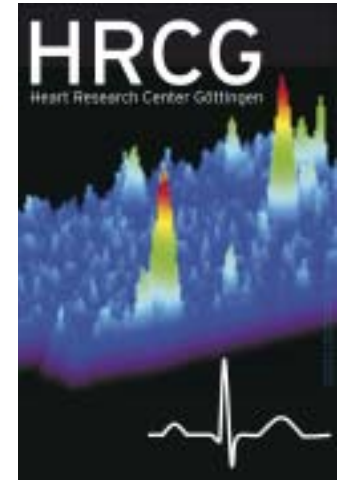




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GÖTTINGEN

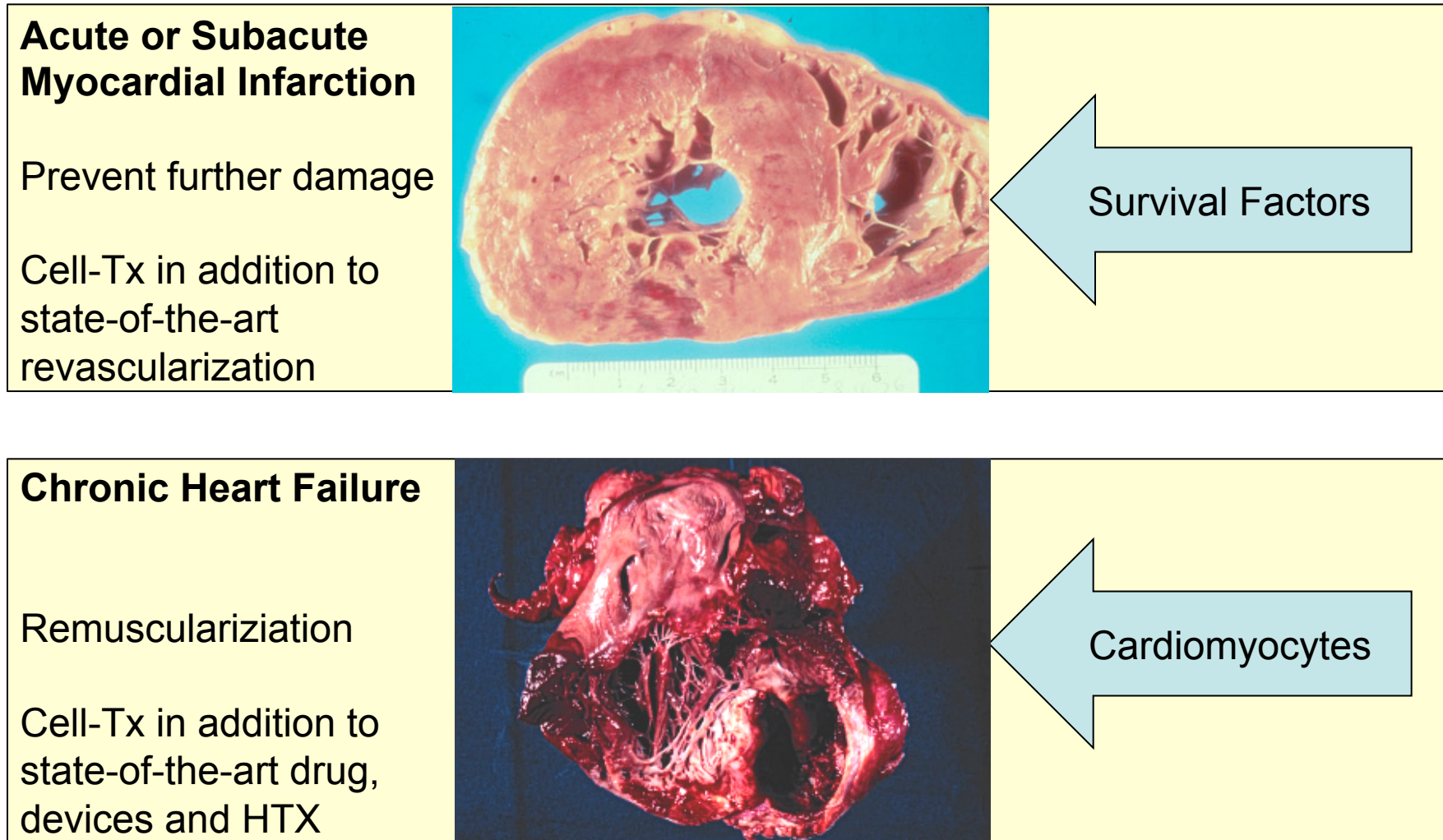


