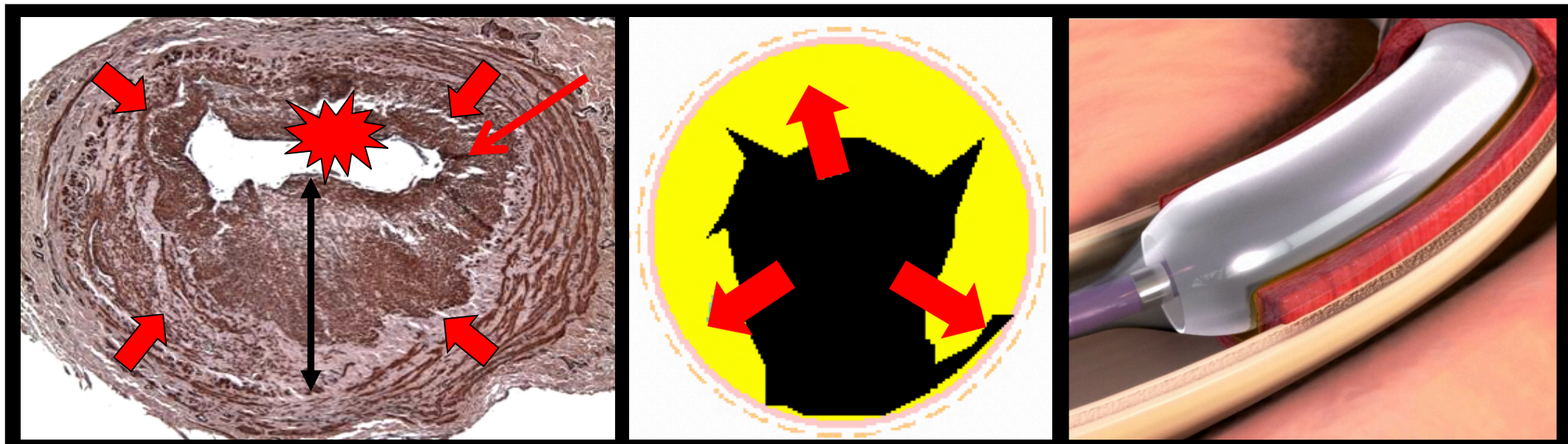


Angioplasty Should no Longer be the Standard of Care for Access Stenosis

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Disclosures

- **Consultant/Advisory Board: WL Gore, Medtronic, Bard-BD, Akebia, Cormedix, Relypsa, Bayer**
- **Founder and Chief Scientific Officer: Inovasc**
- **Grant/Research Support: NIH, VA, University of Arizona, NSF**
- **Clinical Trial Support: Bayer, Akebia, Vascular Therapies, Proteon, Cormedix**

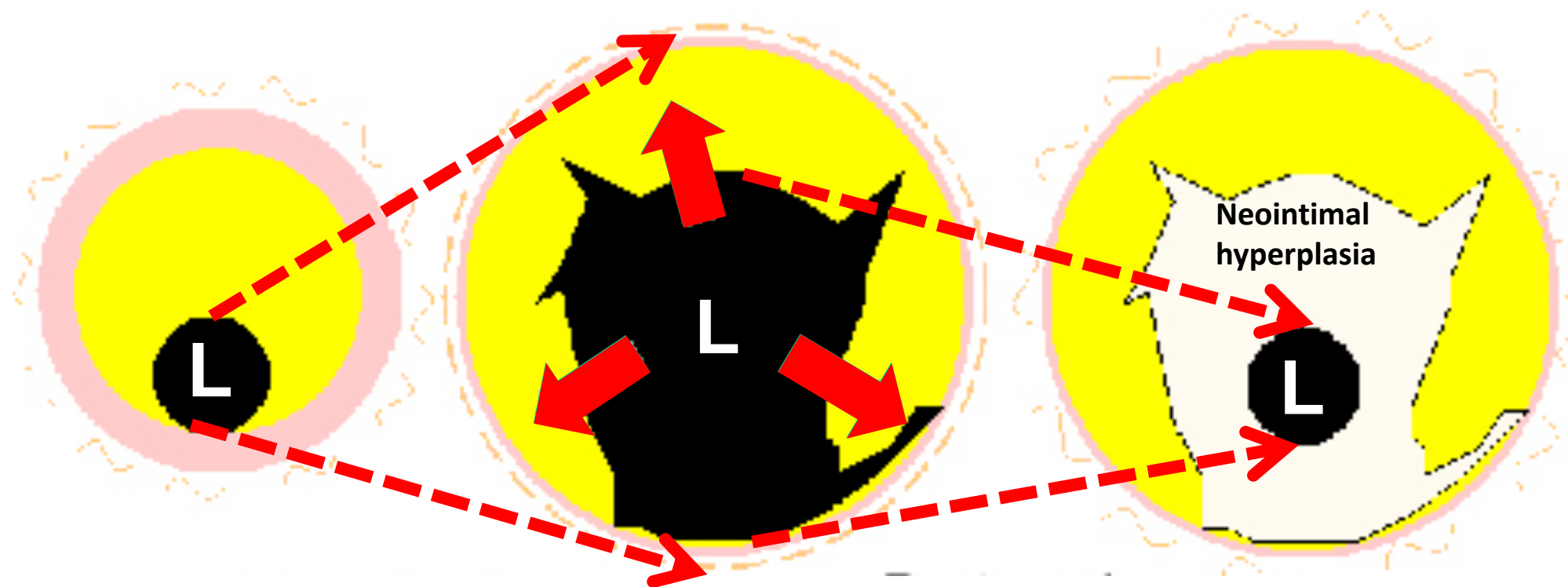


Outline

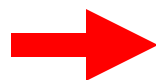
- **Angioplasty provides a poor value add in the setting of dialysis vascular access stenosis**
- **Novel technologies for vascular access stenosis**
- **Champion a precision medicine approach for dialysis vascular access stenosis**



Angioplasty causes forceful outward remodeling followed by aggressive neointimal hyperplasia



Angioplasty



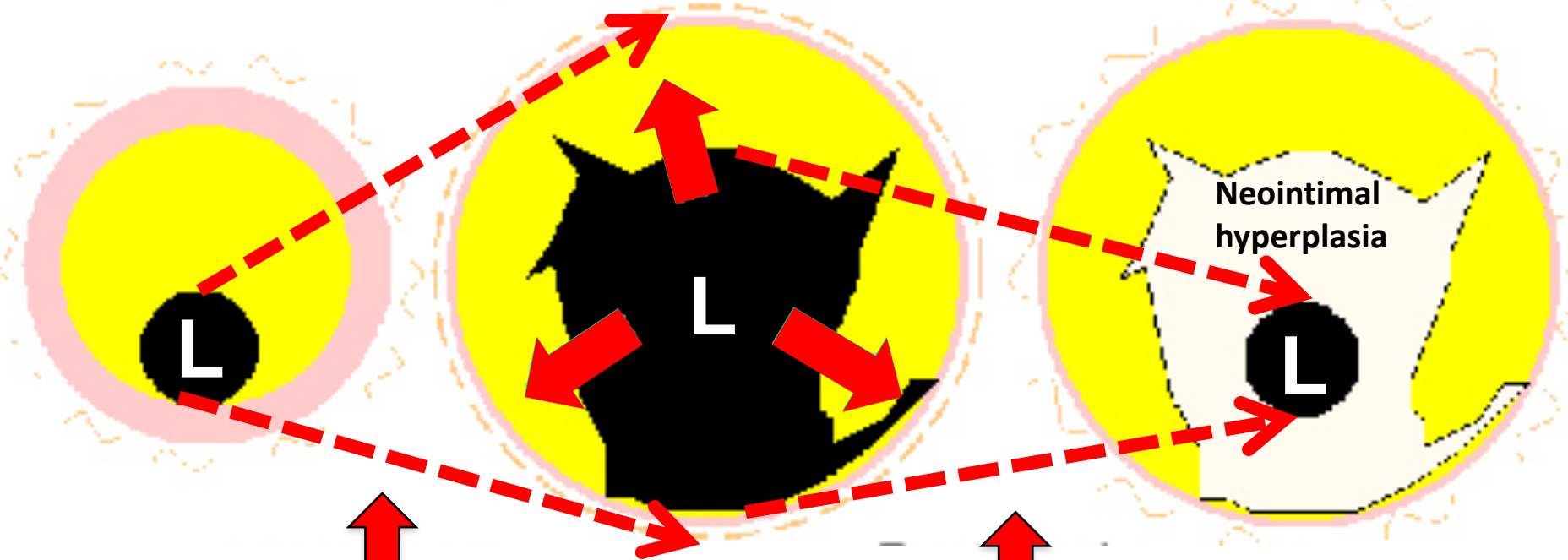
Outward remodeling
due to intima-media
rupture



Restenosis due
to neointimal
hyperplasia



Angioplasty: the GOOD, the BAD and the UGLY



Good



Bad



Ugly



Clinical results: You can't do worse!

