

Y a-t-il des progrès à faire en chirurgie cardiaque pédiatrique?

Olivier Raisky

Quand l'acte ne vient pas, le savoir s'en va

Paris, Mars 2019



Y a-t-il des progrès à faire en chirurgie cardiaque pédiatrique?

Olivier Raisky

Quand l'acte ne vient pas, ~~le savoir~~ l'enfant s'en va

Paris, Mars 2019



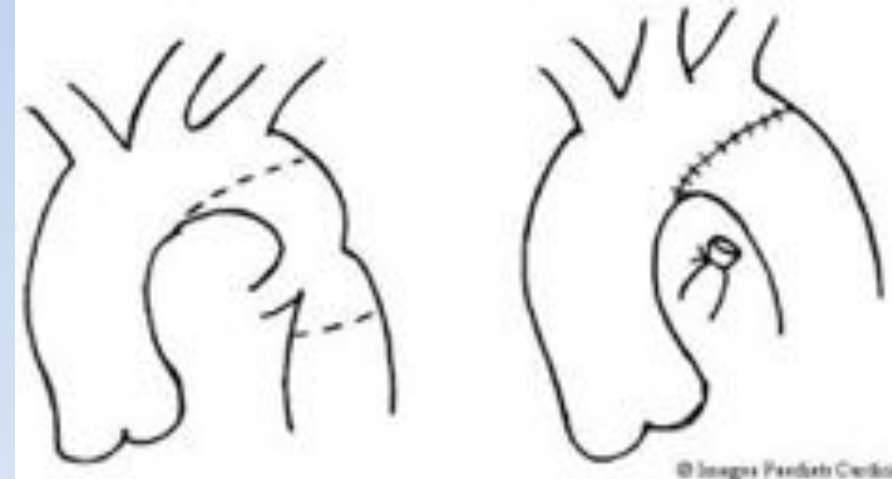
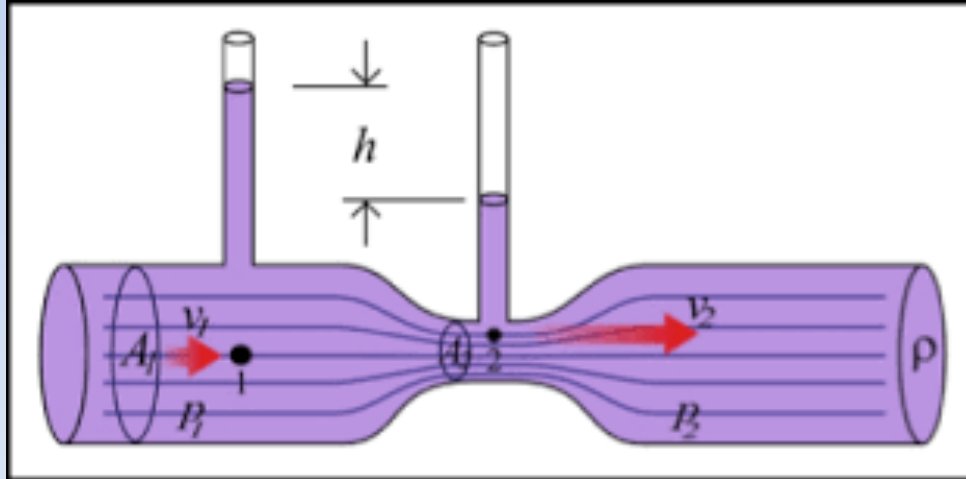
INNOVATIONS SPECTACULAIRES



16 juillet 1969



1950 - 1980
L'ERE DE LA PLOMBERIE !



Progrès chir cardiaque pédiatrique innovation de continuité

- Technique
- Technologique
- Tactique
- Politique, Economique
-

PROGRES ⇔ INNOVATION

**REEMPLACER QUELQUE CHOSE D'ANCIEN PAR QUELQUE
CHOSE DE NOUVEAU**

CHIRURGIEN 1



CHIRURGIEN 2



CHIRURGIEN



CHIRURGIENNE



Dr Margaux PONTAILLER

Working Paper Series

WP 16-3

FEBRUARY 2016

Is Gender Diversity Profitable? Evidence from a Global Survey

Marcus Noland, Tyler Moran, and Barbara Kotschwar

Abstract

Analysis of a global survey of 21,980 firms from 91 countries suggests that the presence of women in corporate leadership positions may improve firm performance. This correlation could reflect either the payoff to nondiscrimination or the fact that women increase a firm's skill diversity. Women's presence in corporate leadership is positively correlated with firm characteristics such as size as well as national characteristics such as girls' math scores, the absence of discriminatory attitudes toward female executives, and the availability of paternal leave. The results find no impact of board gender quotas on firm performance, but they suggest that the payoffs of policies that facilitate women rising through the corporate ranks more broadly could be significant.

LES FEMMES ET L'ENTREPRISE

- Experts internationaux en Economie: Peterson Institute
- 22000 entreprises, 93 pays
- Corrélation directe entre proportion de femmes « exécutives » et performance de l'entreprise
- Augmentation de la valeur et des bénéfices
- Passage de 0 à 30% de femmes « chief executive » ou Board: amélioration de 15% du revenu net

Octobre 2017



Dr Zoghbi

Dr Belli

Dr Calvaruso

3 Associés: rapport humains potentiellement tendus



Date à confirmer

Dr Calvaruso

FEMINISATION du milieu chirurgical

Adaptation – Progrès

- Activité clinique
- Postes Universitaires
- Postes de management

FORMATION CHIRURGICALE

- Parent pauvre du chirurgien
- Comparaison dramatique avec le sport de haut niveau
- Pas de temps dédié possible (objectifs d'activité, raréfaction du personnel)
- Pas de formation pour gestes chirurgicaux fondamentaux: simulation ou réel
- Pas de recours aux techniques d'imagerie mentale
- Pas de vidéo analyse
- Pas de debriefing
- Peu de discussion tactique
- Pas de formation psychique au stress: sophrologie...
- Pas de coaching
- Le « diplôme à tout faire » du chirurgien – pas de qualifications par interventions...

Que de progrès à réaliser...

CULTURE DE L'ÉVALUATION ET CONTRÔLE QUALITÉ

Amélioration considérable des résultats

Morbidité – mortalité

Diminution des lésions résiduelles



Contrôle individuel du
résultat-patient



Contrôle global de
l'activité

Contrôle individuel du résultat-patient De la cécité à la lumière!

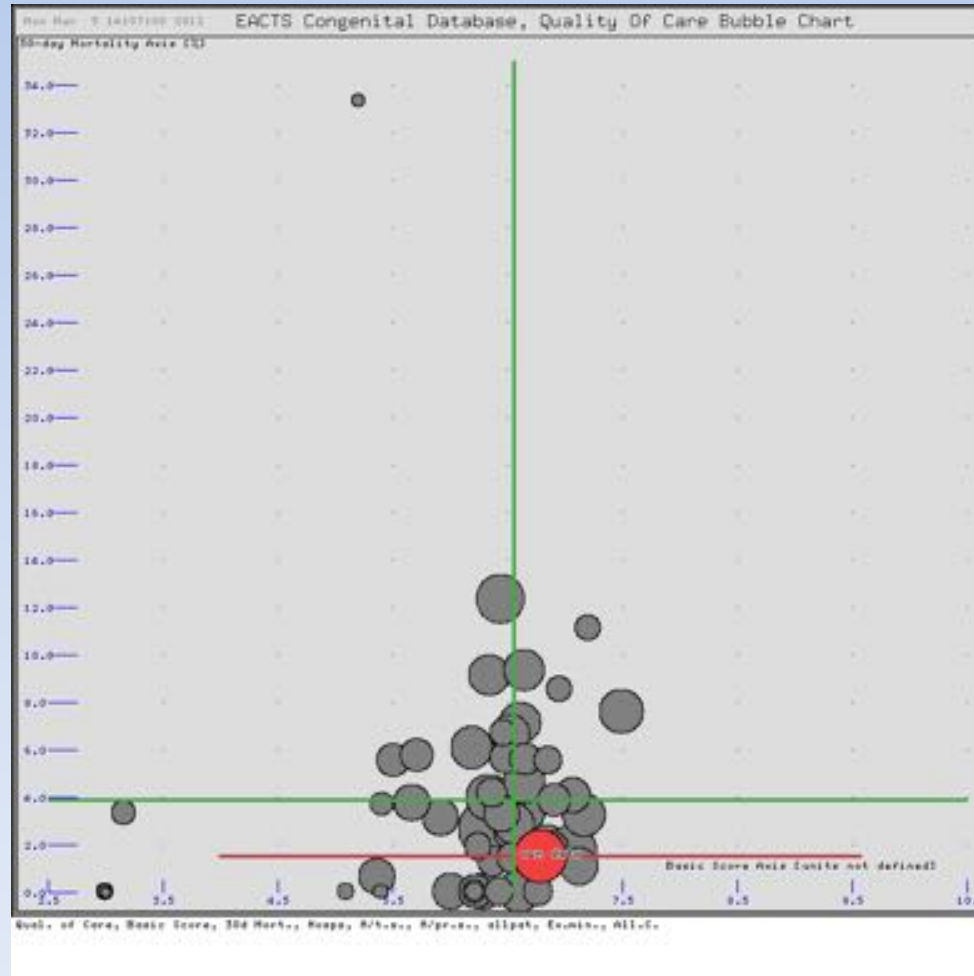
- Immédiateté du contrôle qualité
- Corrélation lésions résiduelles - Mortalité
- Nécessité d'y consacrer plus de temps/plus d'argent
- Performance/Réparation
 - Obligation médico-légale?
 - Echographie transoesophagienne 2D, 3D
 - Le cathétérisme per-opératoire: coronaires du nouveau né
 - Scanner per opératoire
 - IRM 4D