Pluripotent Stem Cells in Chronic Heart Failure Repair

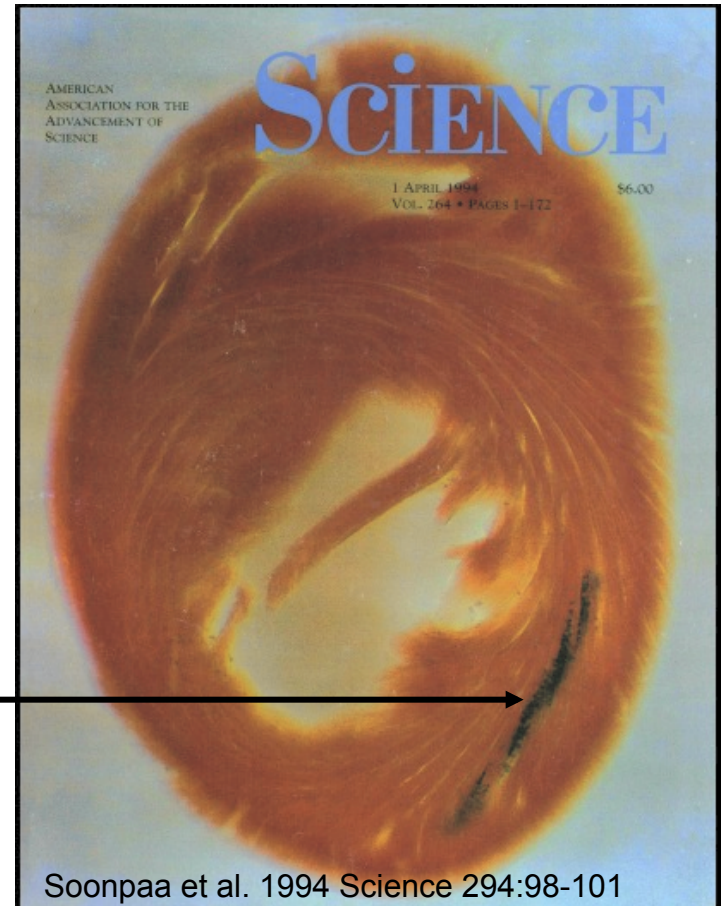
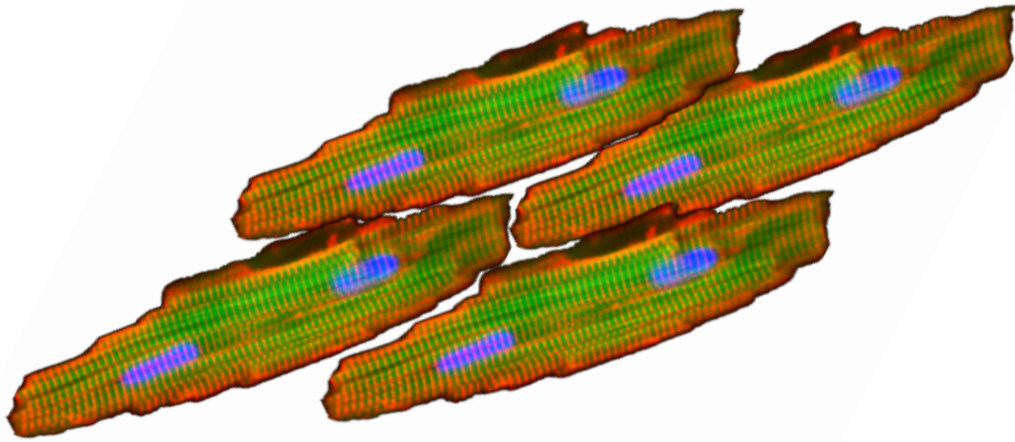
Wolfram-H. Zimmermann