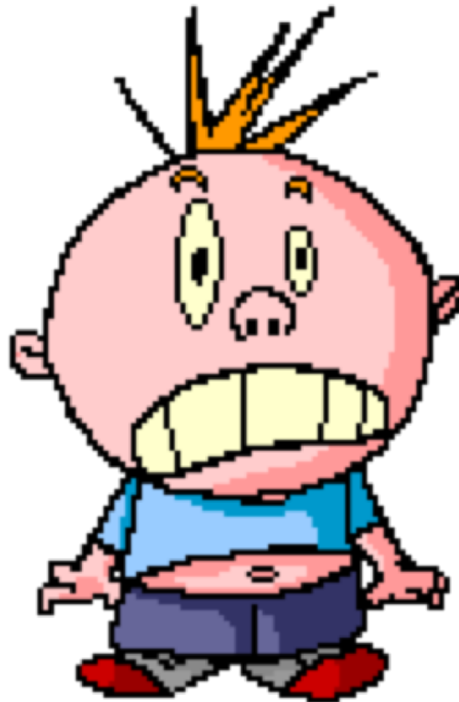
Procedure

Result

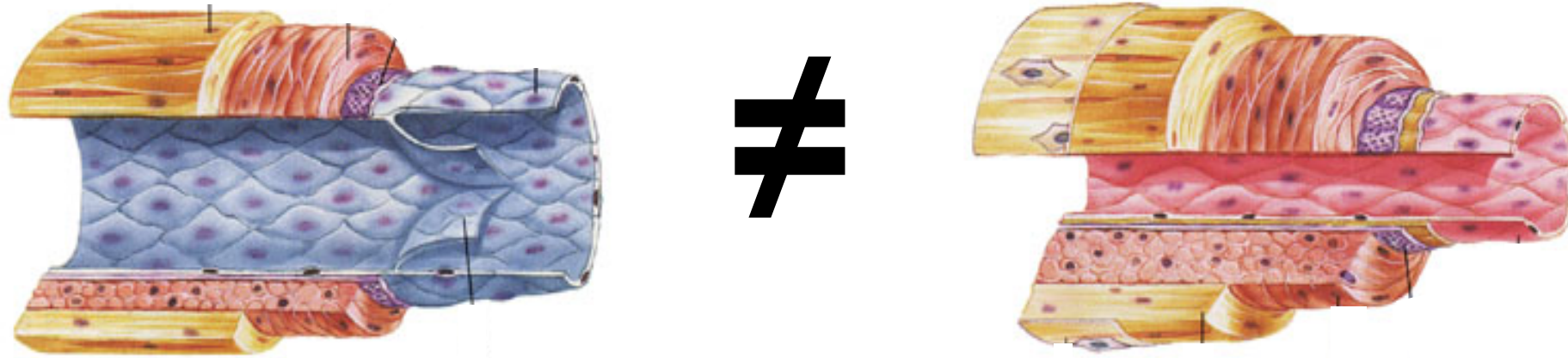
- **Coronary Angioplasty** 90% @ 9 months
- **Carotid Angioplasty** 90% @ 1 year
- **Iliac Angioplasty** 70% @ 5 years
- **Femoral Angioplasty** 50% @ 2 years
- **Peri-anastomotic AVF angioplasty** 50% @ 1 year
- **PTFE graft angioplasty** 50% @ 6 months (p)
40% @ 3 months (t)



Why are the results of Venous Angioplasty so poor?



A vein is not an artery



- **Anatomical:** Veins have a poorly defined internal elastic lamina
- **Physiological:** Veins release less nitric oxide and prostacyclin
- **Molecular:** Significant differential expression of gene products between normal vein and artery

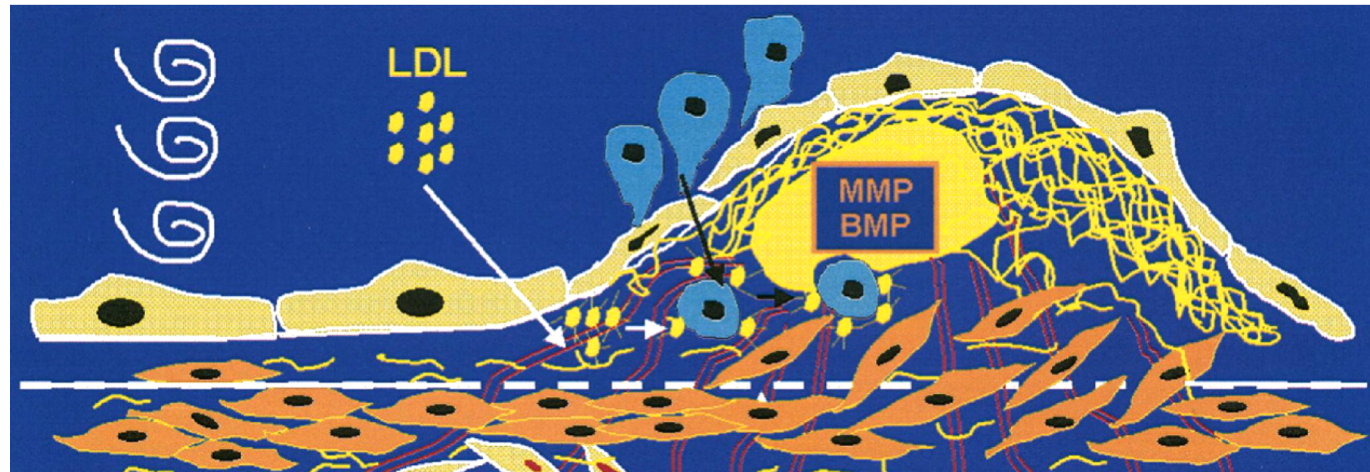
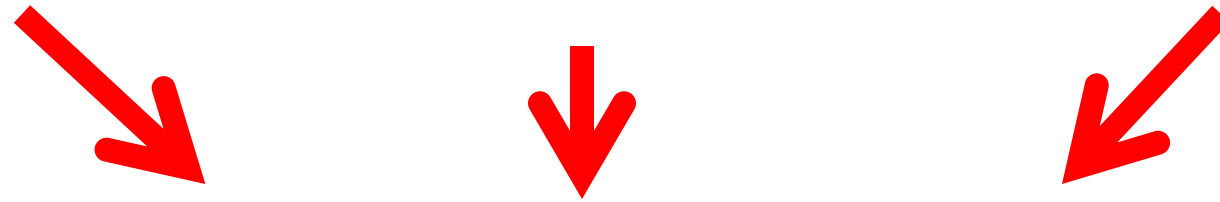


ESRD and CKD are states of massive endothelial dysfunction!!

