



Remplacement œsophagien par Ingénierie Tissulaire

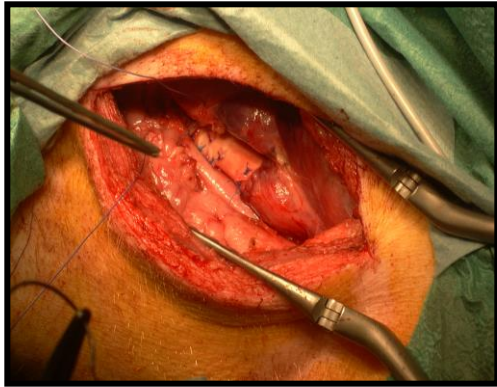


Pierre CATTAN



Esophageal replacement by allogenic aorta in a porcine model

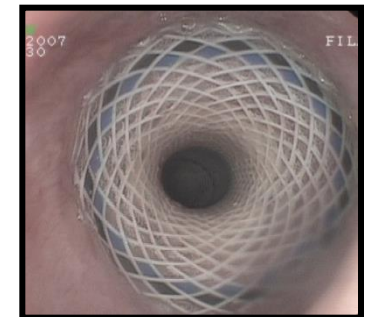
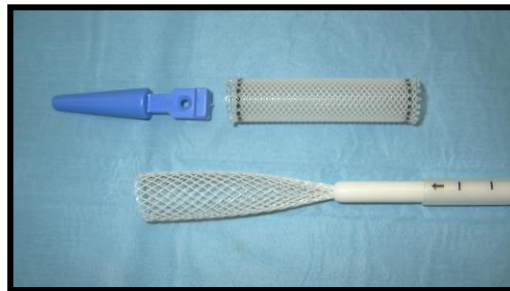
Sebastien Gaujoux, MD,^{a,f,g} Yann Le Balleur, MD,^{h,i} Patrick Bruneval, MD,^{f,j,l} Jerome Larghero, MD, PhD,^{b,c,f} Séverine Lecourt,^b Thomas Domet,^b Benoit Lambert, MD,^a Sarah Zohar, PhD,^{d,e} Frederic Prat, MD, PhD,^{h,i} and Pierre Cattan, MD, PhD,^{a,g,k} *Paris, France*



18 porcs mini-pigs
Suivi max. 12 mois
Remplacement de 4 cm d'œsophage cervical

Analyses séquentielles (3-6-9-12 mois)

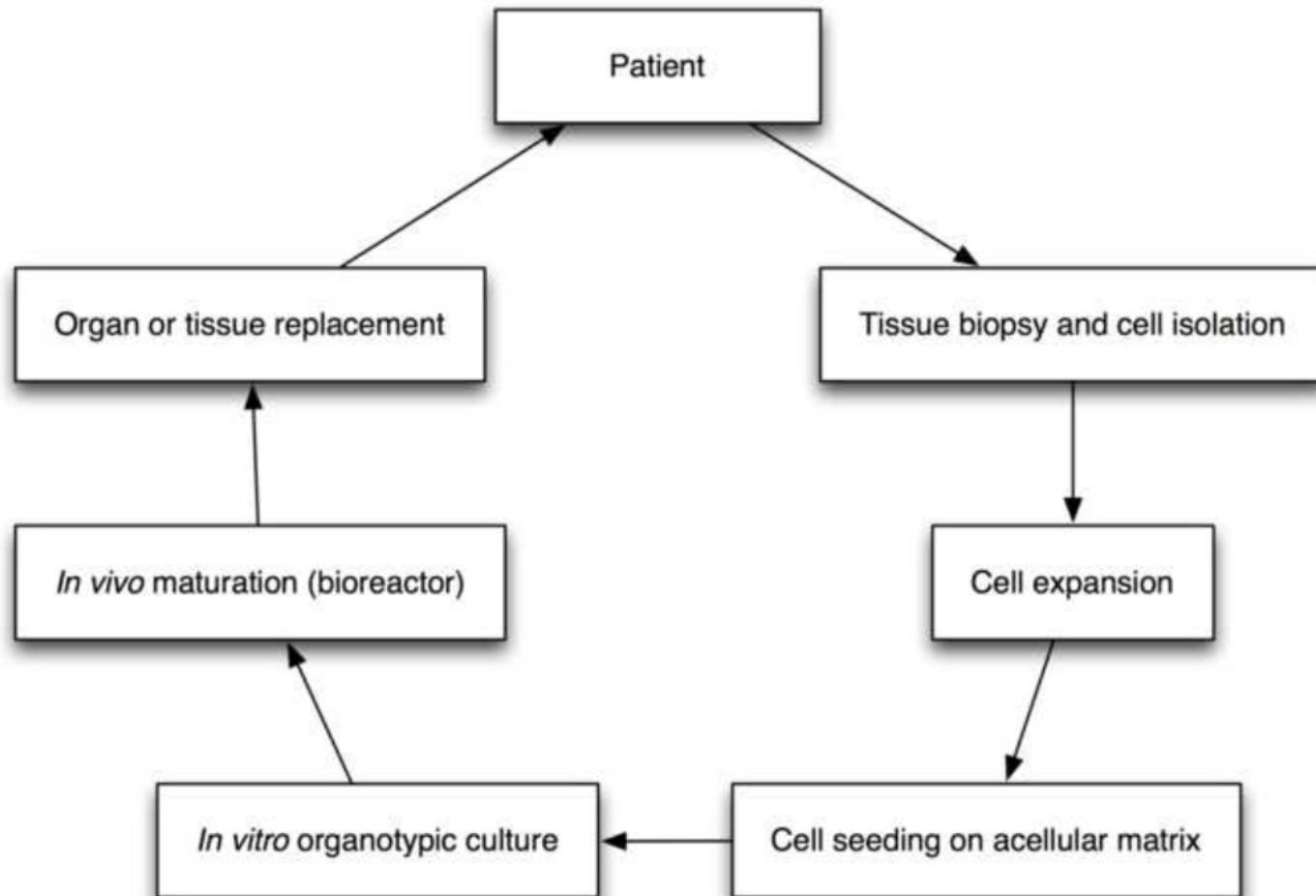
- Survie
- Complications
- Fonction
- Anatomopathologie