Department of Pharmacology
Heart Research Center Göttingen
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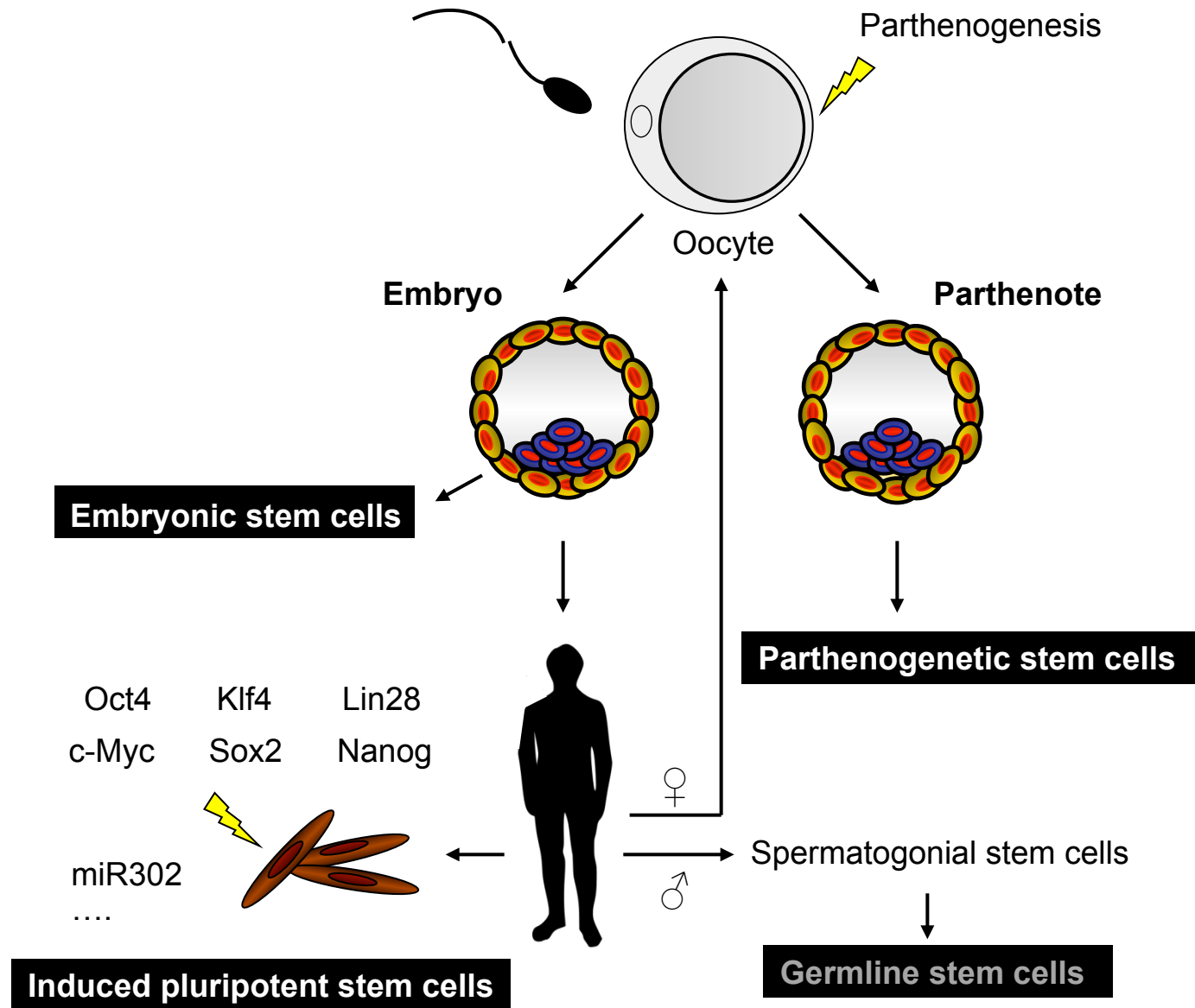
Clinical Scenario and Mechanism of Action of Cells