Encore faut-il accepter cette évaluation perçue comme un jugement

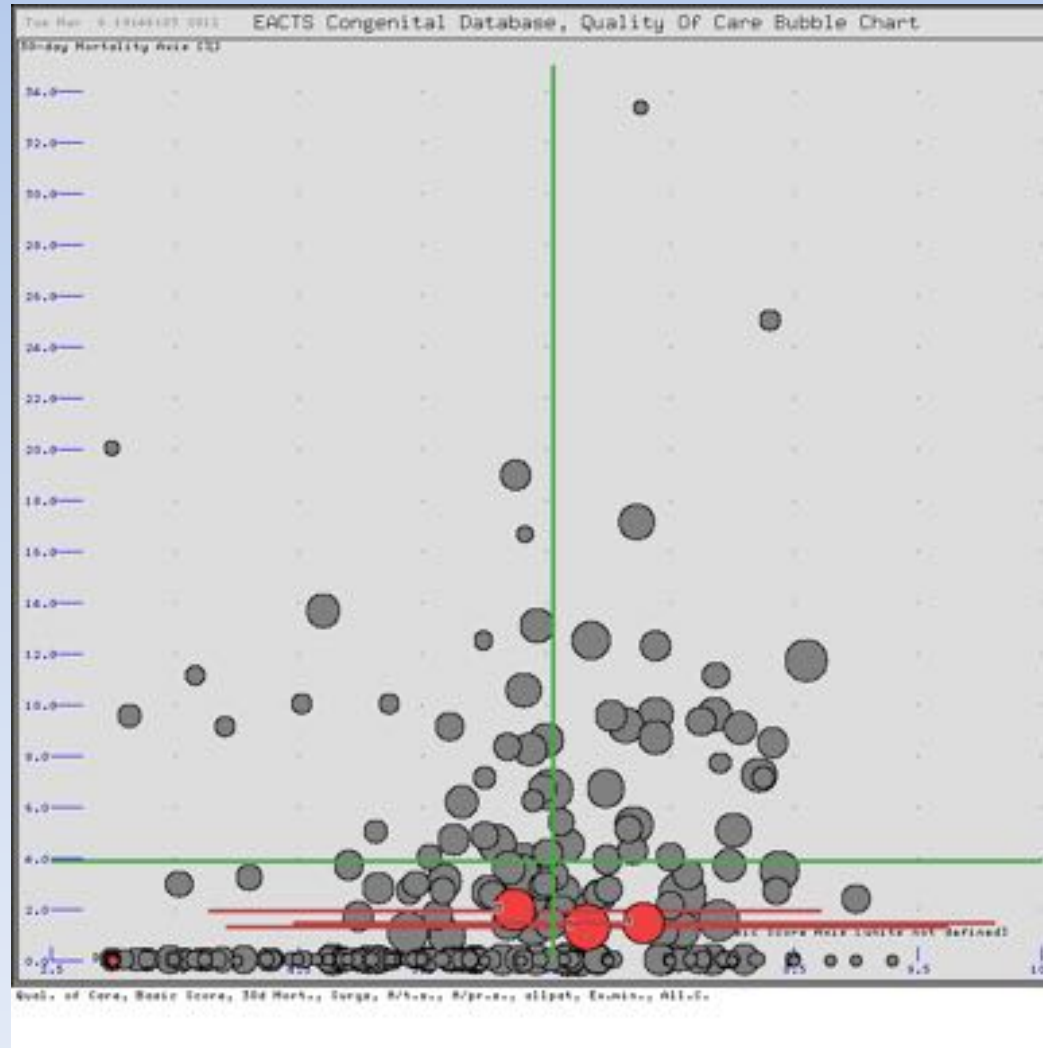
Evaluation



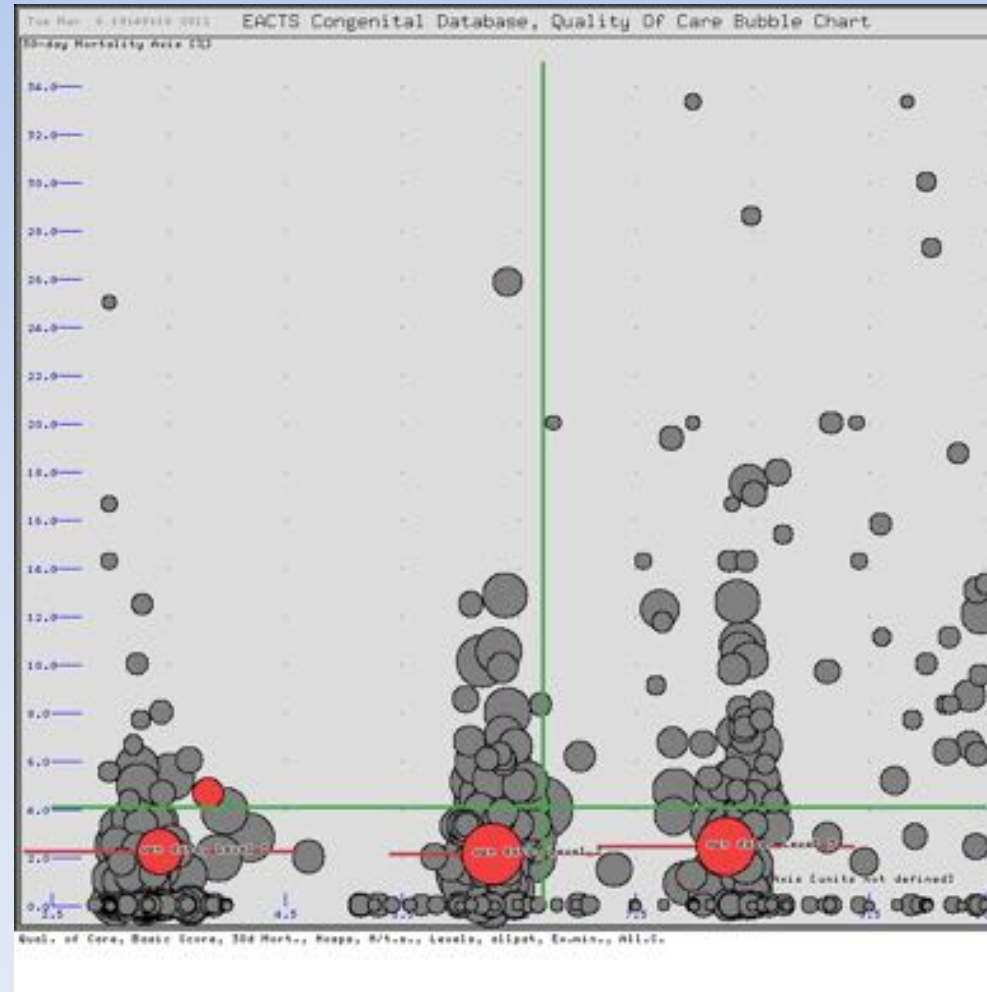
EACTS database



EACTS database



EACTS database



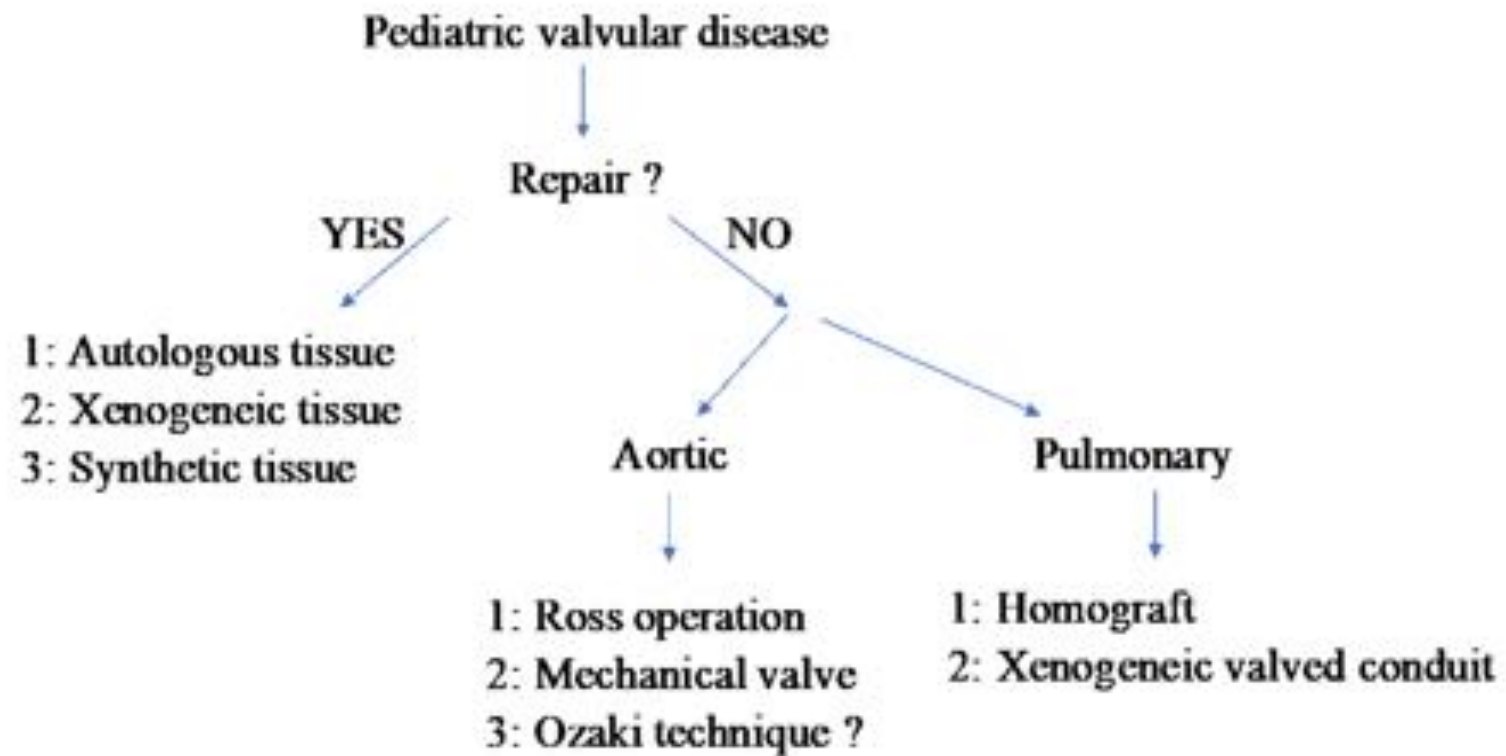
Base de données obligatoire = Progrès majeur

- Publications scientifiques: vérité parcellaire, autocensure inconsciente
- Evaluation objective de la situation globale et particulière
- Passage de la communication / indices de résultat
- Adressage patient en connaissance/conscience

INNOVATION TECHNOLOGIQUE

DE CONTINUITE?

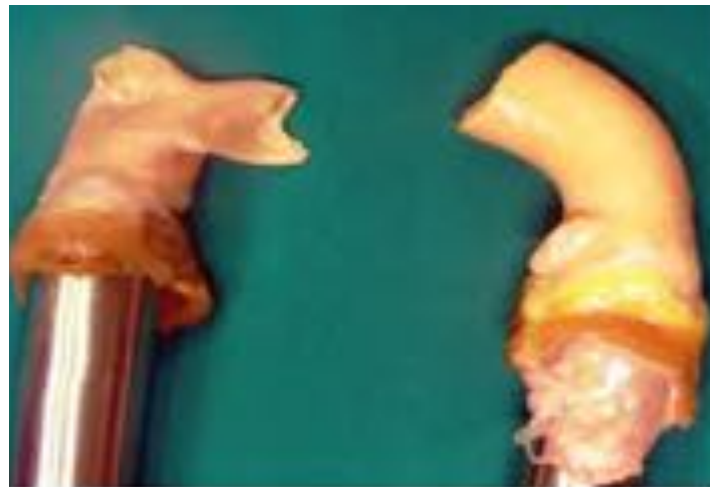
VOIE DROITE ET PATCH



Tube de Hancock: valve porcine, tube dacron



Contegra: jugulaire de boeuf



Homogreffe pulmonaire cryopr serv e

RÉINTERVENTIONS

- 1989-2008
- 156 patients
- 70% nouveaunés
- Homogreffe
 - Aortic(56%)
 - Pulm (44%)