Uremia

Oxidative stress

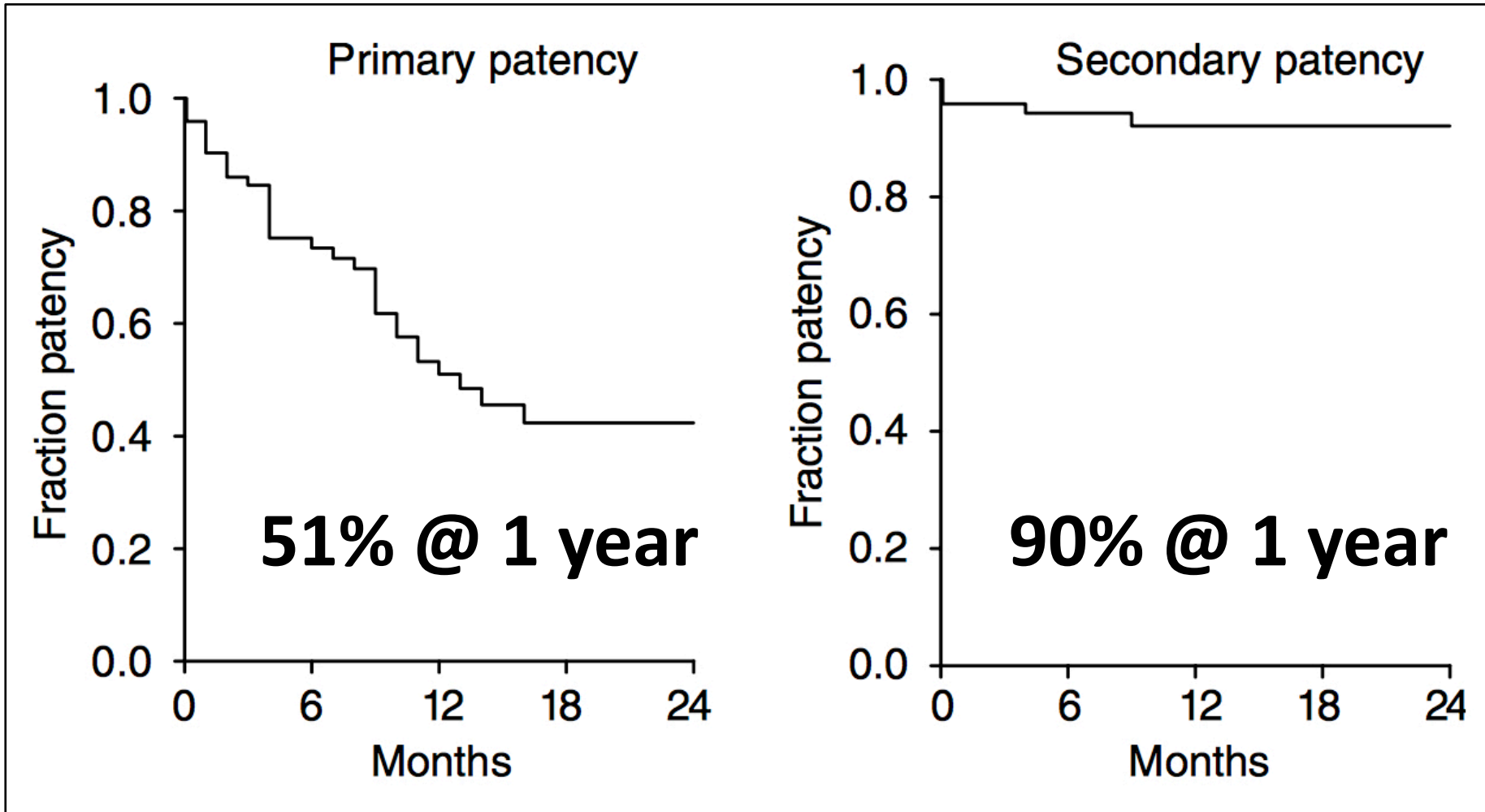
Inflammation



More aggressive restenotic response to angioplasty



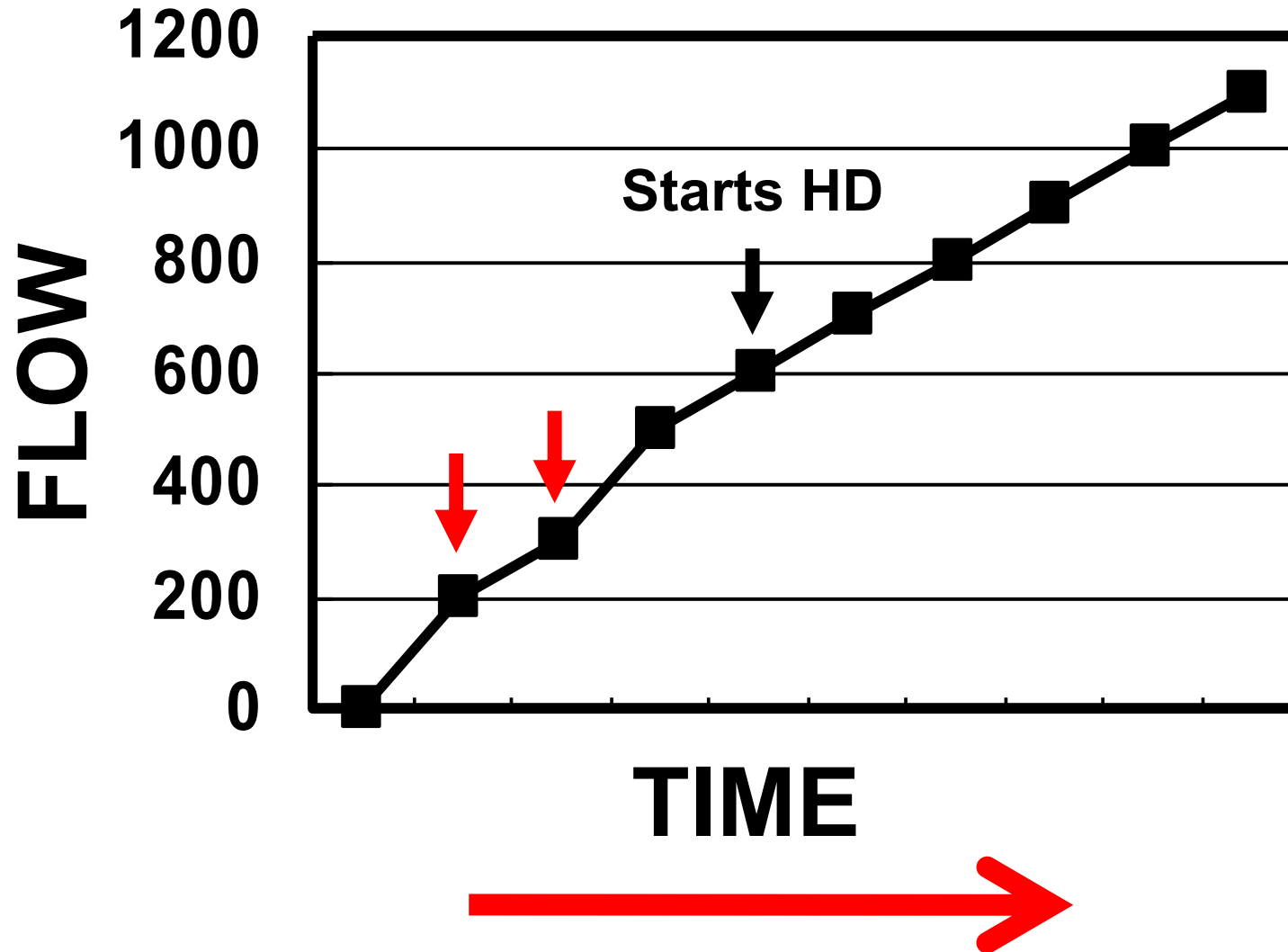
So why is angioplasty still the mainstay of therapy for dialysis access stenosis?



- **Multiple angioplasty procedures can result in excellent long term patency**



How many is too many??