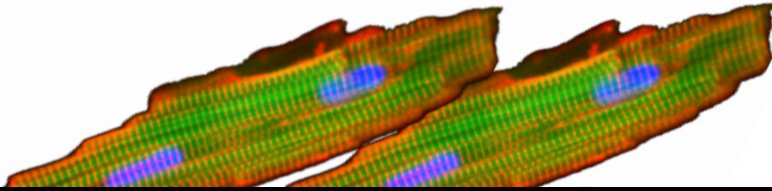
Remuscularizing the Failing Heart



Pluripotent Stem Cells for Heart Repair



Remuscularizing the Failing Heart



Myocardial Infarction → † 1.000.000.000 myocytes

Intramyocardial cell injection → >95% of the cells are lost

Calculated Therapeutic Cell Dose → 20.000.000.000 myocytes

Total myocyte number of the heart → ~4.000.000.000

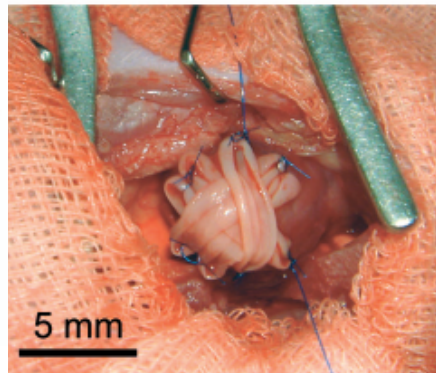
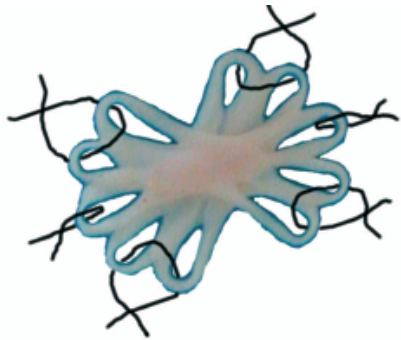
Tissue Engineering-based Heart Repair