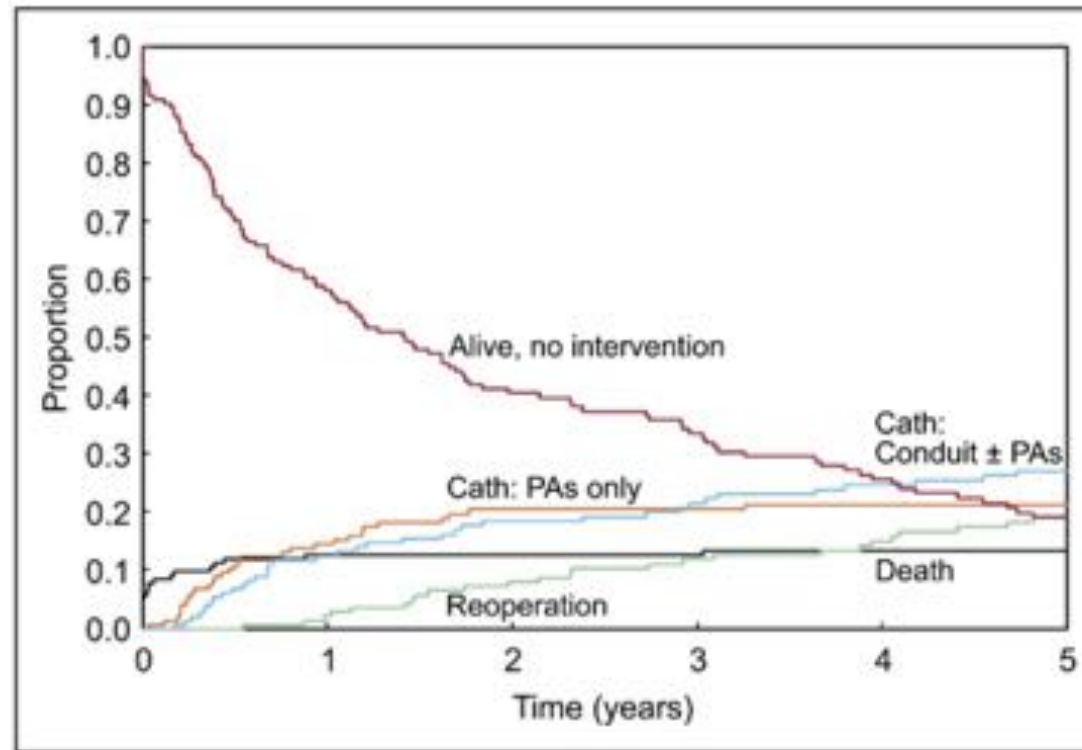
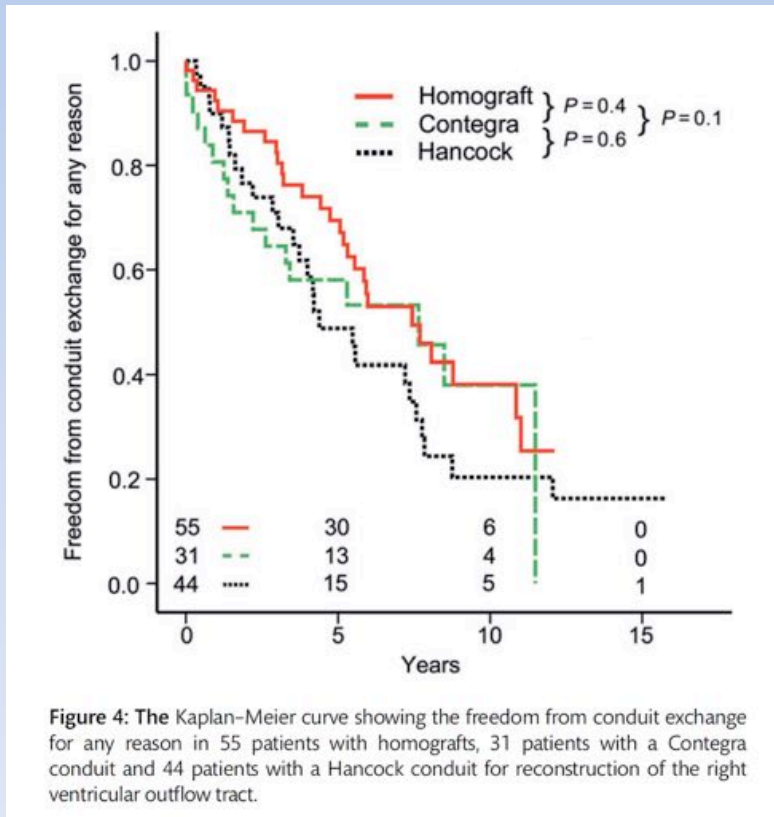
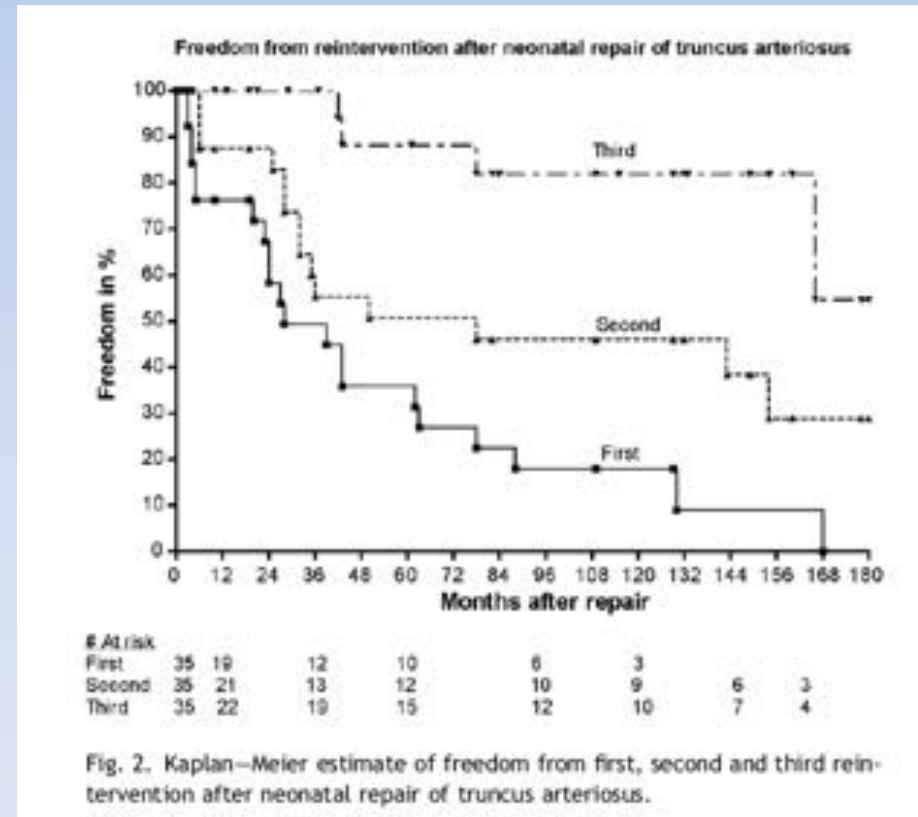


Figure 1. Competing risks curves demonstrating interval-to-first event:

RÉINTERVENTIONS



Vitanova, EJCTS, 2014



Sinzobahamvya N, Eur J Cardiothorac Surg 2008; 34; 732-737 (Sankt Augustin)

TUBE VALVE DE KYOTO

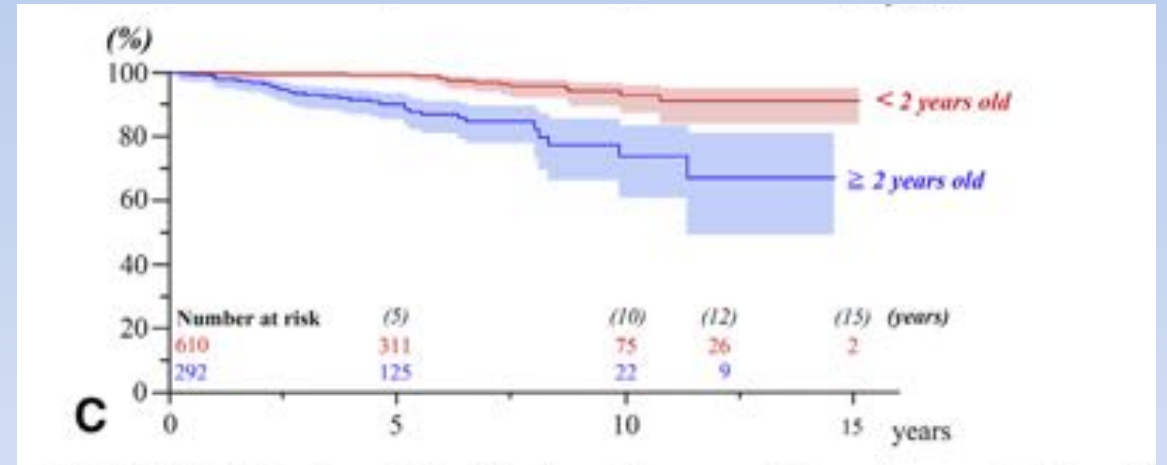
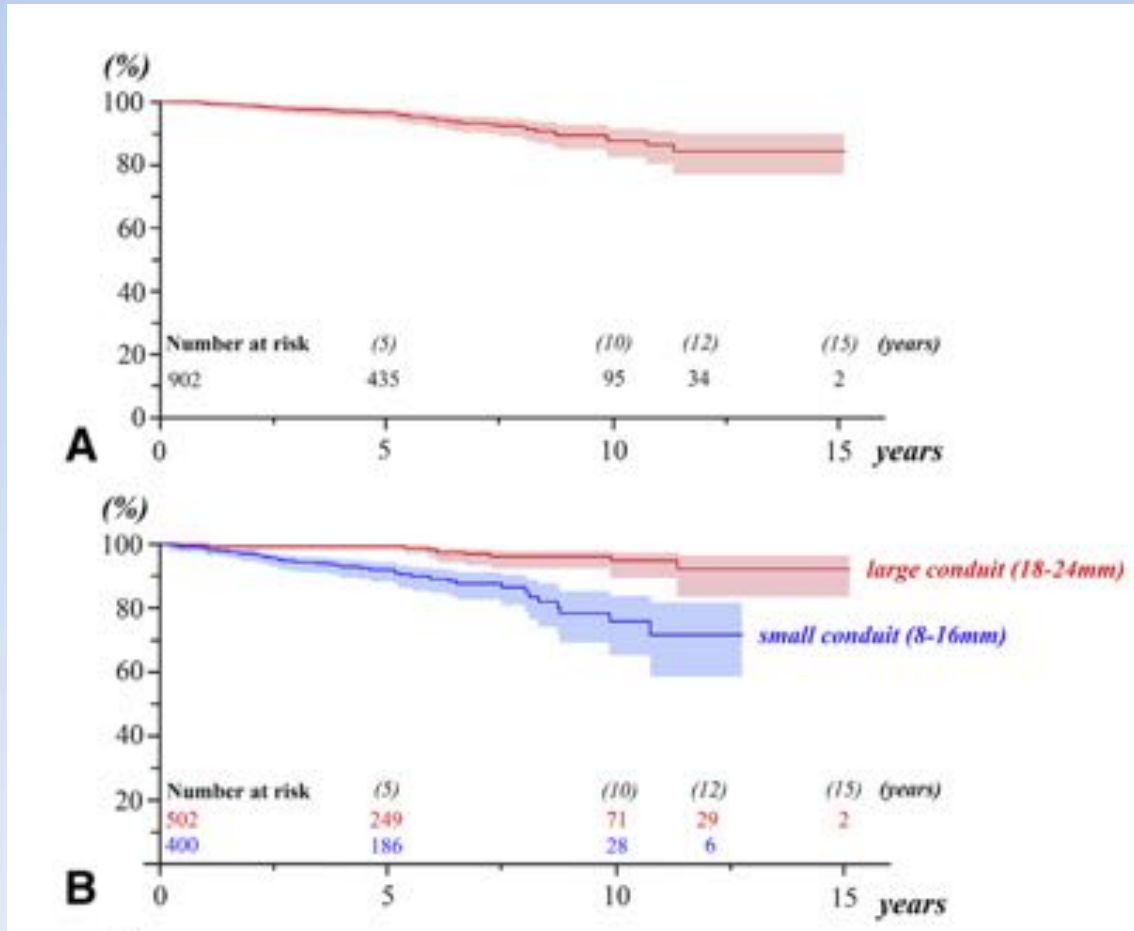


JTCS 2018

Long-term outcomes of expanded polytetrafluoroethylene conduits with bulging sinuses and a fan-shaped valve in right ventricular outflow tract reconstruction