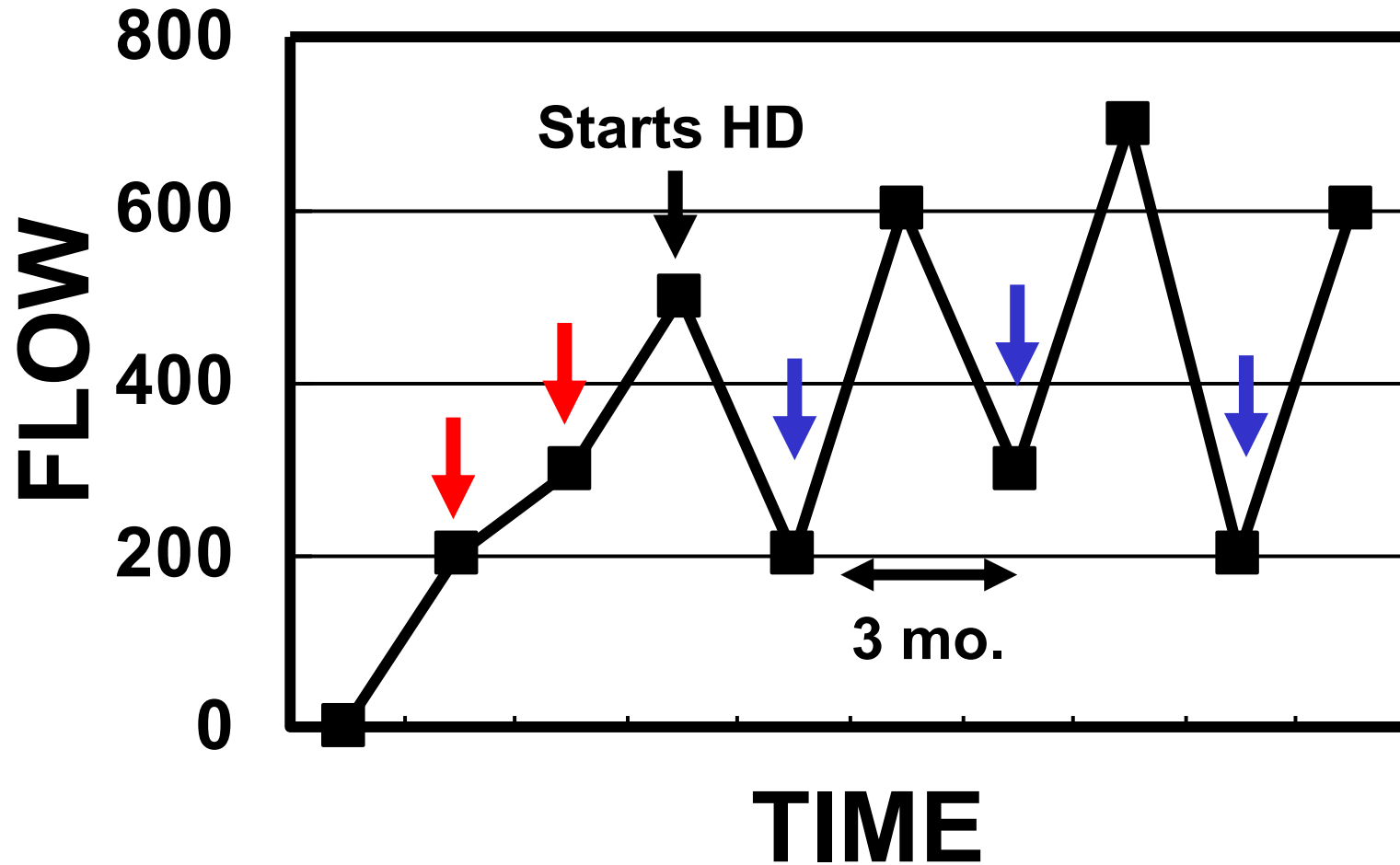


- Excellent result

- In the best interest of the patient



How many is too many??



- Is this in the best interest of the patient and overall economic cost?



Two Differing View Points

Angioplasty is good!

**Minimal post angioplasty
stenosis is better!!**

Big lumens are best!!!

**Interventional
Viewpoint**



**Vessel wall injury
is bad!**

More injury is worse!!

Big lumens are worst!!!

**Cell Biology
Viewpoint**



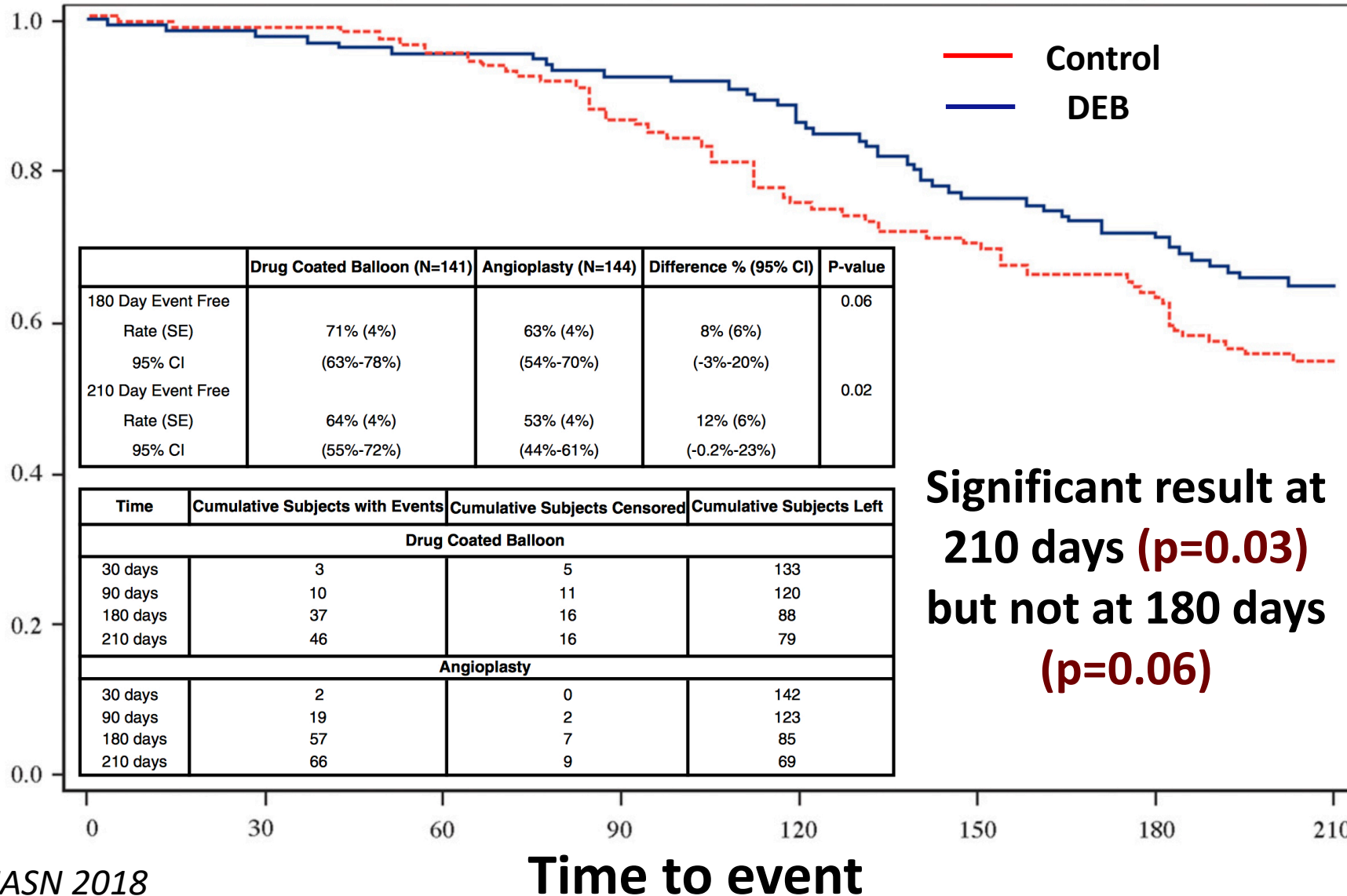
The Angioplasty “Plus” approach

- How does one reconcile these two very different views
- Combine angioplasty with some sort of anti-stenosis therapy +/- anti-recoil therapy
- Drug eluting balloons and stent grafts
- Cup half full!!!

