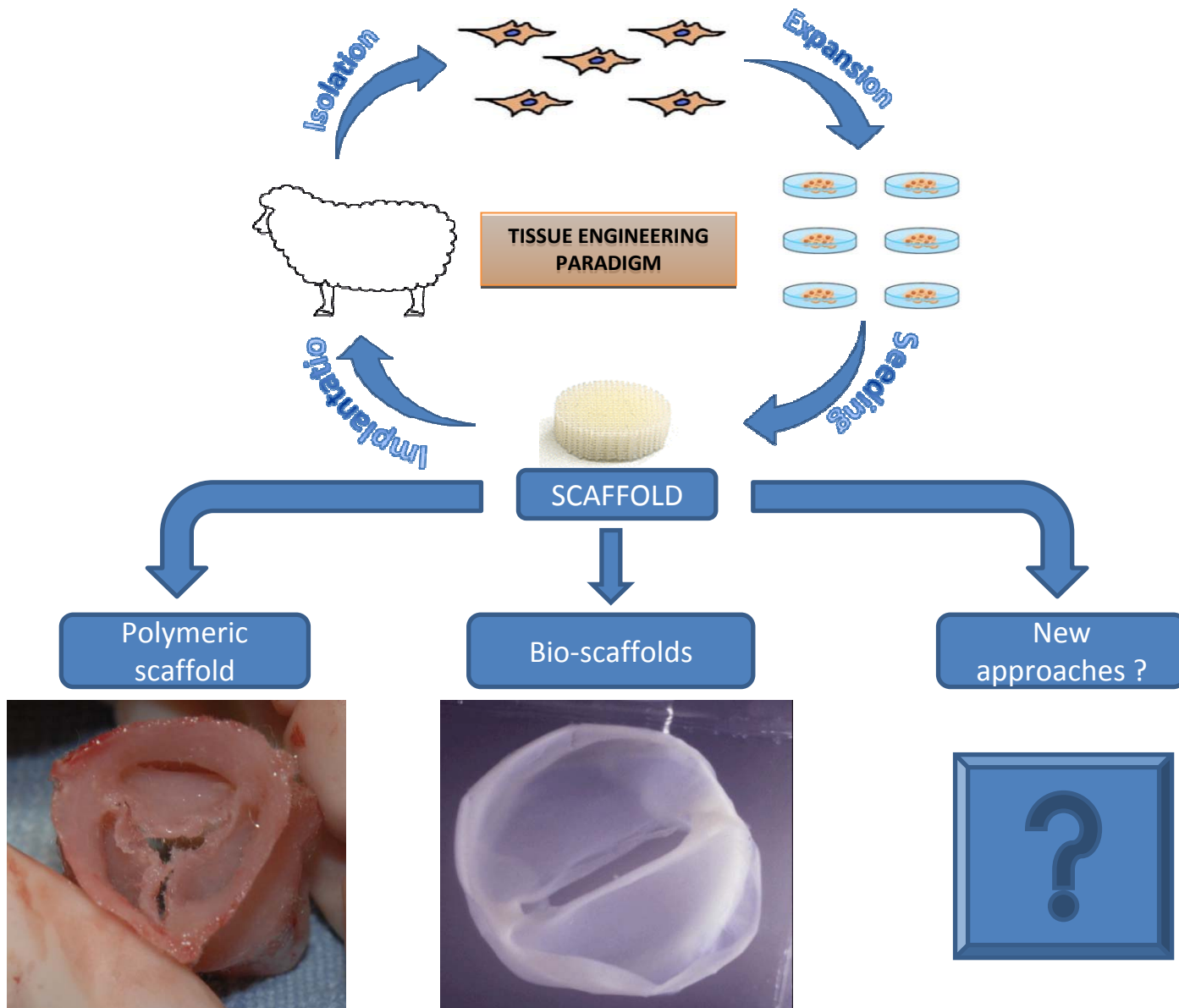