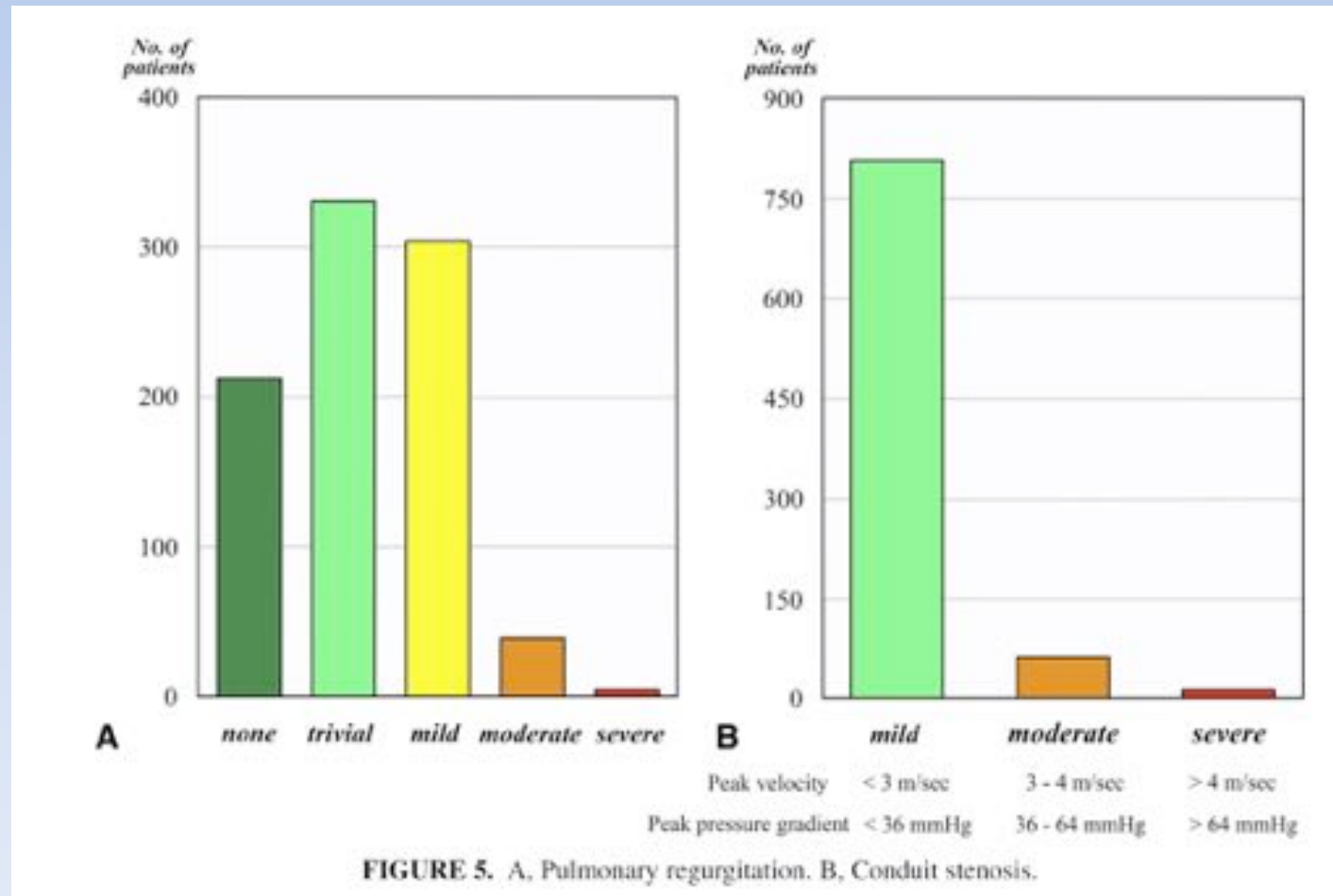
Takako Miyazaki, MD, PhD,^a Masaaki Yamagishi, MD, PhD,^a Yoshinobu Maeda, MD,^a Satoshi Taniguchi, MD,^a Shuhei Fujita, MD,^a Hisayuki Hongu, MD,^a and Hitoshi Yaku, MD, PhD^b

Tube valvé de Kyoto

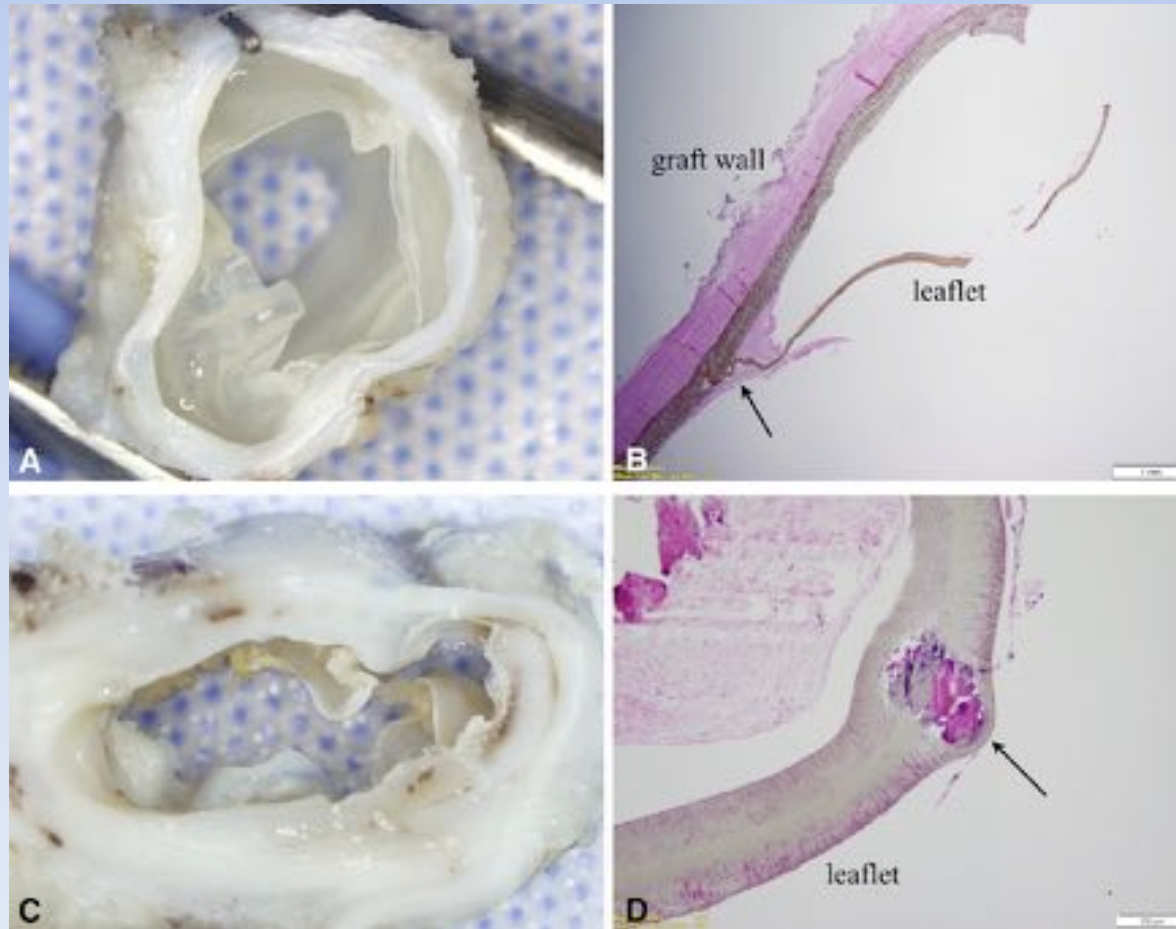


Kaplan-Meier freedom from conduit exchange

Sténose et valve pulmonaire



Dégradation = calcifications



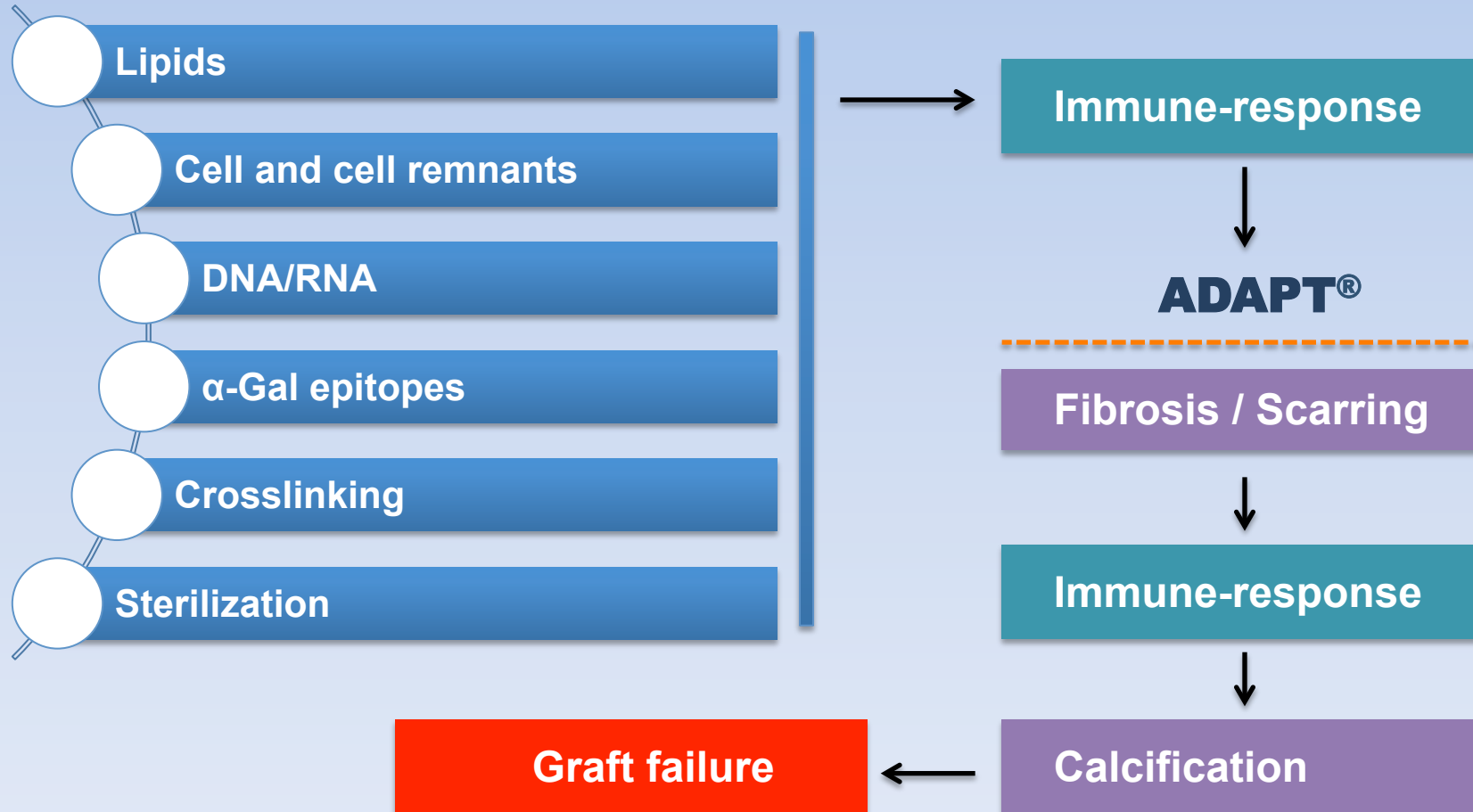
Un paradoxe certain...



Prendre une part de cela....

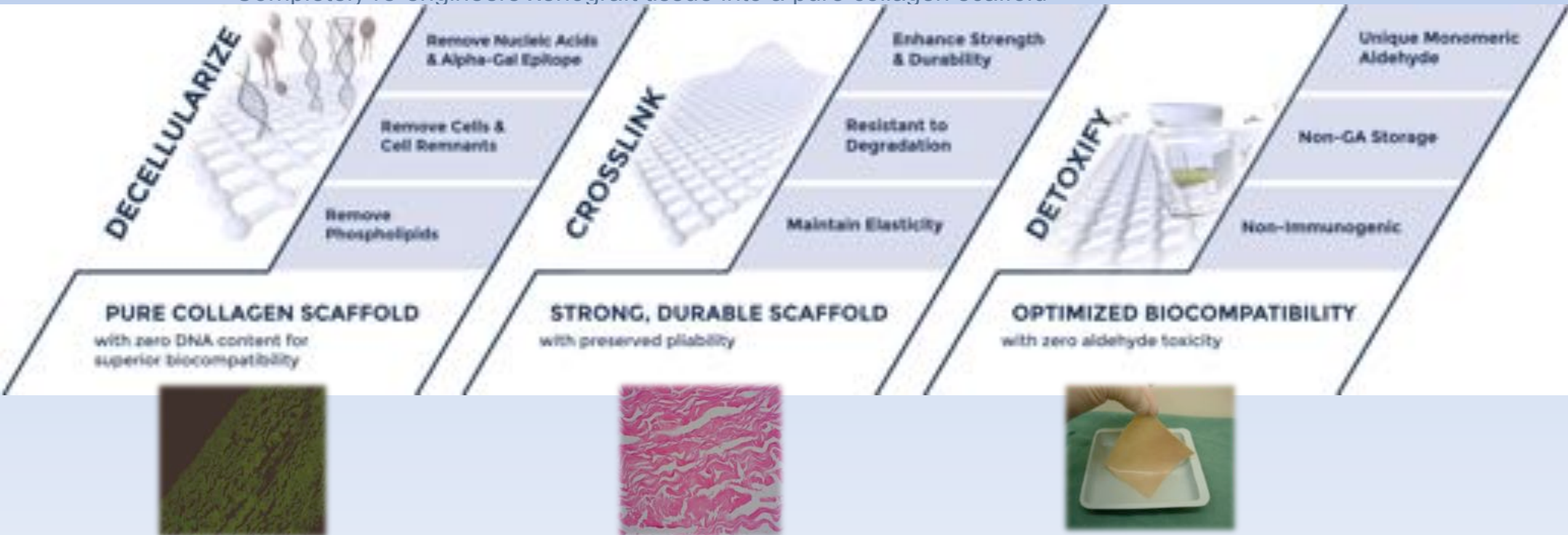
Pour résoudre cela...