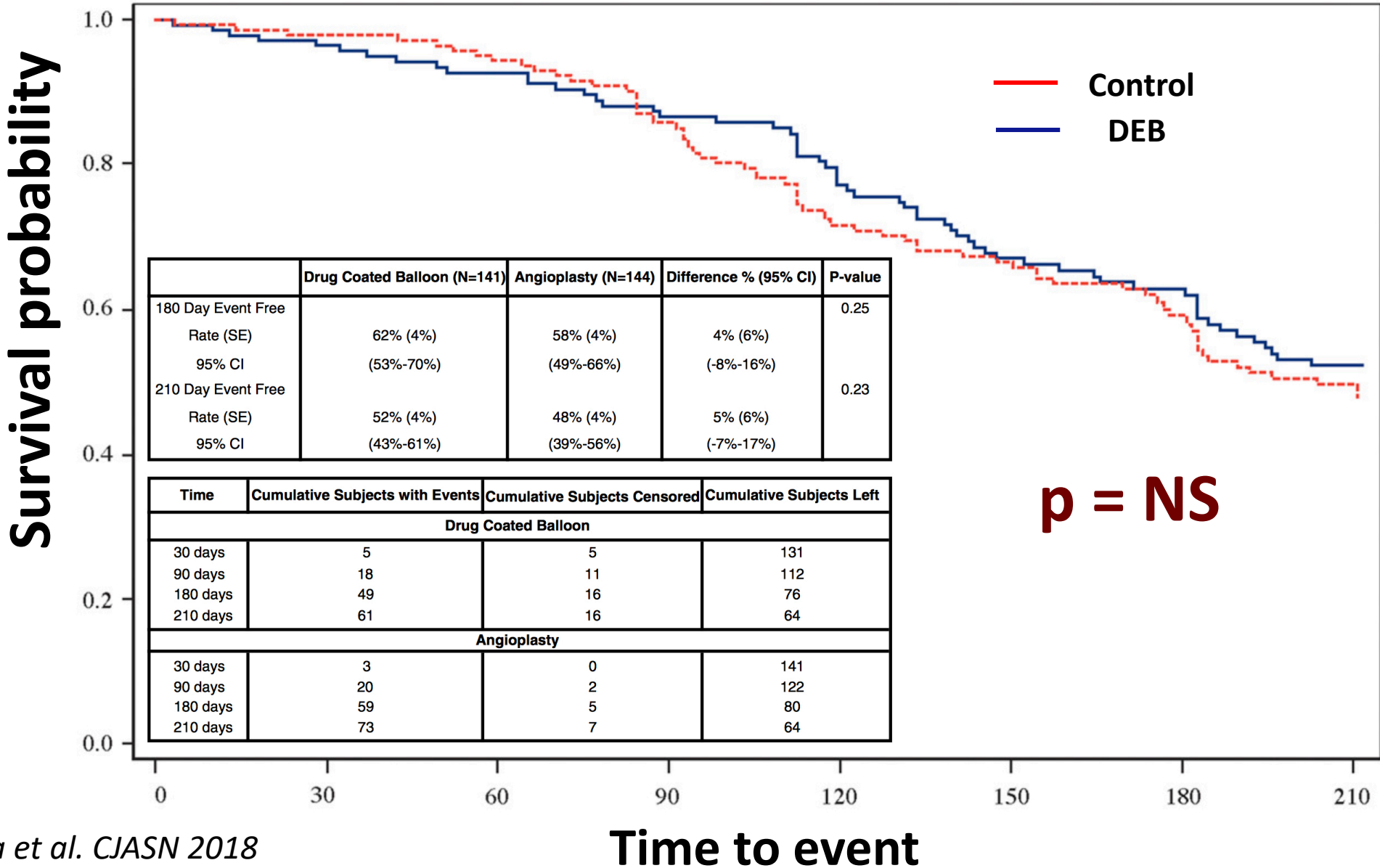


DEB (Lutonix) have a positive impact on primary patency post AVF angioplasty

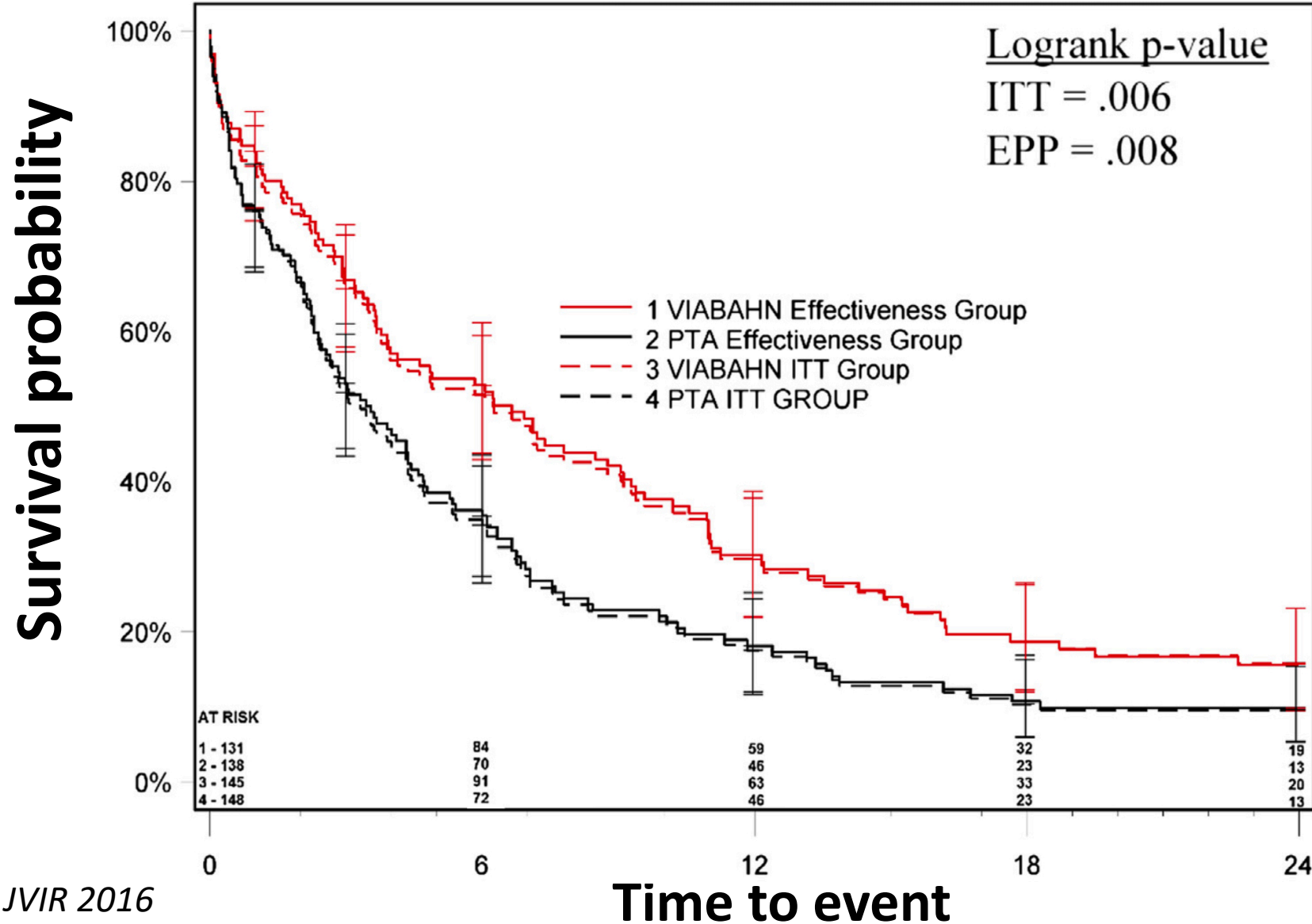
Survival probability



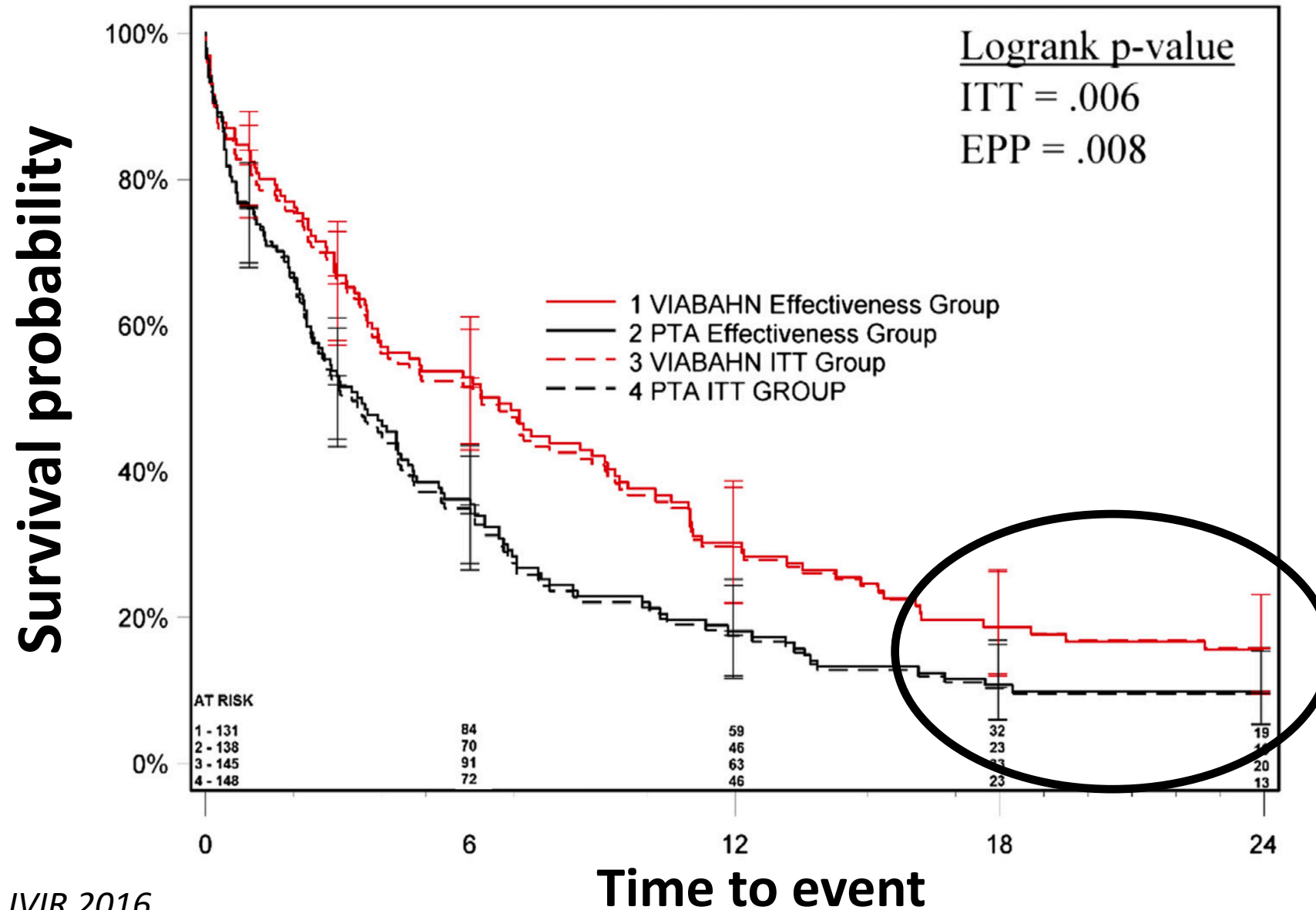
Minimal impact on dialysis circuit patency



