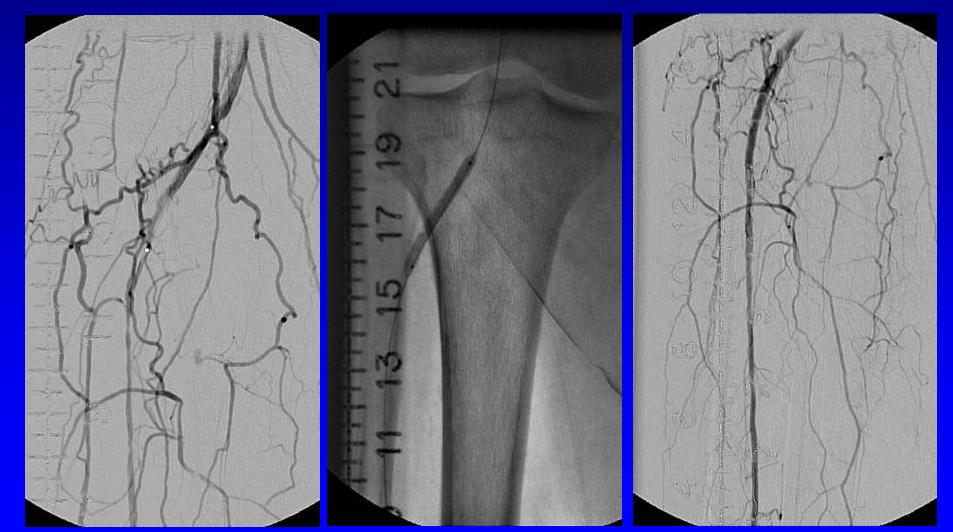


# Below the knee Interventions *Pedal Access*

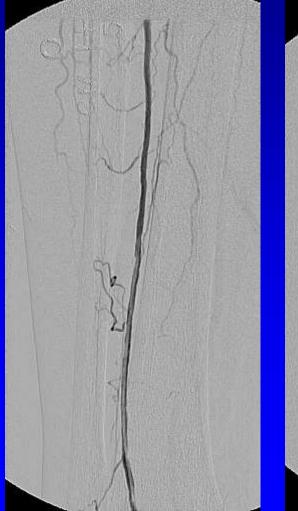










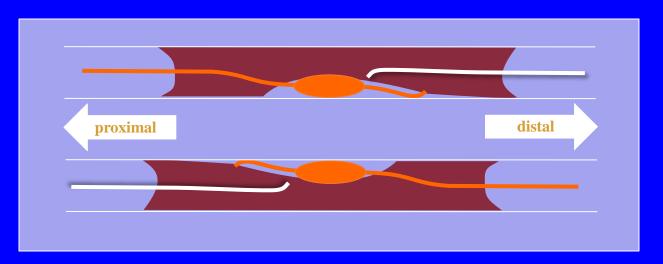




#### **CART or Reverse CART**

Retrograd e wire crossing If 1° failed The antegrade balloon can get into CTO body and the retrograde wire can reach the antegrade balloon advanced in CTO body.





Below the knee Interventions Pedal Access techniques

- CART
- Reverse CART
- Direct intervention from pedal
- Snaring wire and reverse
- Initial pedal PTA and reverse

## **Angiosome Concept**

- No prospective evaluation
- Used of historical controls
- Most studies used different definitions with no anatomical information
- Not information from studies of degree of tissue loss between groups
- Studies performed at different times
- Possible selection bias. Good targets versus diffuse atherosclerosis. More advanced disease versus less disease, etc

## **Angiosome Concept**

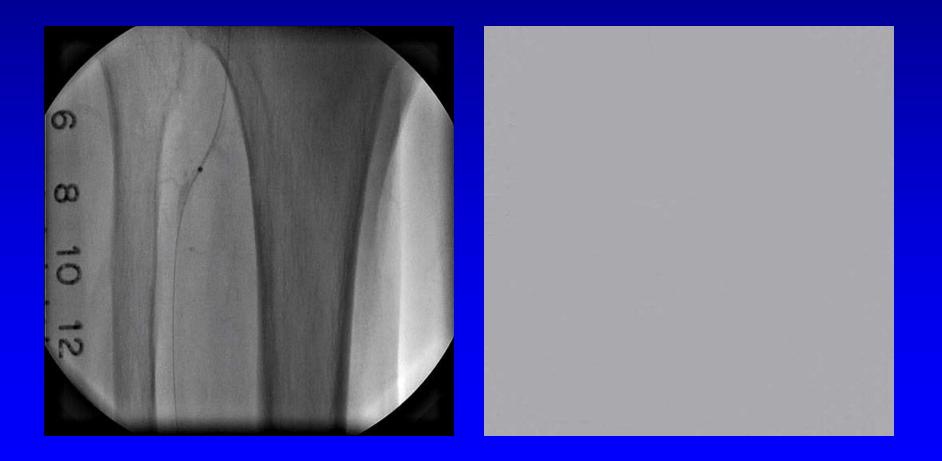
- Not beneficial in non-diabetics (collateral circulation is not as affected)
- The presence of good plantar arch might be the best predictor
- Patients with ischemic limbs have different angiosome distribution
- Interangiosome connection
- Not able to get direct revascularization might be the main predictor