Post MI

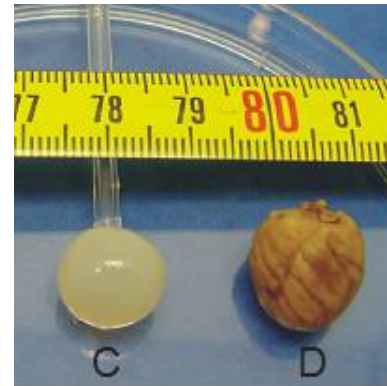
CHF



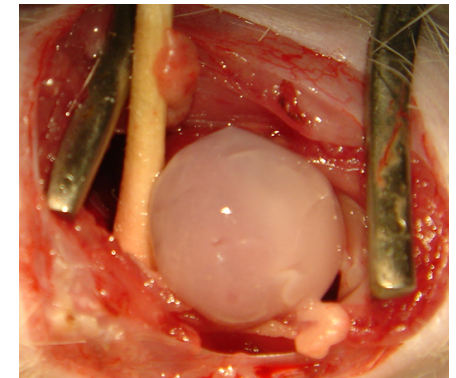
DCM



a) Multi-loop engineered heart tissue

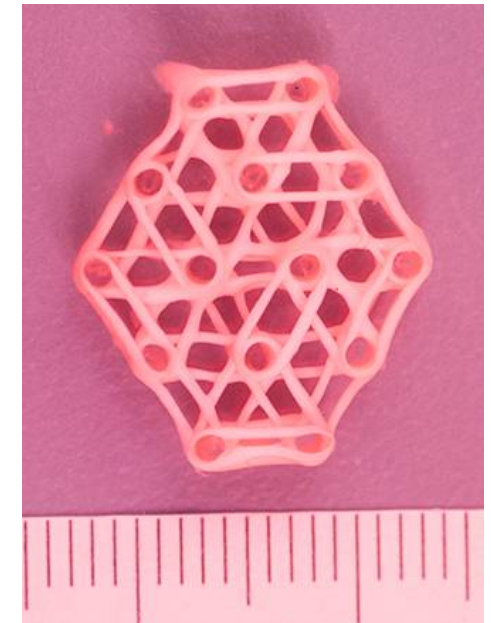
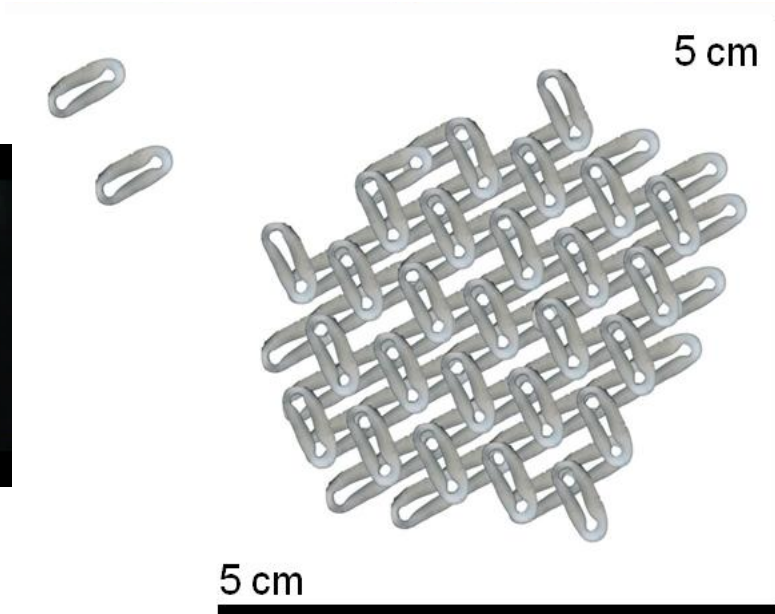


b) BioVAD™ i.e. biological ventricular assist device



Engineered Heart Muscle - Adaptable Design

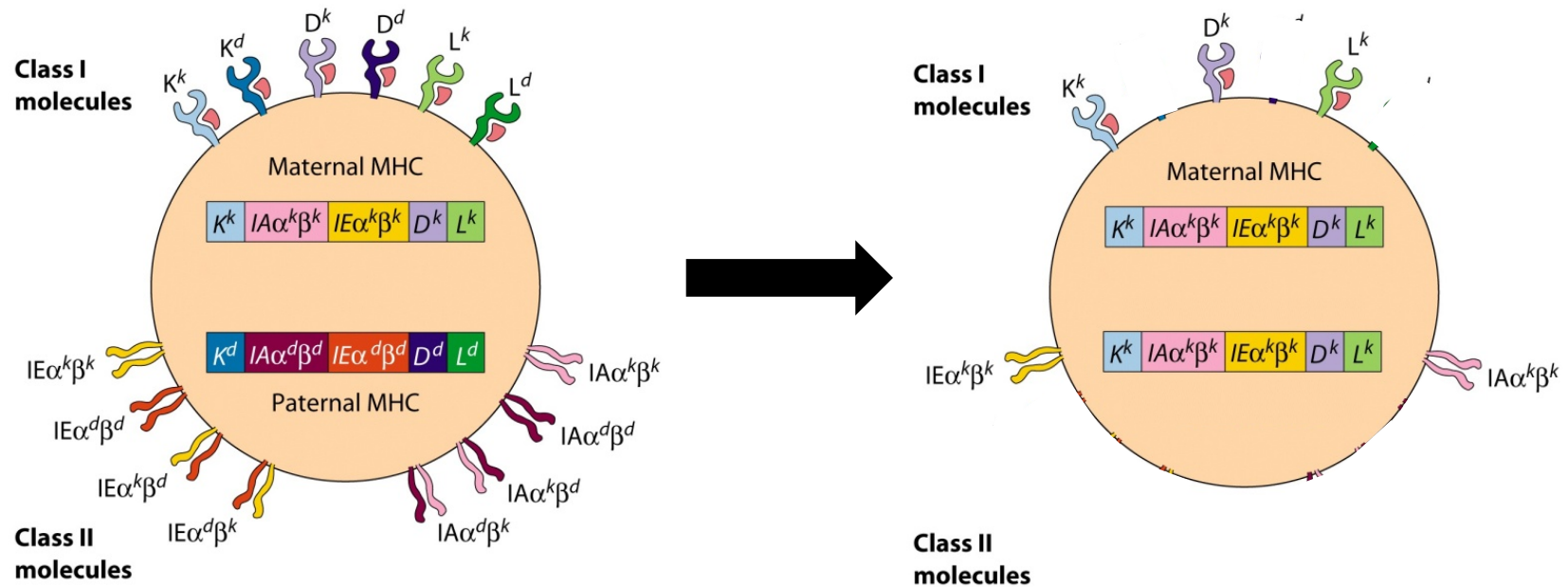
Zimmermann et al. 2002 Circulation
Naito et al 2006 Circulation
Soong et al. 2012 CPCB