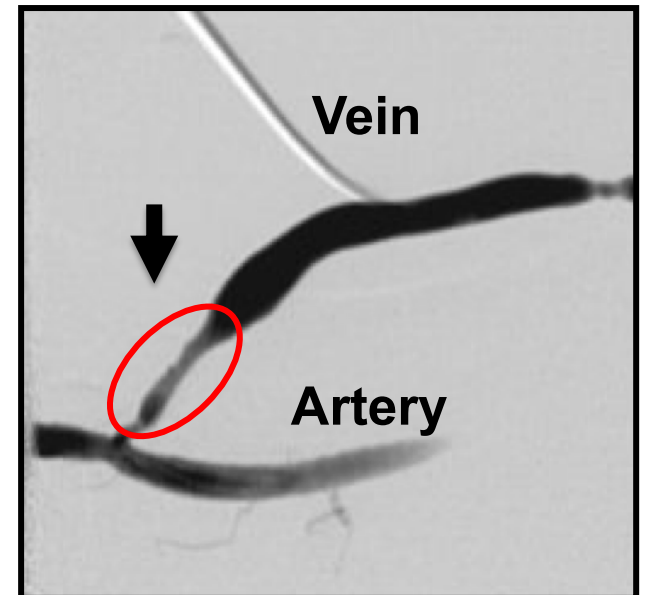
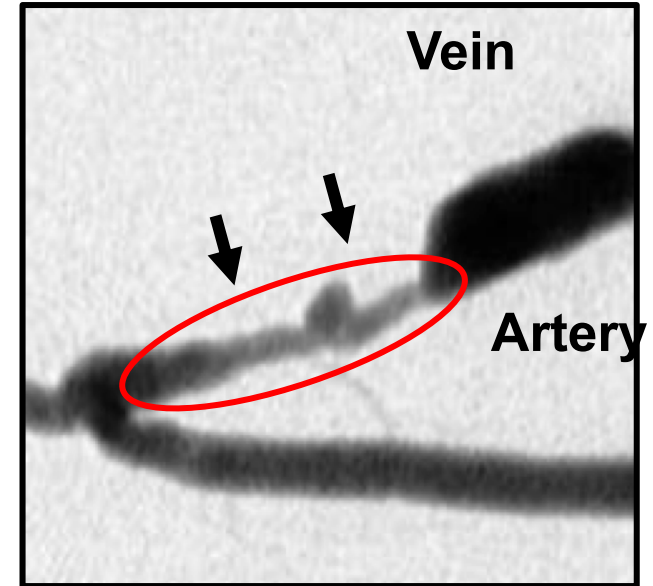
Stent grafts (Viabahn) improve primary patency post AVG angioplasty



But long term results remain poor...



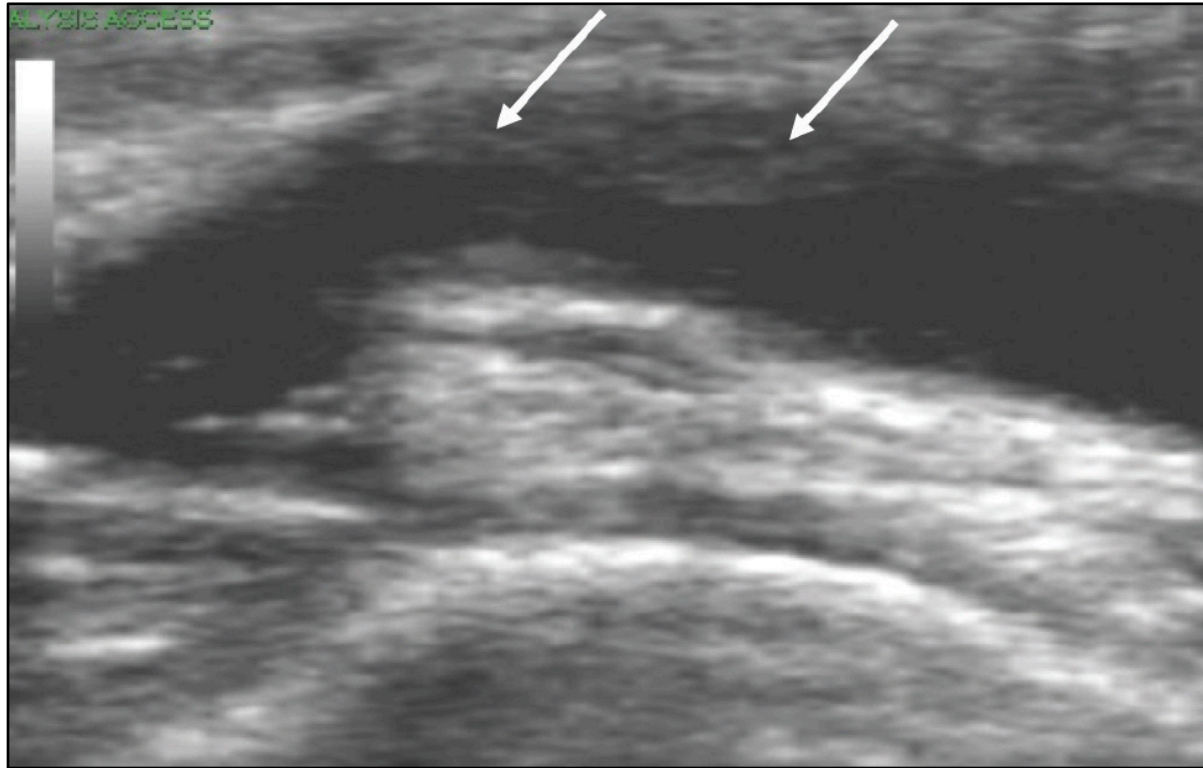
So why are our results so poor...