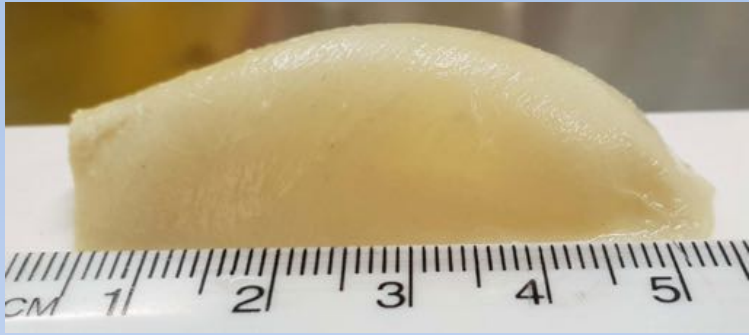
ADAPT[®] VALIDATION DESIGN



■ ADAPT[®] Technology

Completely re-engineers xenograft tissue into a pure collagen scaffold





CardioCel 3D RVOT Hood



CardioCel 3D Arch



CardioCel 3D Conduit

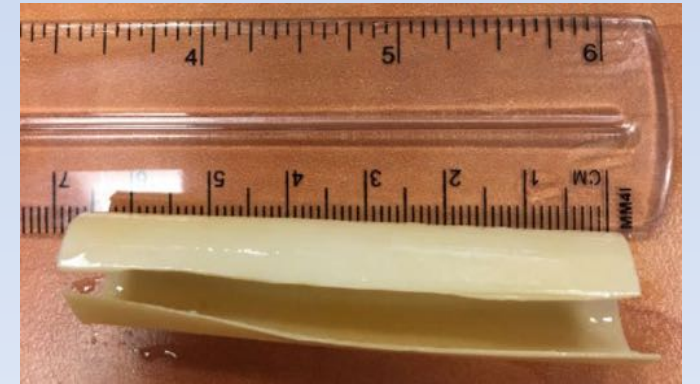


Single piece Aortic Valve



CardioCel Ao Leaflet

Confidential - Admedus

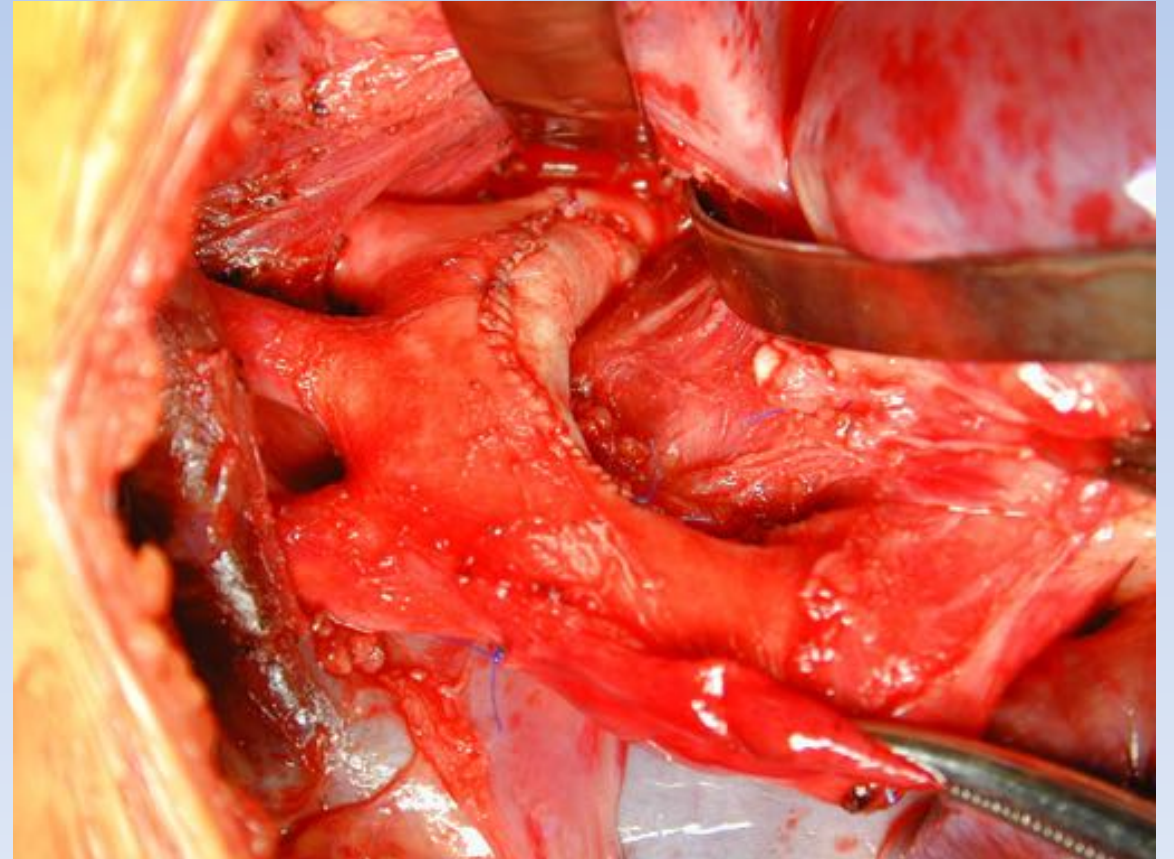
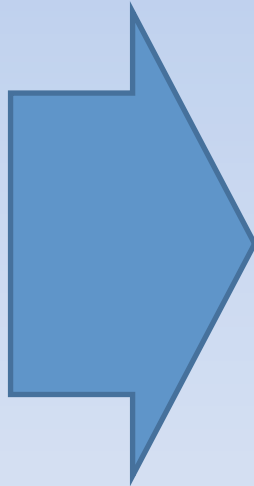


CardioCel 3D Conduit

Arch Repair



CardioCel 3D Arch (CE Mark)