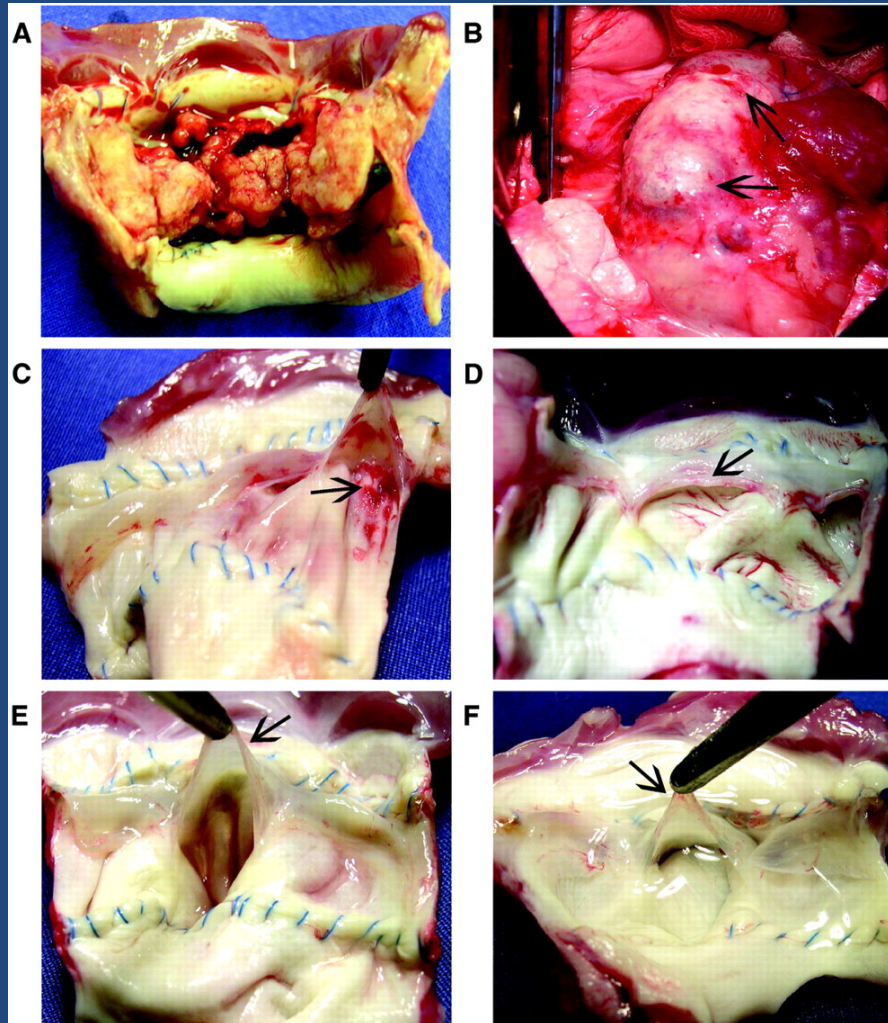