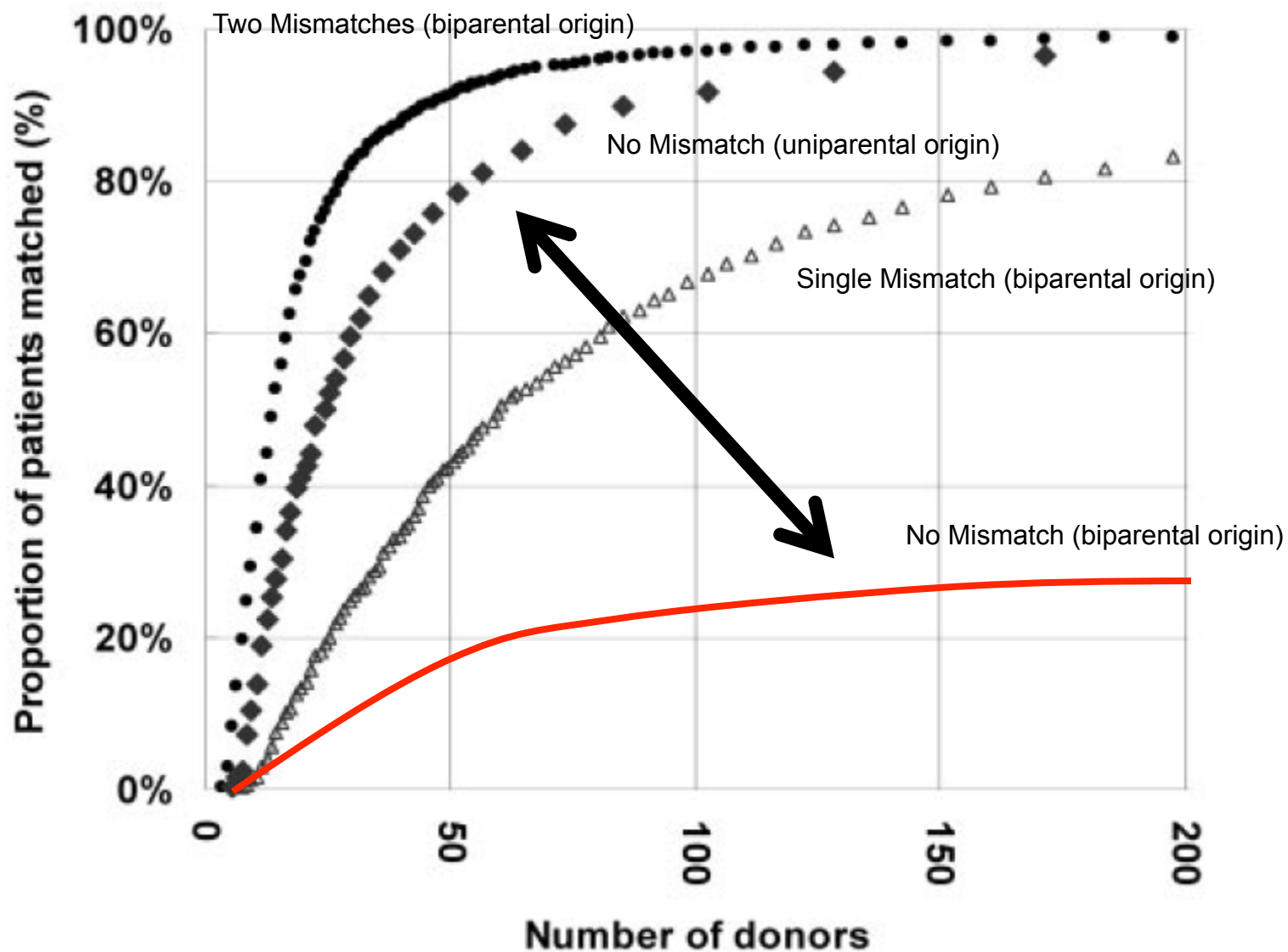
Tiburcy, Soong et al. unpublished

- (1) Force of contraction: >0.3 mN
- (2) Elastic modulus: >20 kPa
- (3) Anisotropic spread of excitation: >0.1 m/sec
- (4) Defined cell composition: 30-60% cardiomyocytes, 40-60% meso. non-myocytes
- (5) Negative for Oct4 cells