Bioartificial Esophagus in the Era of Tissue Engineering

Tigran Poghosyan, Sebastien Gaujoux, Rony Sfeir, Jérôme Larghero, Pierre Cattan

J Pediatr Gastroenterol Nutr 2011;52 Suppl 1:S16-7



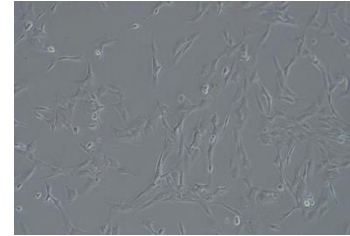
Protocole expérimental - approche hybride

1 Prélèvements

Cellules épithéliales

Cellules musculaires

Mini-pig



Expansions
cellulaires

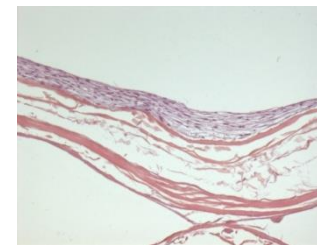
2

3

Ensemencement des matrices



MAH



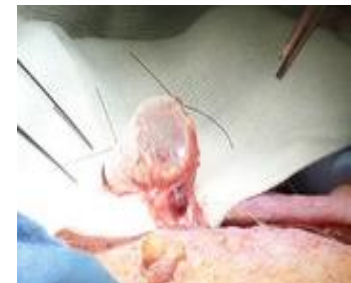
SIS

5

Auto-transplantation

Assemblage et maturation
dans un bioréacteur

4



In Vitro Development and Characterization of a Tissue-Engineered Conduit Resembling Esophageal Wall Using Human and Pig Skeletal Myoblast, Oral Epithelial Cells, and Biologic Scaffolds

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Patrick Bruneval, MD, PhD,⁴ Thomas Domet,^{1,3} Severine Lecourt, PhD,^{1,3} Mohamed Jarraya, MD,⁵
Rony Sfeir, MD,⁶ Jerome Larghero, Pharm D, PhD,^{1,3} and Pierre Cattan, MD, PhD¹⁻³