Prospects for Clinical Application of Tissue Engineered Cardiac Valves

John E. Mayer, Jr., M.D.

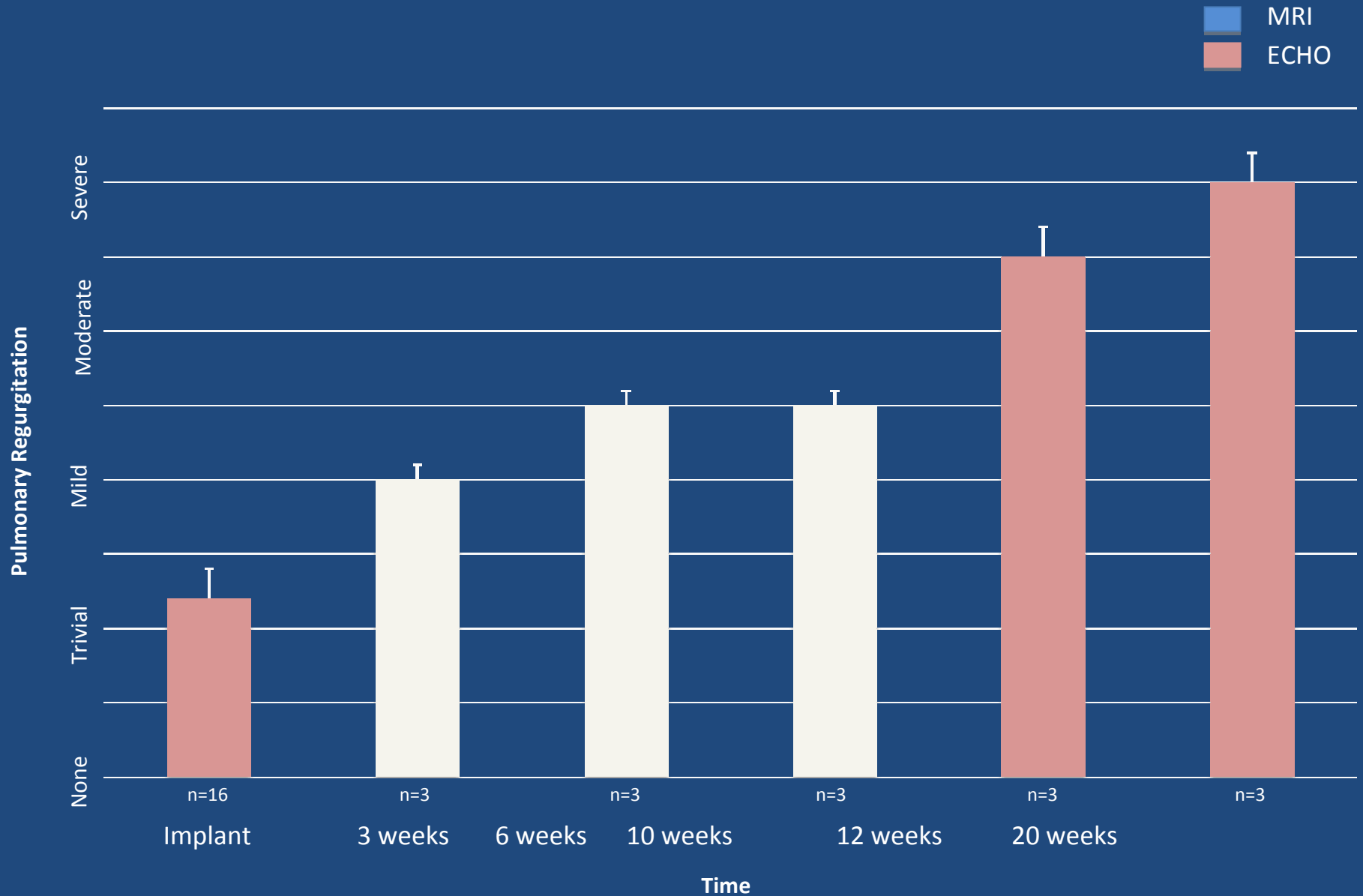


Macroscopic morphology of explanted valves

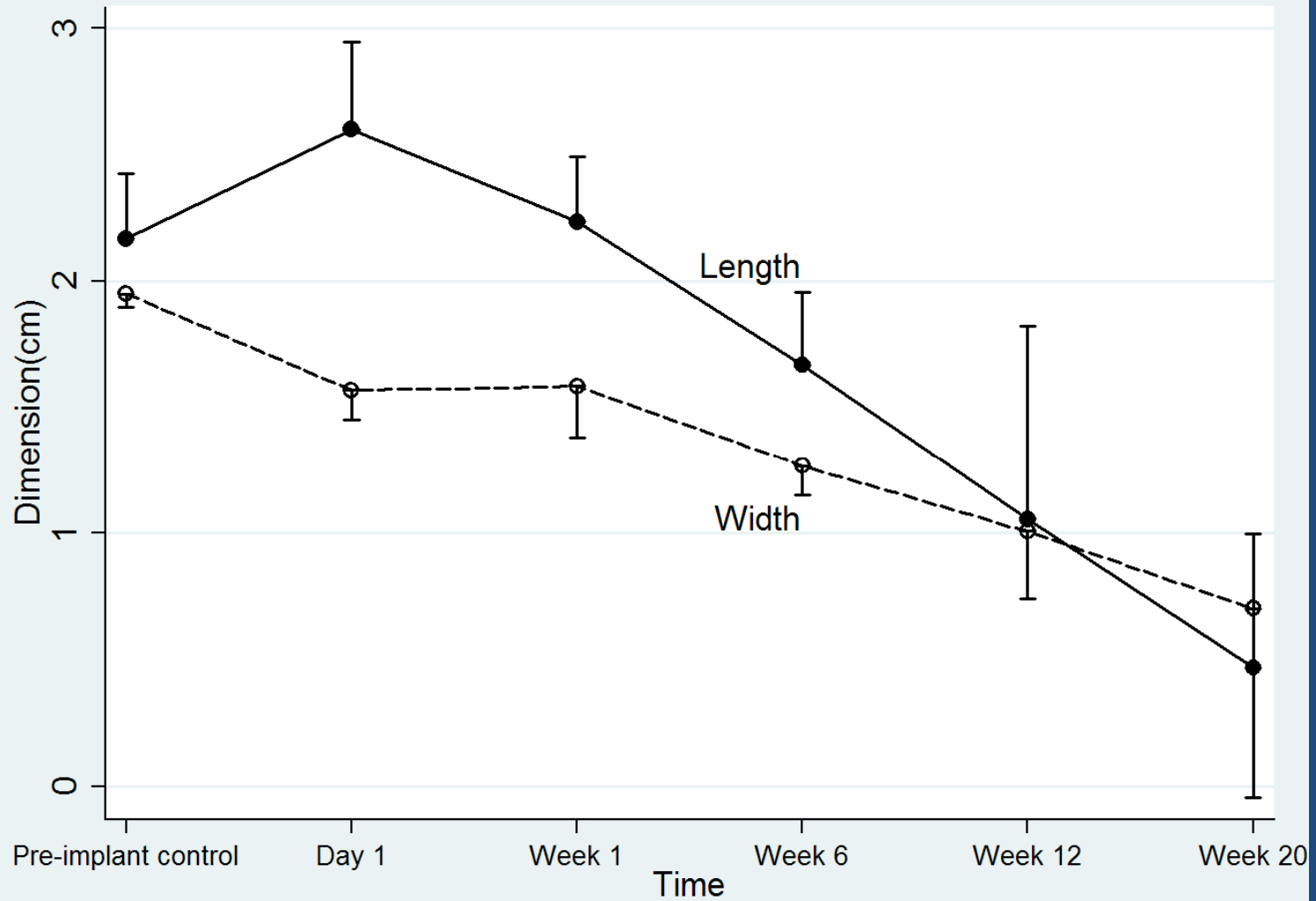


Lichtenberg, A. et al. *Circulation* 2006;114:I-559-I-565

PULMONARY REGURGITATION



CUSP EXPLANT DIMENSIONS



Current Human Experience with “Tissue Engineered” Heart Valves

- Domen et al 2007- Saphenous vein endothelial cells seeded on decellularized pulmonary homografts for Ross procedure (n=23)
- Cebotari et al 2006- Circulating endothelial progenitor cells seeded (21d) on decellularized pulmonary homografts for TOF patients (n=2)
- Simon et al 2003- Decellularized porcine pulmonary homografts- Little “spontaneous recellularization” and high failure rate

Tissue Engineered Cardiac Valves

In vivo feasibility demonstrated (animals, man?)

Outstanding Issues for Clinical Trials

1. In vivo “remodeling/maturation”- cellular production/remodeling of ECM and long term performance in animal models
2. In vivo monitoring of tissue engineered valve performance in human implants
3. In vitro predictors of long term in vivo performance

Outstanding Scientific Issues

1. Cell Source(s)
2. *In vitro* “Engineering”
 - Physical signals
 - Chemical/cytokine signals
3. Scaffolds
 - Biodegradable Polymer
 - Decellularized tissue with autologous cell seeding
 - Understanding scaffold or ECM interactions with cells
 - Is destination destiny for stem cells?*