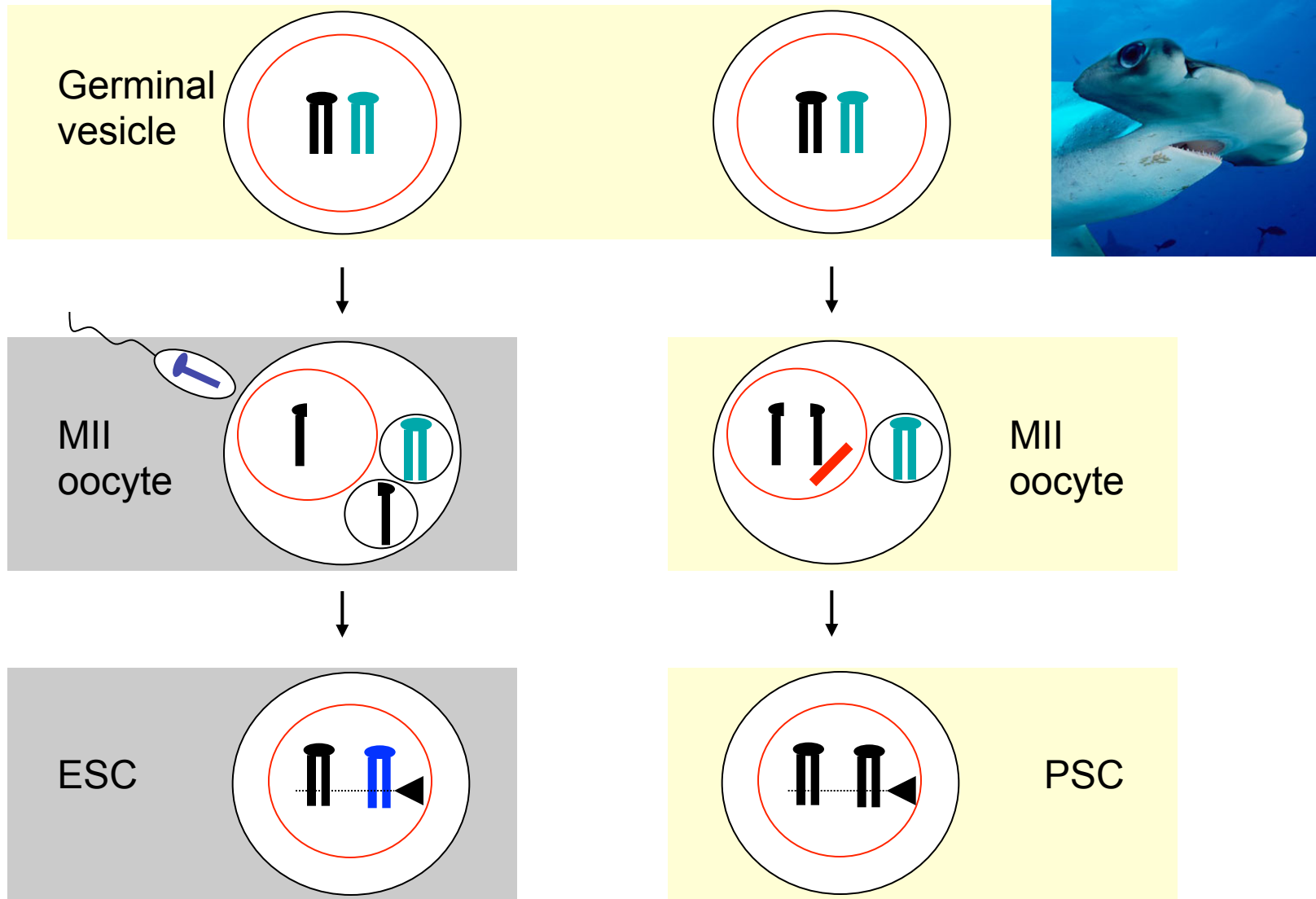
Reducing Immunological Complexity



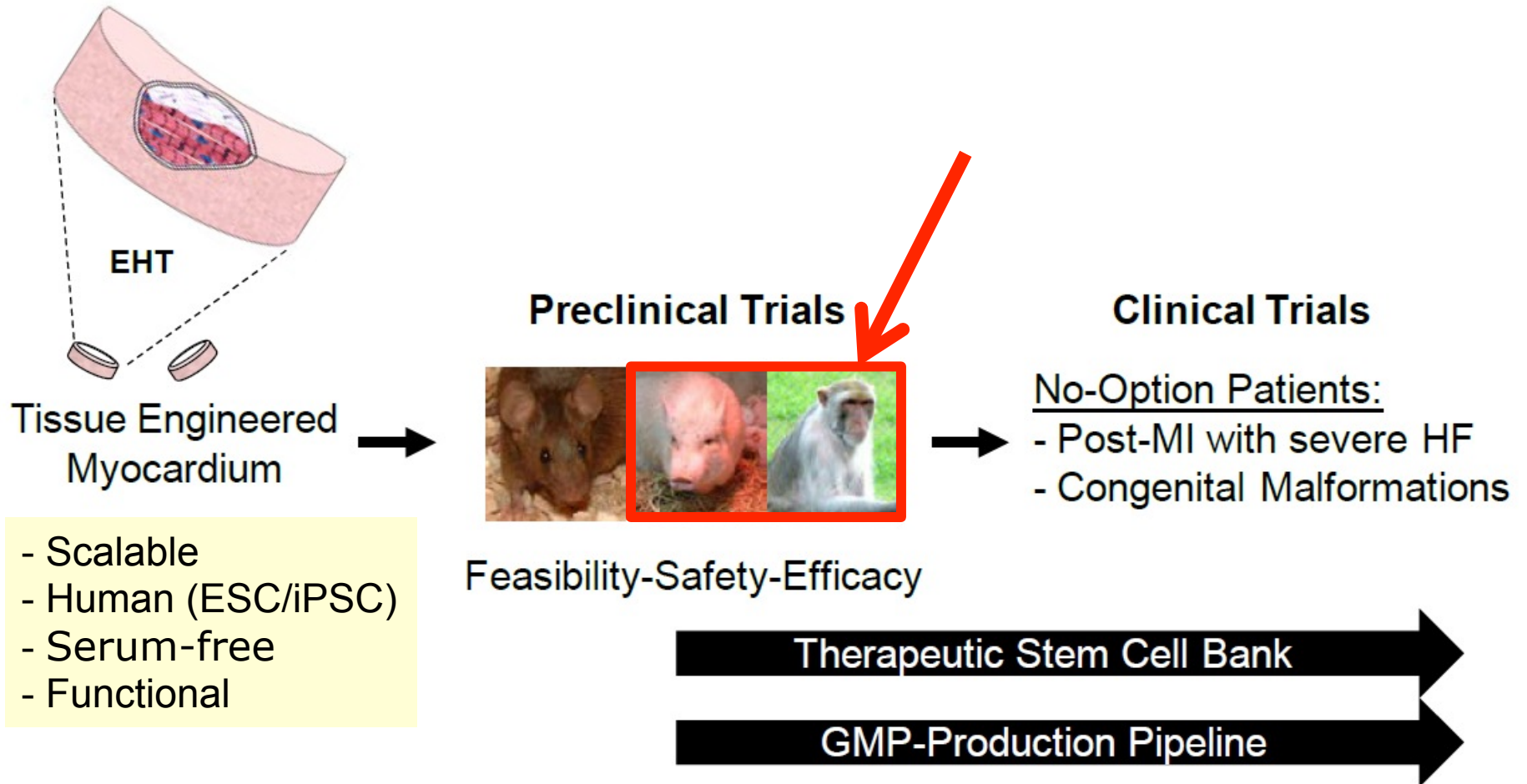
Finding Immunologically Appropriate Cells



Embryogenesis and Parthenogenesis



Roadmap



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L. Couture (City of Hope)
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T. Eschenhagen (Hamburg)
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DFG