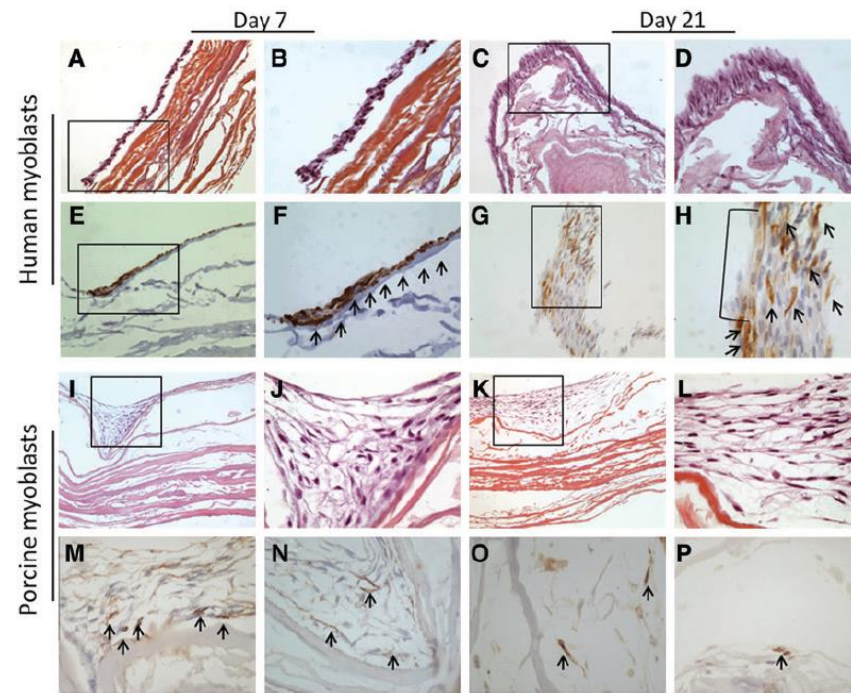


FIG. 7. Pathology analysis. (A, B) HSMs on SIS by D7 (HES $\times 20$ and $\times 40$); (C, D) HSMs on SIS by D21 (HES $\times 20$ and $\times 40$); (E, F) HSMs on SIS by D7 (Desmine staining $\times 20$ and $\times 40$); (G, H) HSMs on SIS by D21. Multinucleate myotube. (Desmine staining $\times 20$ and $\times 40$). (I, J) PSMs on SIS by D7 (HES $\times 10$ and $\times 40$); (K, L) PSMs on SIS by D21 (HES $\times 10$ and $\times 40$); (M, N) PSMs on SIS by D7 (α -smooth muscle actin[SMA] staining $\times 20$); (O, P) PSMs on SIS by D21 (α -SMA staining $\times 20$). Due to the absence of difference between two concentrations, only scaffolds seeded by 0.5×10^6 cells/cm² are shown. Color images available online at www.liebertpub.com/tea

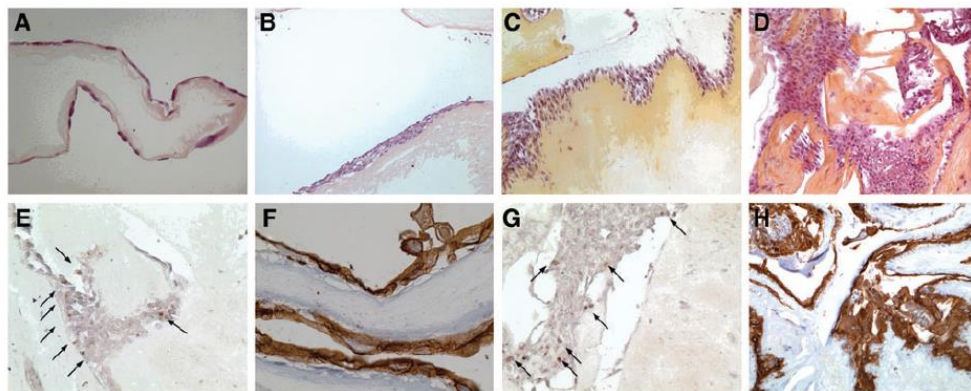


FIG. 9. Pathology analysis of porcine OEC on HAM (A) 0.5×10^6 cells/cm², D7 (HES $\times 20$); (B) 0.5×10^6 cells/cm², D14 (HES $\times 10$); (C) 10^6 cells/cm², D7 (HES $\times 10$); (D) 10^6 cells/cm², D14 (HES $\times 10$); (E) 0.5×10^6 cells/cm², D14 (Proliferating Cell Nuclear Antigen [PCNA] $\times 20$); (F) 0.5×10^6 cells/cm², D14 (pancytokeratin AE1/AE3 $\times 40$); (G) 10^6 cells/cm², D14 (PCNA $\times 20$); (H) 10^6 cells/cm², D14 (pancytokeratin AE1/AE3 $\times 5$). Color images available online at www.liebertpub.com/tea

In vivo

Experimental design

18 mini-pigs

In vitro procedure (n=12)