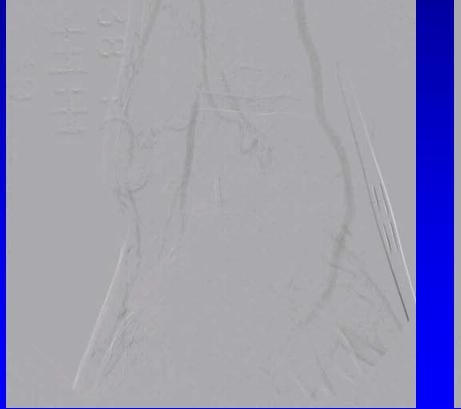
Thank you



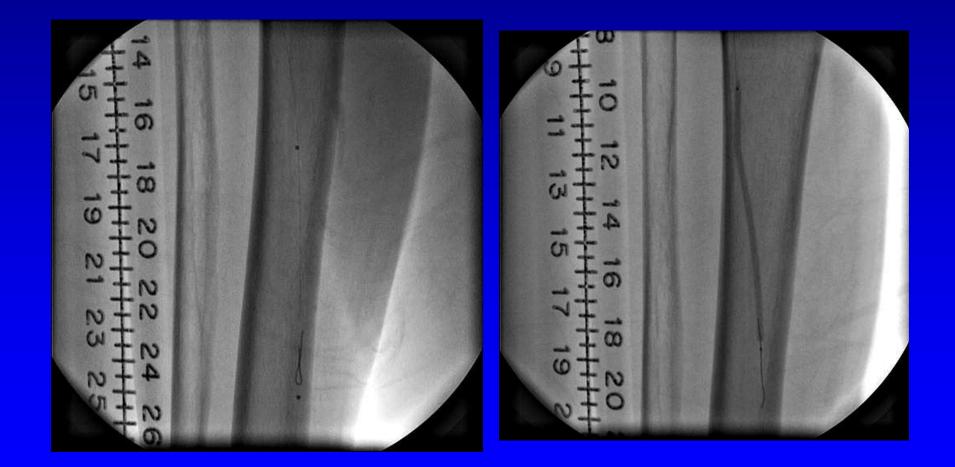


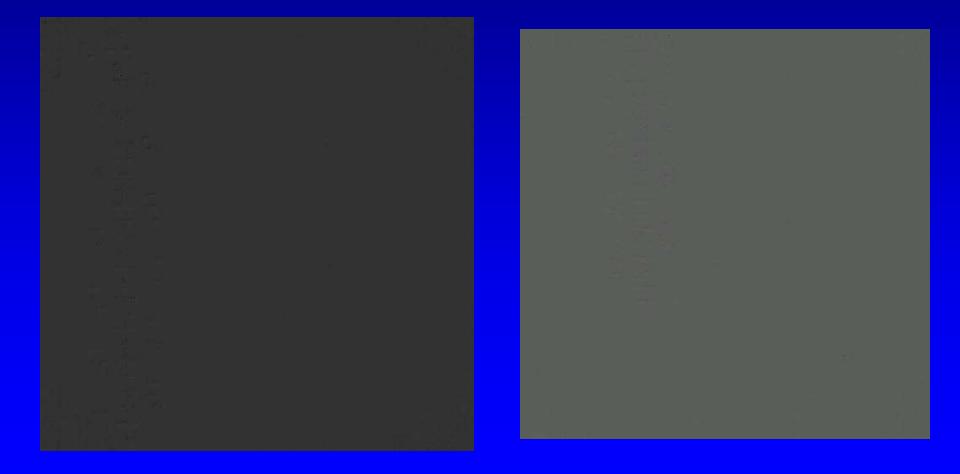




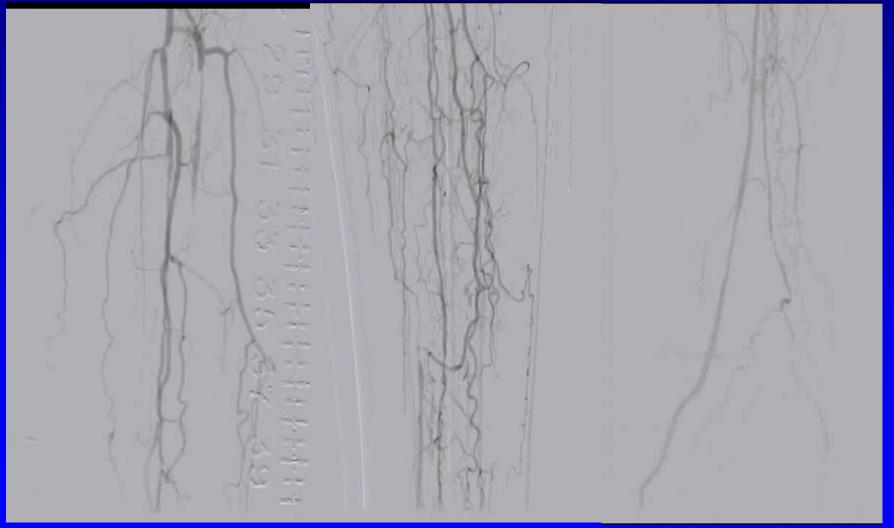


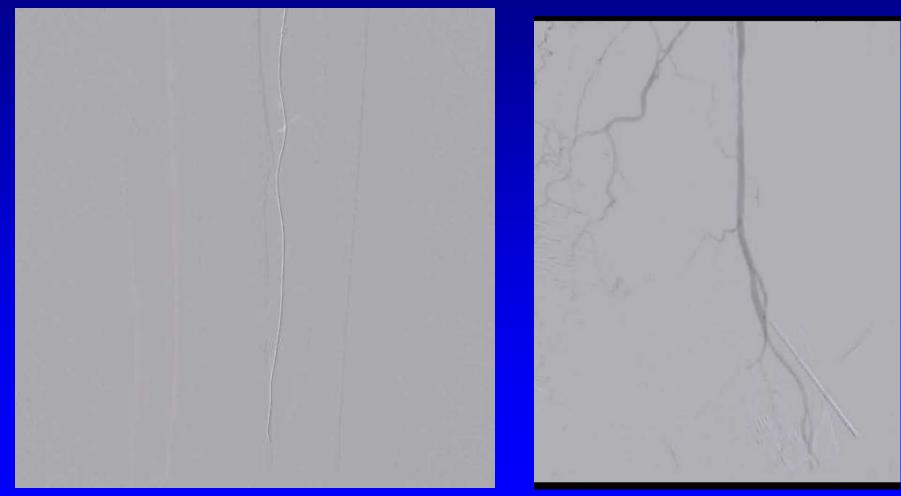




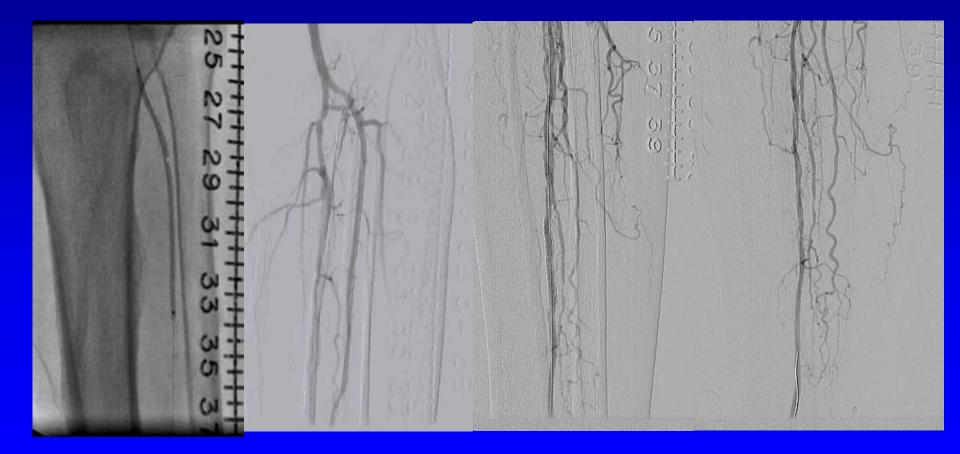












### **PTA in Limb Ischemia** *Pharmacology During the Procedure*

- Treatment of Spasm
- Anticoagulation
- Antiplatelets agents •

- Heparin
- Bivalirudin
- Additional bolus

- Aspirin
- Clopidogrel
- GP 2b/3a
- Prasugrel

Thank you

## Thank you