Courtesy : Prof. Ch. Brizard, 2019

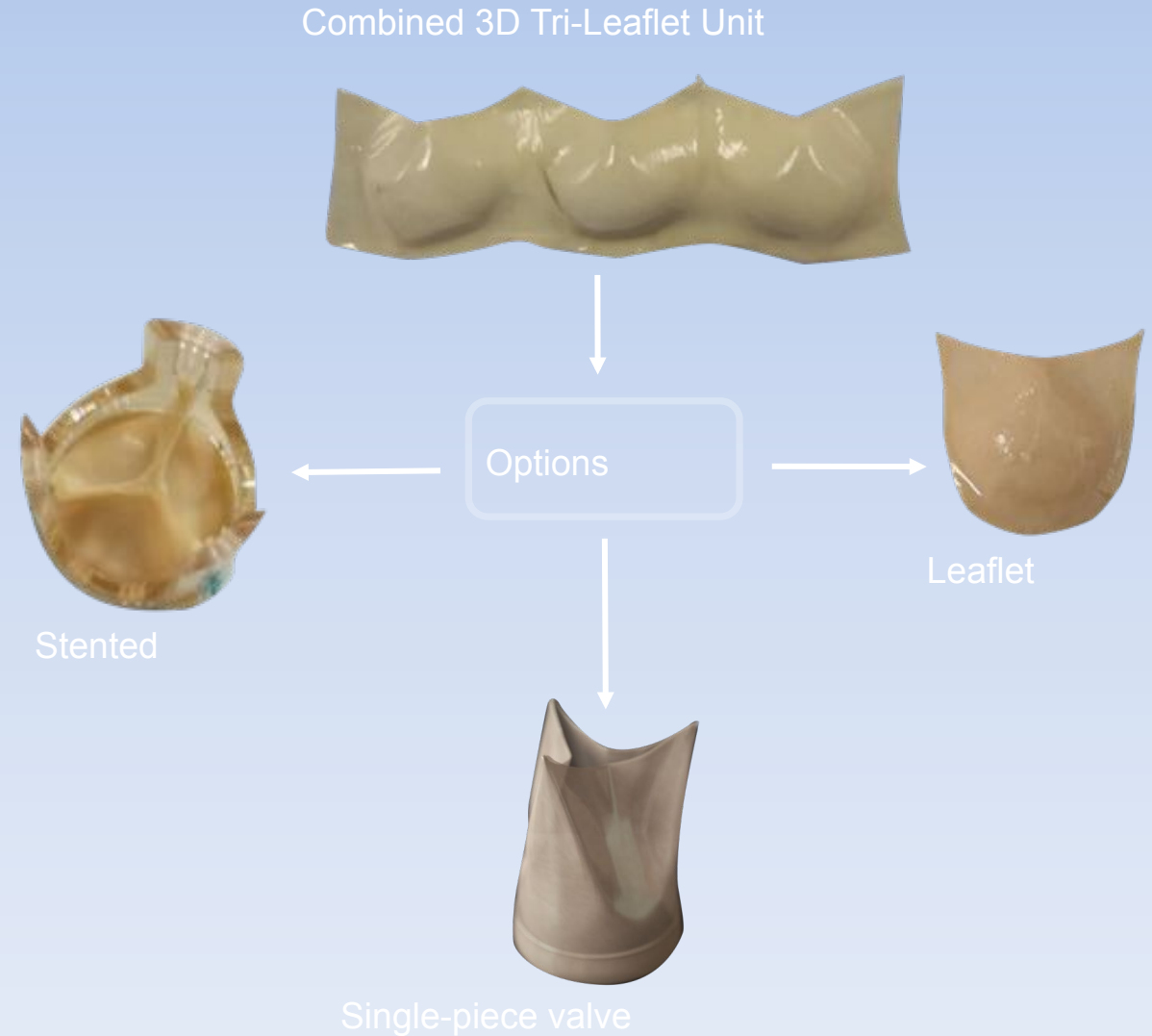
■ Anatomically Correct Design

Single-piece 3D-formed valve design

Anatomically correct design results in better leaflet performance

35% reduction in leaflet stress *

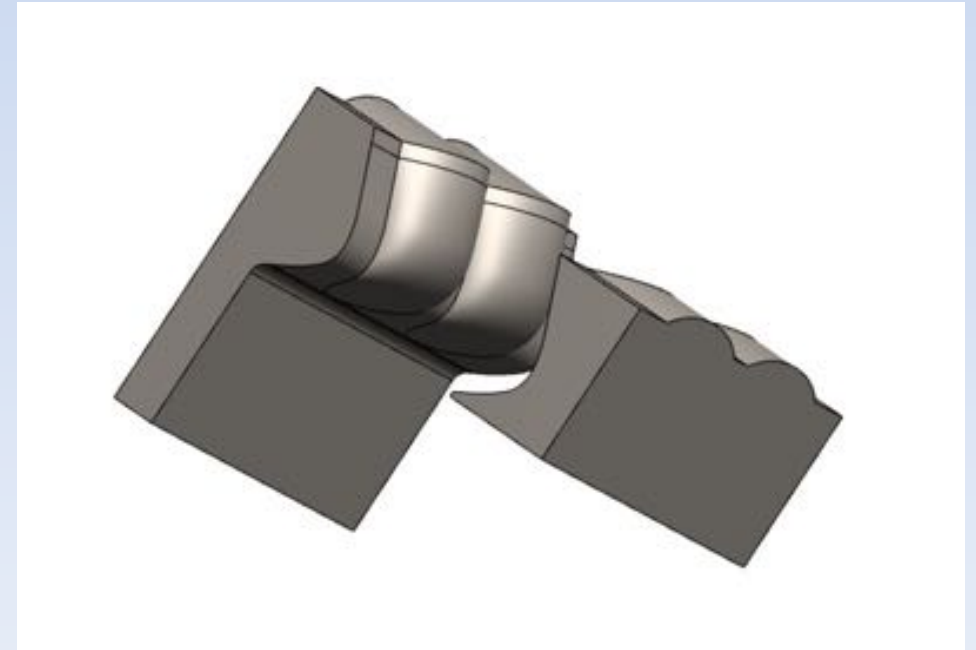
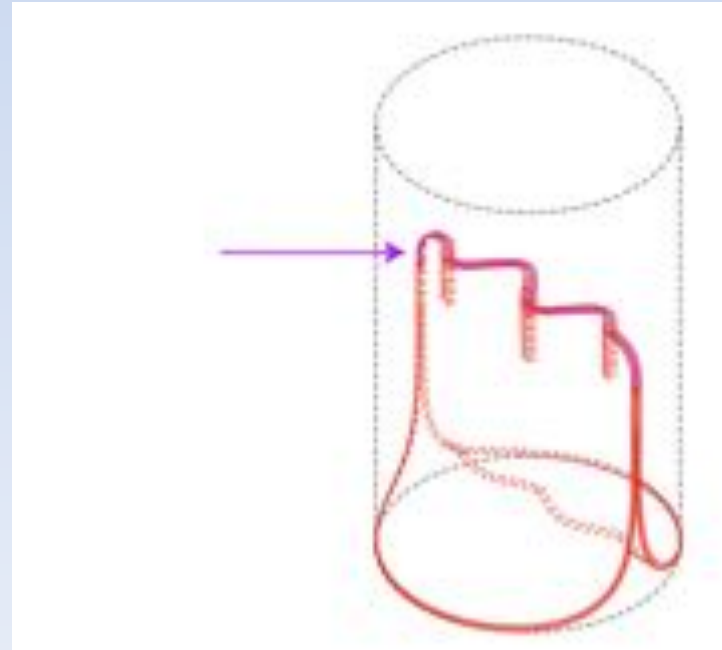
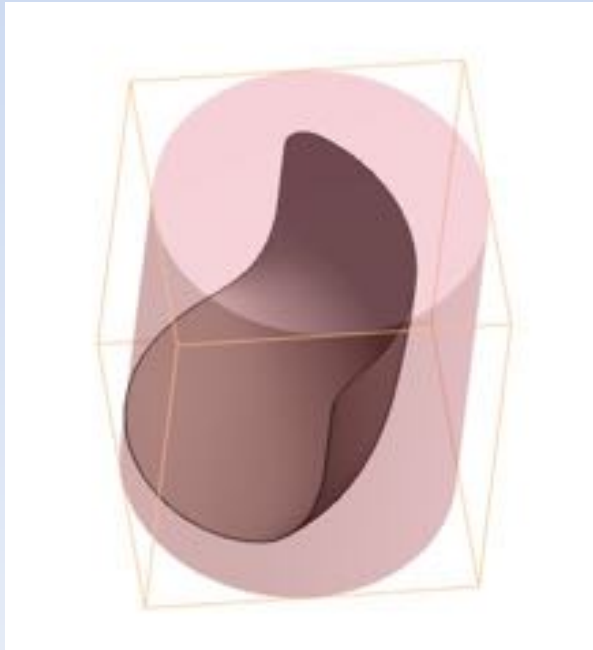
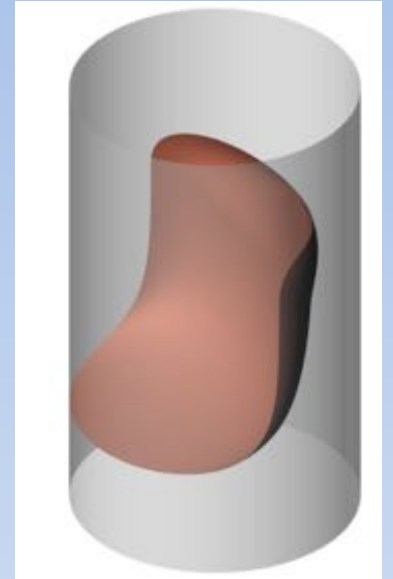
185% increase in leaflet closing contact area *



* Lim KH, Candra J, Yeo JH, Duran CM. Flat or curved pericardial aortic valve cusps: a finite element study. J Heart Valve Dis. 2004 Sep;13(5):792-7.

CREATION D'UNE VALVE AORTIQUE POUR NOUVEAU NE

- Bicuspédie
- Petits diamètres
- Absence d'anticoagulant
- Durabilité > 2 ans

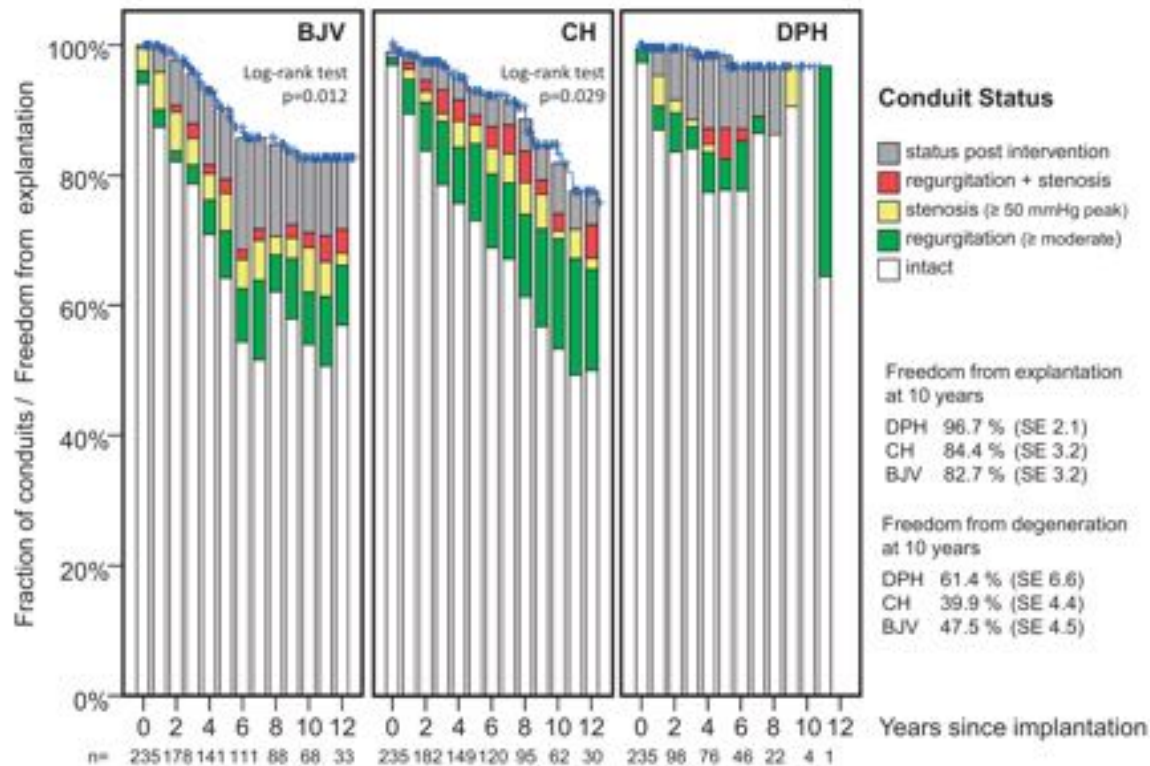


A European study on decellularized homografts for pulmonary valve replacement: initial results from the prospective ESPOIR Trial and ESPOIR Registry data†

Dietmar Boethig^{a,†}, Alexander Horke^{a,†}, Mark Hazekamp^b, Bart Meyns^c, Filip Rega^c, Joeri Van Puyvelde^c, Michael Hübler^d, Martin Schmiady^d, Anatol Ciubotaru^e, Giovanni Stellin^f, Massimo Padalino^f, Viktor Tsang^g, Ramadan Jashari^h, Dmitry Bobylev^a, Igor Tudorache^a, Serghei Cebotari^a, Axel Haverich^a and Samir Sarikouch^{a,*}

6

D. Boethig et al. / European Journal of Cardio-Thoracic Surgery



Janvier 2019

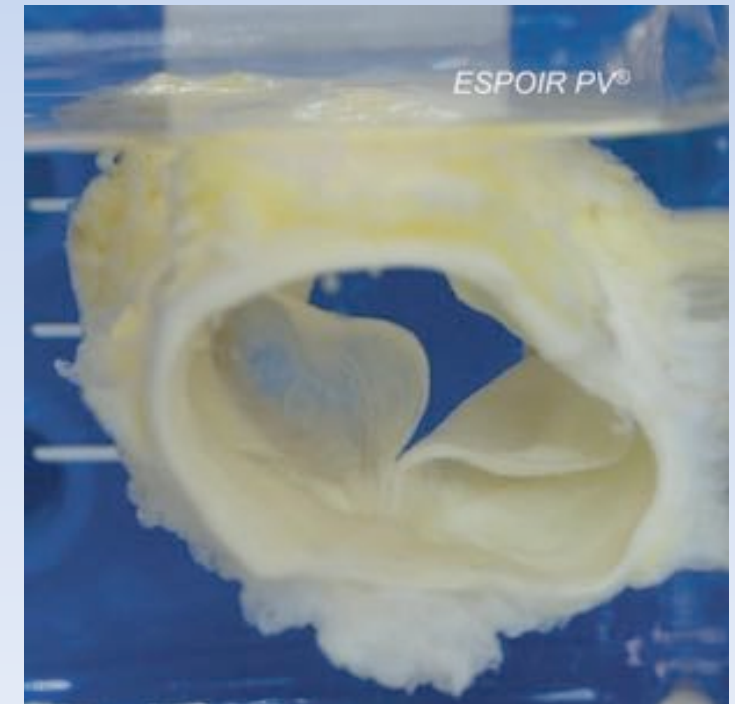
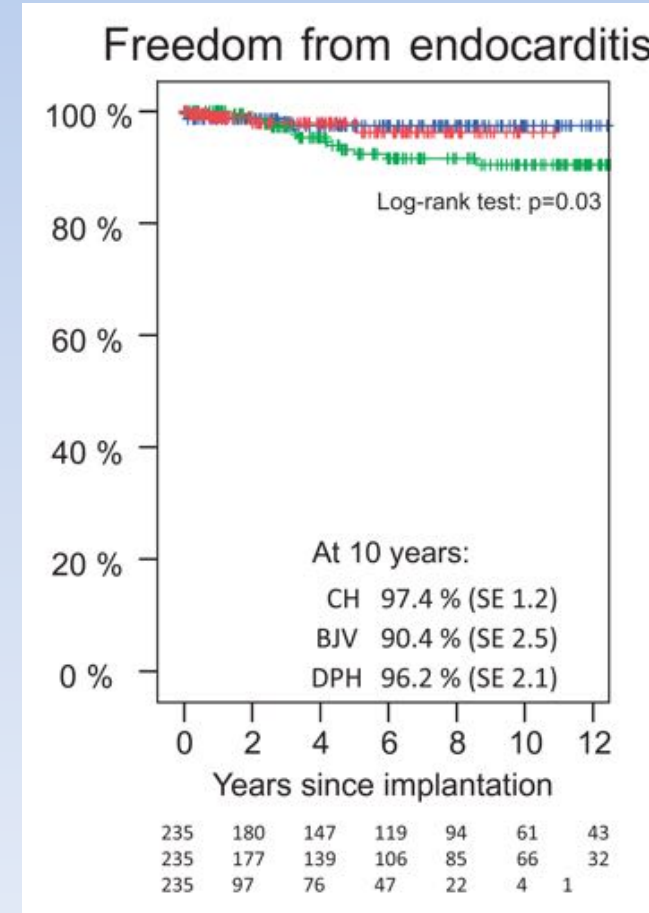
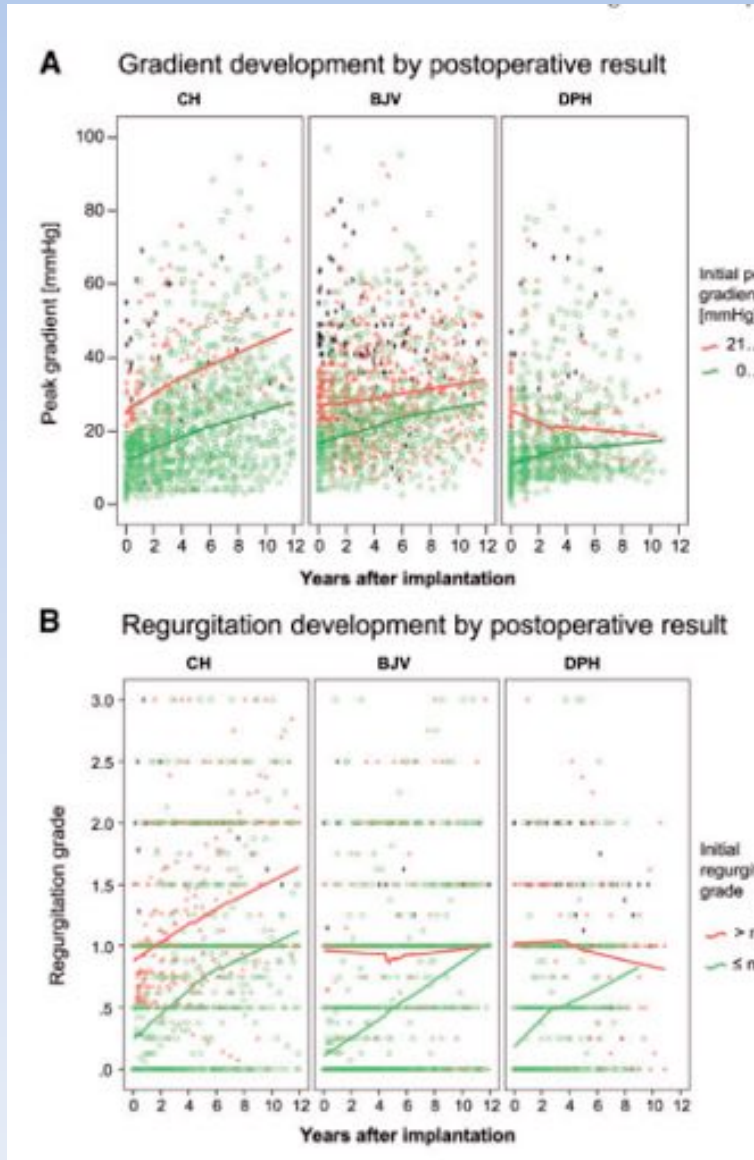