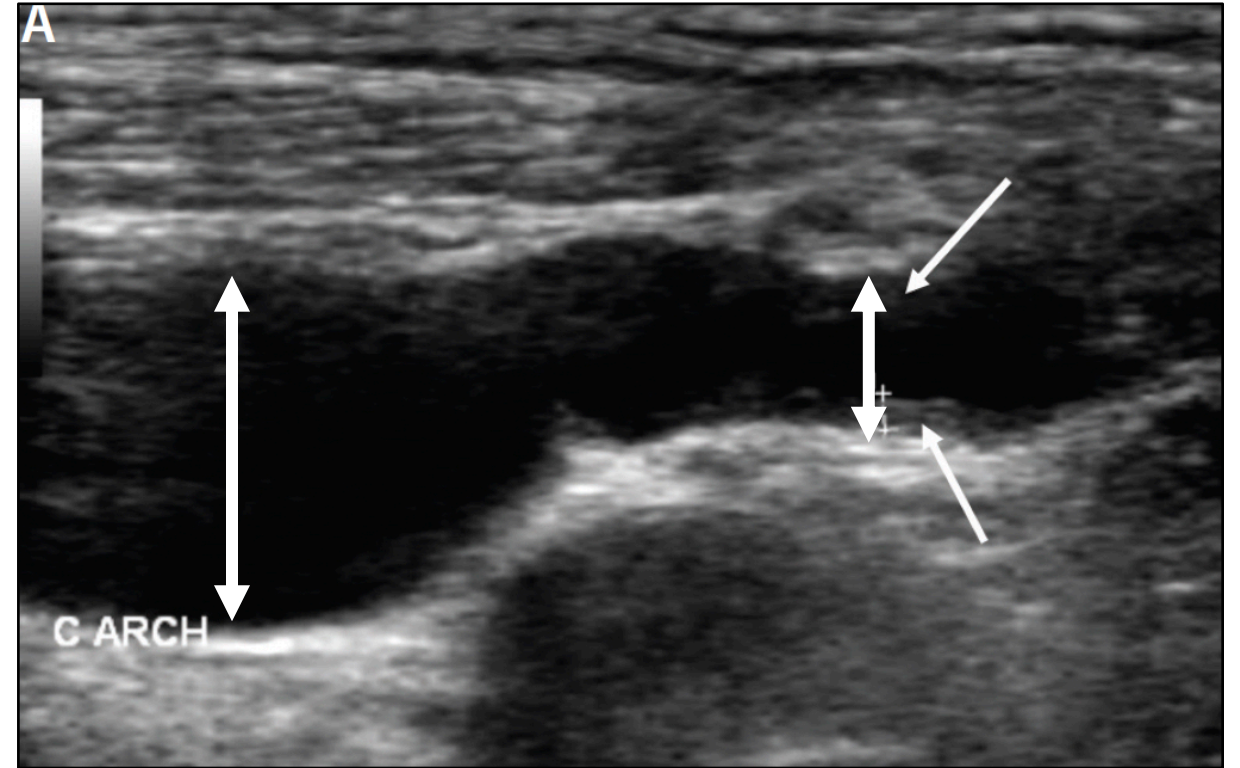
- Just as people are different
- Vascular access stenoses are different



Vascular access stenoses are different



Stenosis due to neointimal hyperplasia



Stenosis due to vascular constriction



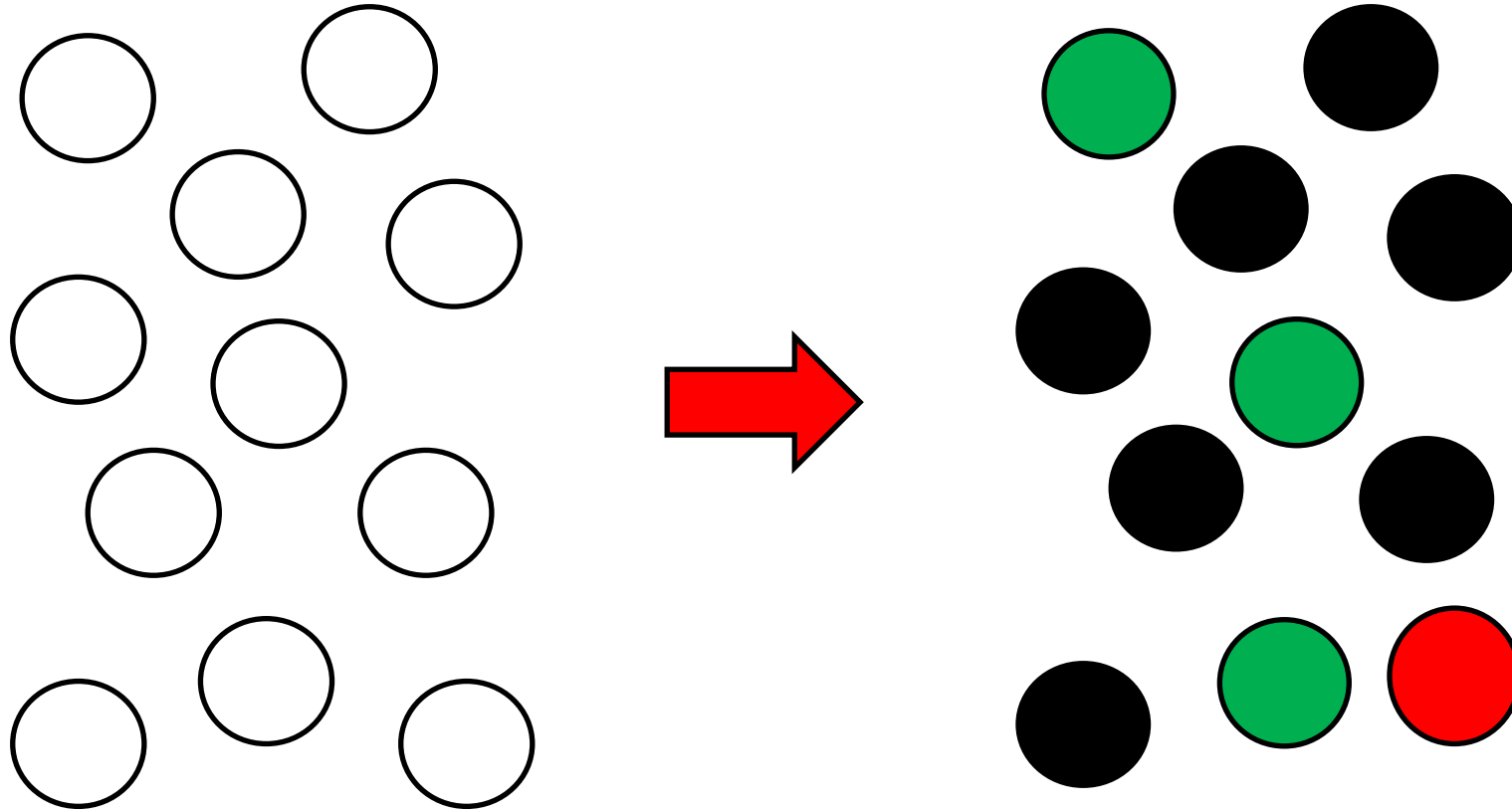
Need to get away from a one size fits all!!