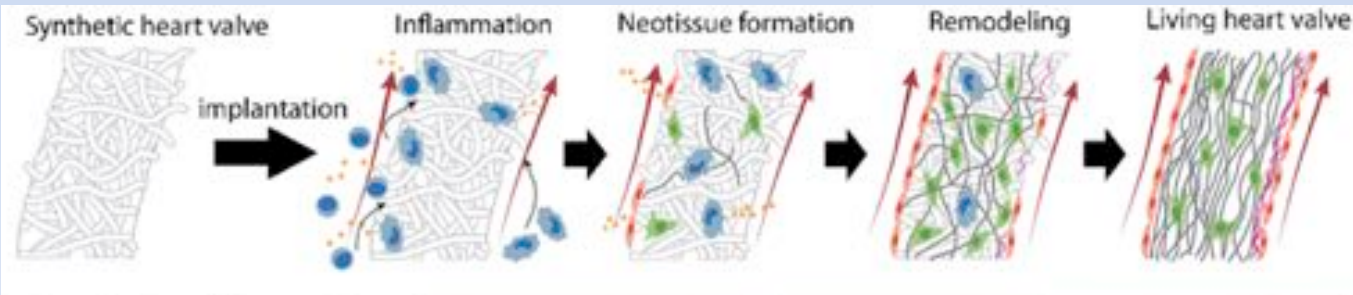
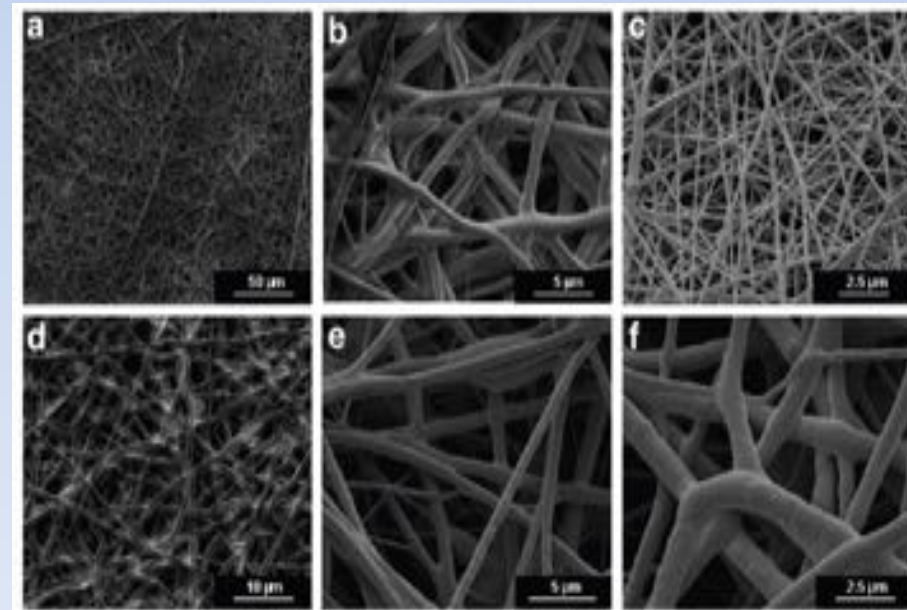
Figure 4: Freedom from explantation and functional conduit status for DPH, CH and BJV cohorts. Log-rank test results for freedom of explantation comparisons are provided within Table 2. BJV: bovine jugular vein conduits; CH: cryopreserved conventional homografts; DPH: decellularized pulr

Homogrefe Décellularisée: Peu de sténose, peu de fuite



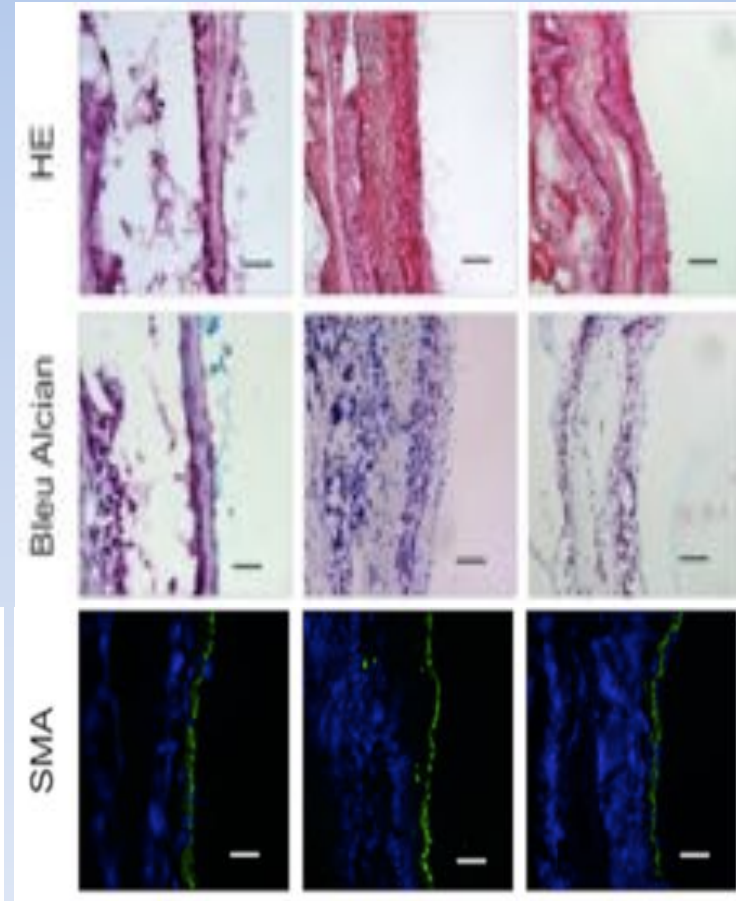
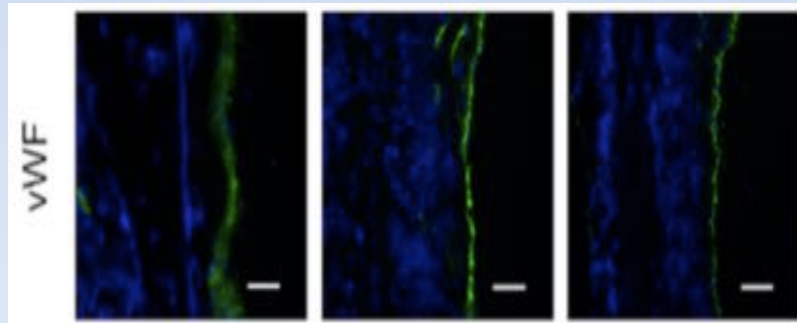
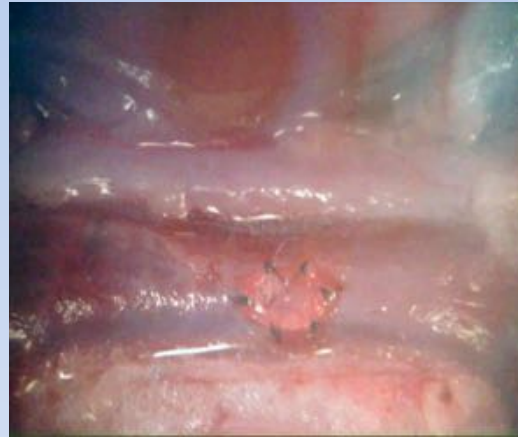
Biomatériaux Résorbables

- Which polymer(s) is(are) available ?
- Medical grade ?
- Can we produce patches ? Tubes ? Valved tubes ?
- Mechanical properties ?
- Biological properties ?



AIM #1 : Bioabsorbable biomaterial

- Biological properties ? -> *In vivo* screening
- > 300 animals

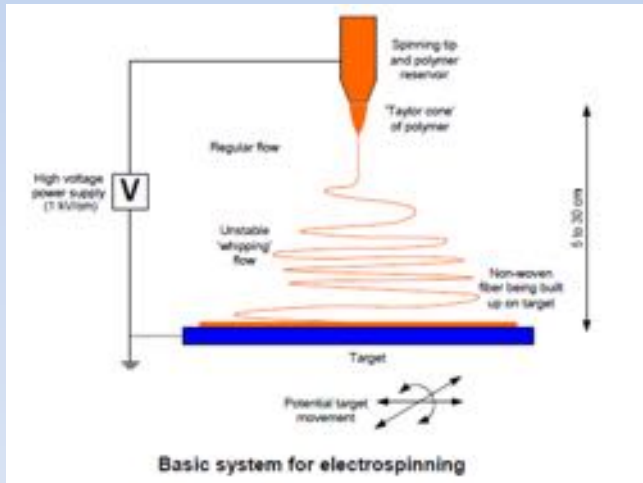


This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 604049. Copyright © 2014 TEH-TUBE Consortium - All rights reserved