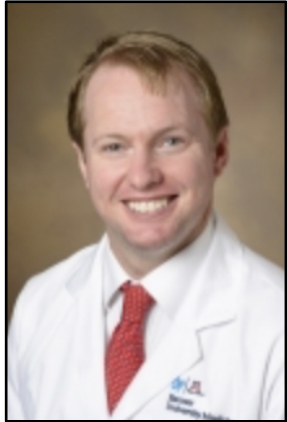
- Get away from the “one size fits all” vascular access paradigm
- To develop a true precision medicine approach to vascular access care



We need a precision medicine approach because each one of us is different

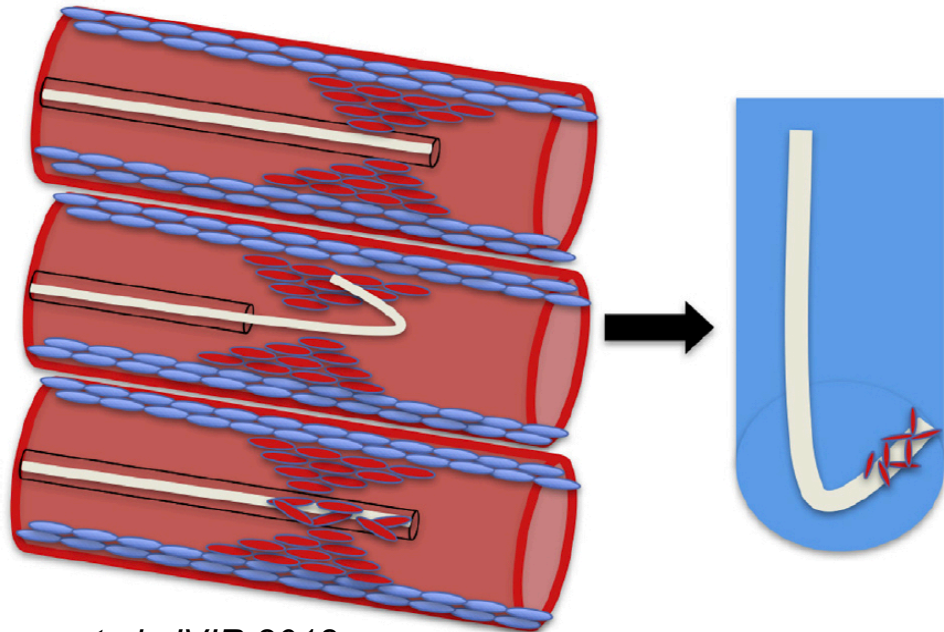


The future is nearer than we think!!

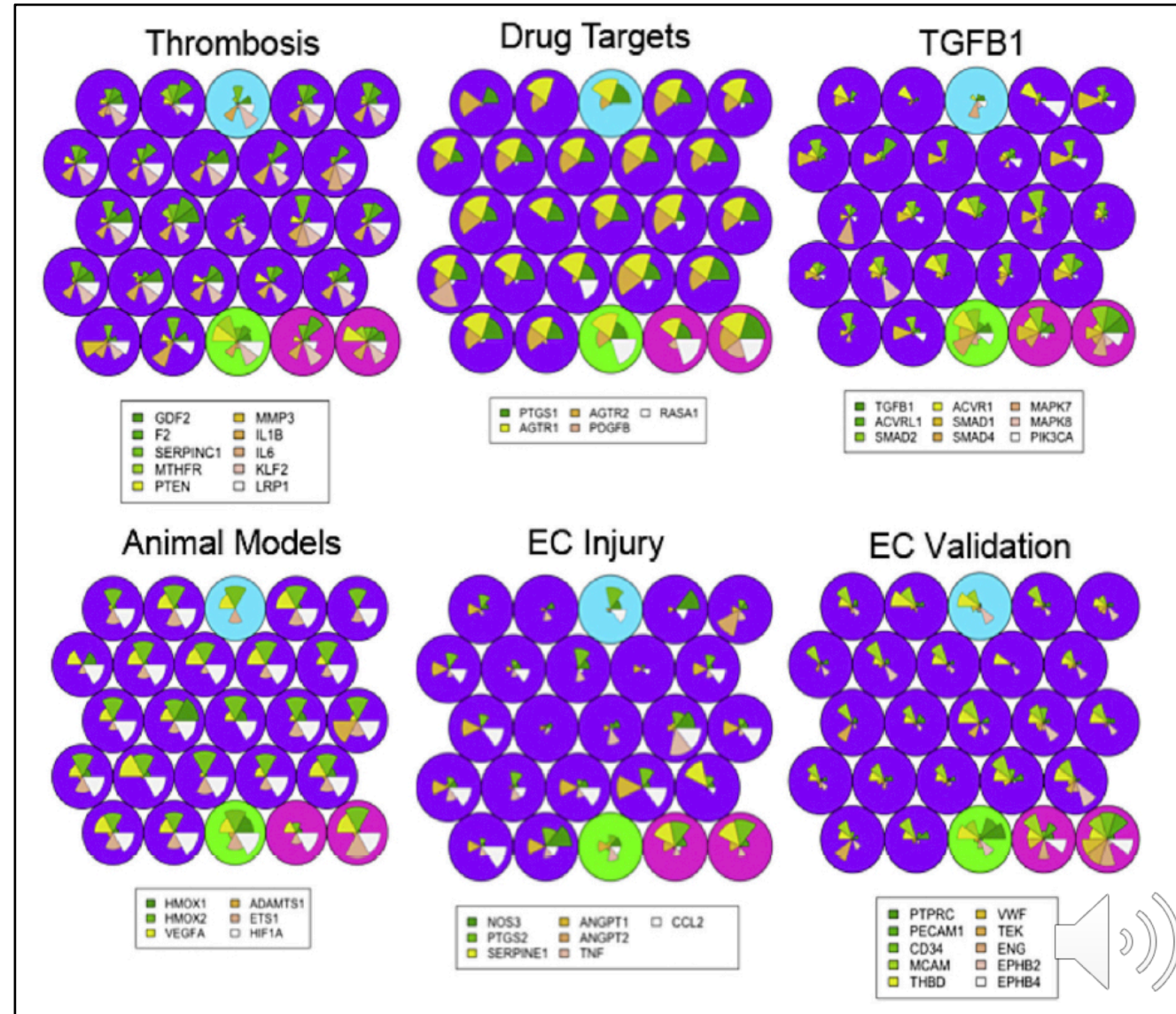


Endovascular Biopsy and Endothelial Cell Gene Expression Analysis of Dialysis Arteriovenous Fistulas: A Feasibility Study

Hugh McGregor, MD, Zhengda Sun, PhD, David McCoy, MS, Vishal Kumar, MD, Miles Conrad, MD, Mark Wilson, MD, and Daniel Cooke, MD



McGregor et al. JVIR 2018



Hope for the Future

- **Stratify patients into different RESPONDER groups based on clinical, demographic and BIOLOGICAL parameters**
- **Biological parameters would include next generation imaging, markers of the vascular response to injury and “OMICS”**



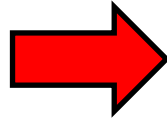
Looking to the FUTURE!

- **GOOD Responder = Standard Angioplasty**
- **MODERATE Responder = Tailored DES/DEB**
 - **Patient A with Stenosis J gets DEB X**
 - **Patient B with Stenosis K gets DEB Y**
 - **Patient C with Stenosis L gets DES Z**
- **POOR Responder = New Access**



Looking to the FUTURE!

**Precision
Medicine
Approach**



**Population
Health**



**ADD VALUE to
Vascular Access
Care and take
better care of our
patients**