Bioabsorbable biomaterial

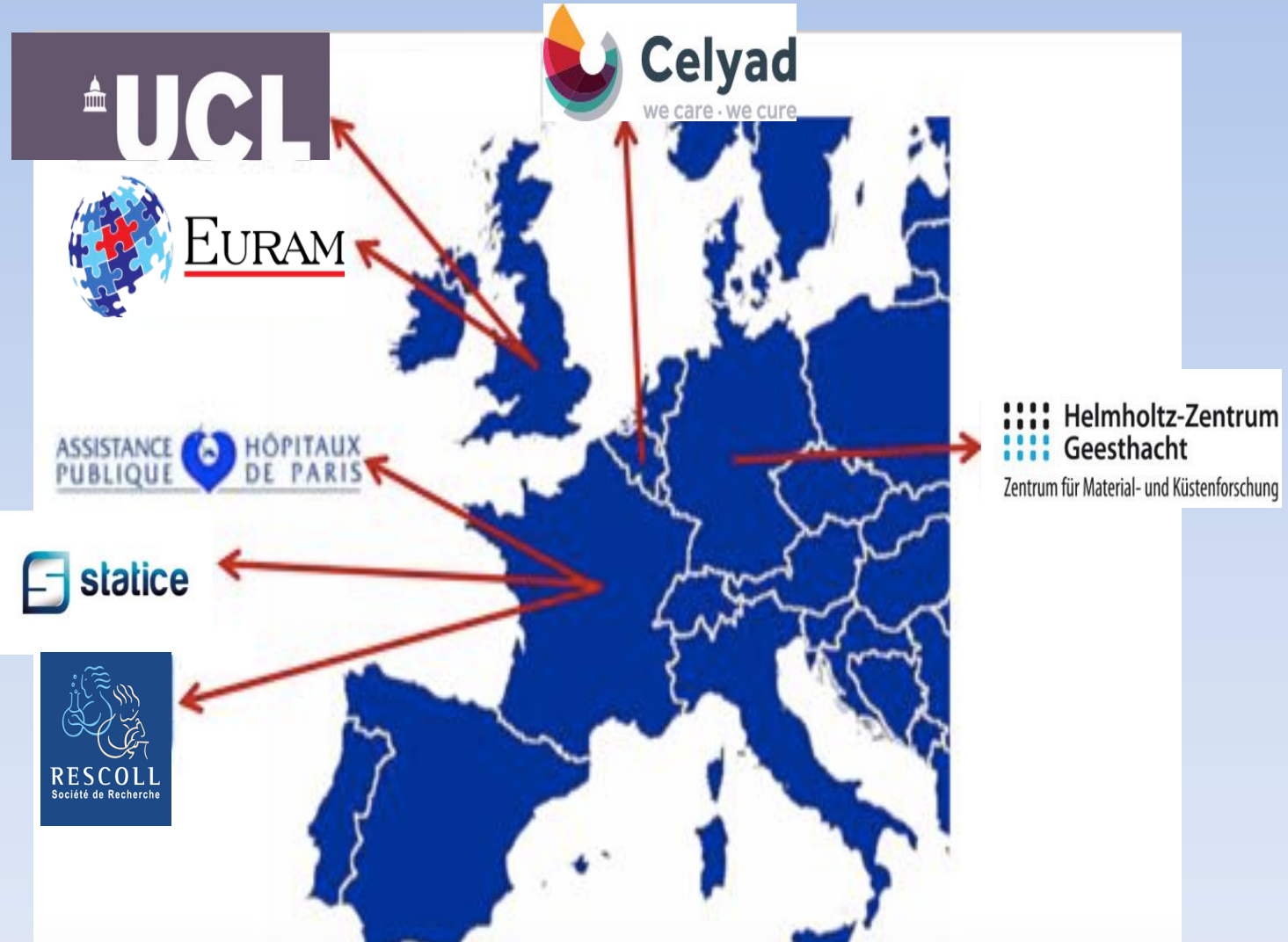
- Some polymers can be electrospun



This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 604049. Copyright © 2014 TEH-TUBE Consortium - All rights reserved



EUROPEAN PARTNERS



In situ heart valve tissue engineering using a bioresorbable elastomeric implant – From material design to 12 months follow-up in sheep

Biomaterials 2017

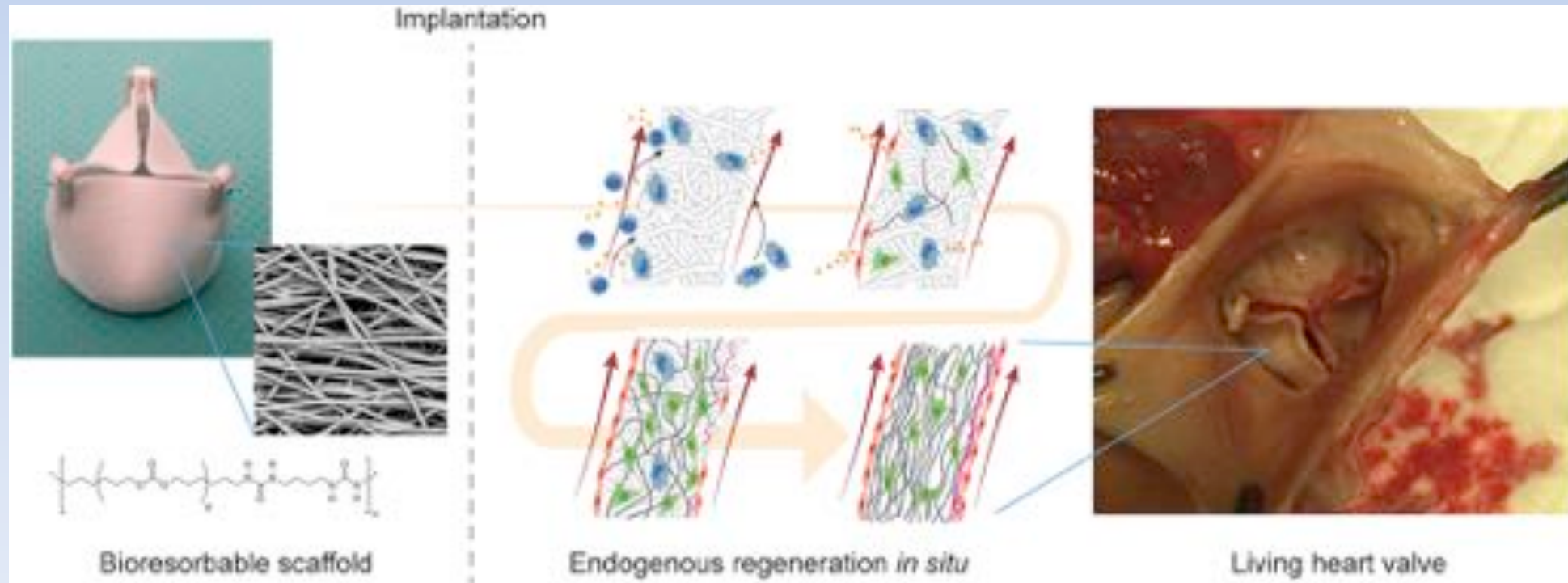


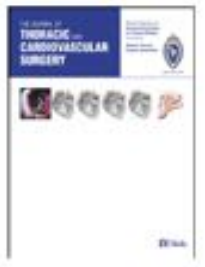


image.jfif

XELTIS

Total Cavo-Pulmonary Connection with a New Bio-Absorbable Vascular Graft First Clinical Experience

Leo A. Bockeria, MD, Oleg Svanidze, MD, Alex Kim, MD, Konstantin Shatalov, MD, Vladimir Makarenko, MD, Martijn Cox, PhD, Thierry Carrel, MD

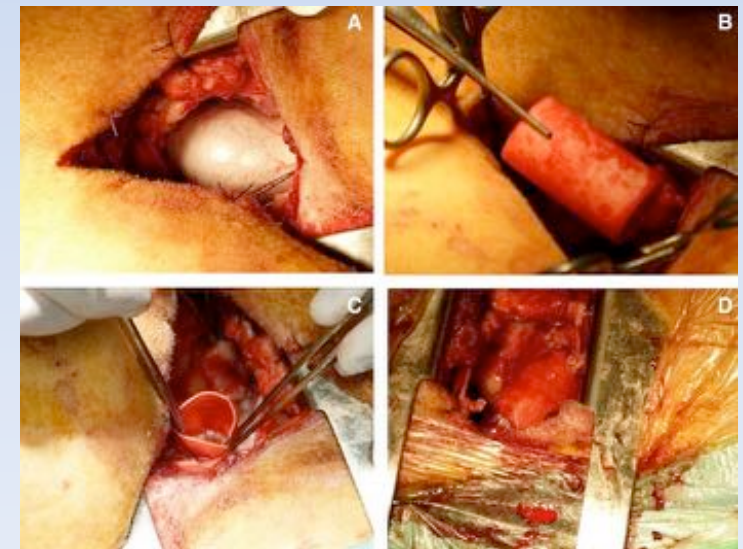


Original Article

Morphology and mechanisms of a novel absorbable polymeric conduit in the pulmonary circulation of sheep[☆]

Marieke Brugmans^a, Aurélie Serrero^a, Martijn Cox^a, Oleg Svanidze^b, Frederick J. Schoen^{c,*}

^a Xeltis BV, De Lismortel 31, 5612AR, Eindhoven, The Netherlands
^b Xeltis AG, Muhlebachstrasse 28, Zurich, Switzerland
^c Department of Pathology, Brigham and Women's Hospital and Harvard Medical School, 75 Francis Street, Boston, MA, USA

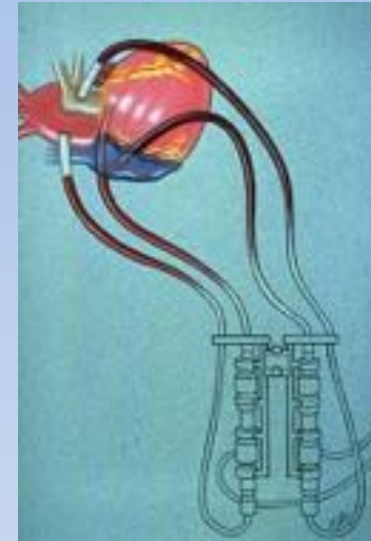


INNOVATIONS TECHNOLOGIQUES

ASSISTANCES CIRCULATOIRES

CHIRURGIE ROBOTIQUE

ASSISTANCE VENTRICULAIRE



Développés pour assistance gauche =>
Pas de sites de canulation adaptés
DCPT: Précharge élevée et post charge basse: dysfonction

Pompes micro-axiales

Haggerty (Boston), JTCS 2012

Impella Abiomed, assistance gauche et droite

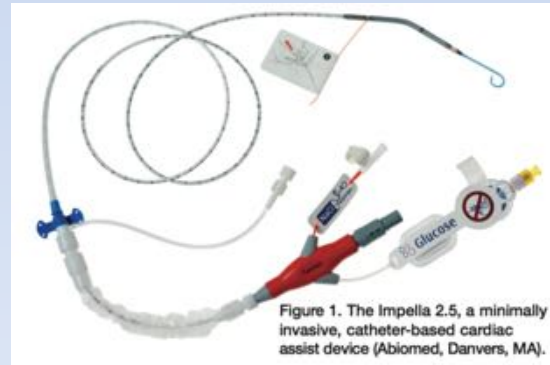
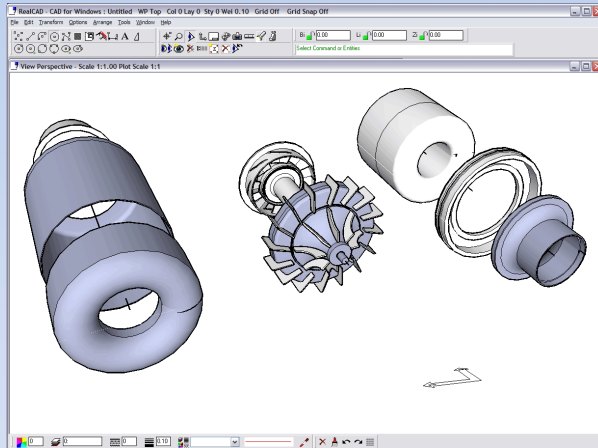
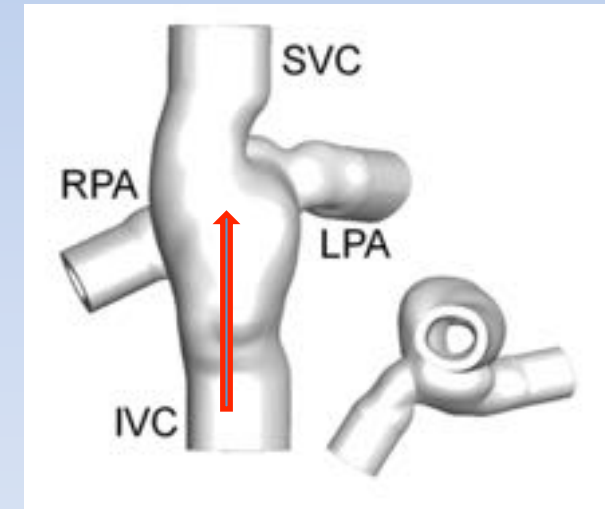


Figure 1. The Impella 2.5, a minimally invasive, catheter-based cardiac assist device (Abiomed, Danvers, MA).



- Attention à l'augmentation de la pression cave sup
- Recirculation très importante => énergie consommée ++
- Pas de diminution significative des pressions cave inf

PROBLEMATIQUE

Coût des investissements

Qualité des développeurs

CHIRURGIE ROBOTIQUE



CHIRURGIE ROBOTIQUE



Problématique:

Efficienc e coût
des soins

Intérêt du
malade

LES OBSTACLES A L'INNOVATION – AU PROGRES



LES PREVISIONS SONT DIFFICILES,
SURTOUT LORSQU'ELLES CONCERNENT
L'AVENIR

Pierre DAC