Group C (n=6)
Esophageal replacement
by esophageal stent

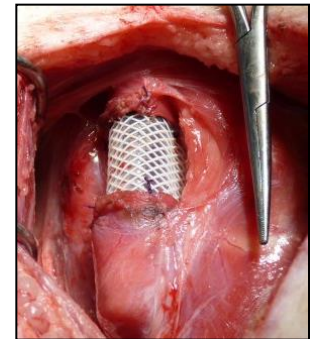
Bioreactor: substitute maturation
into omentum
(15 days)

Esophageal replacement by substitute

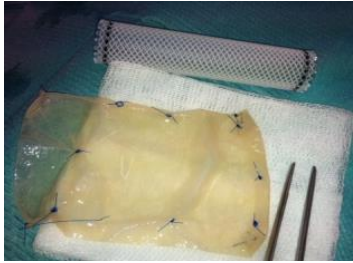
Group A (n=6)
With esophageal
stent
Per-os nutrition

Group B (n=6)
Without esophageal
stent
Nutrition by NGT

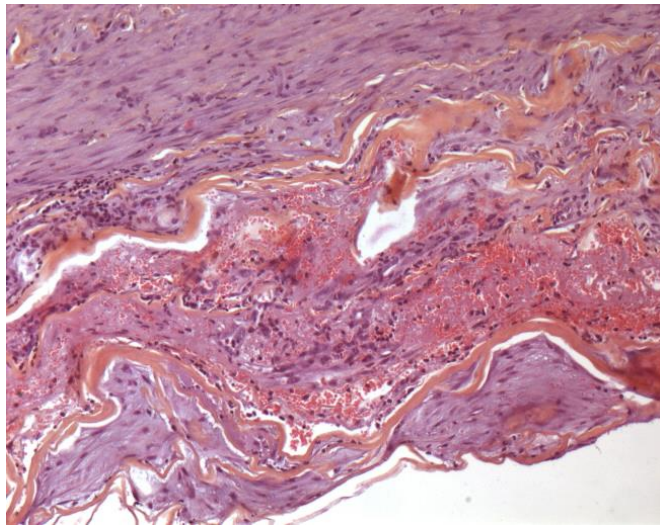
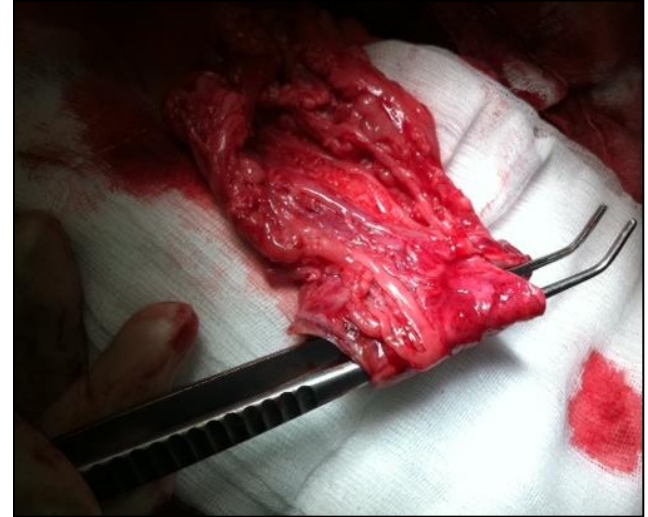
Sequential sacrifice at 3, 6 and 12
months



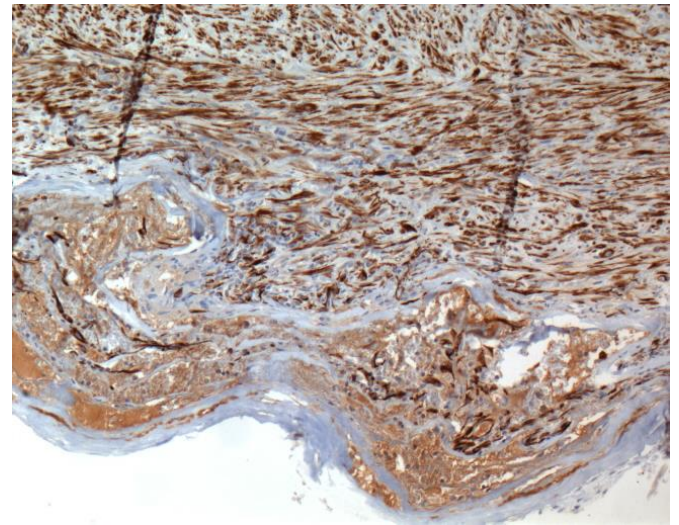
Bioreactor: substitute maturation



2 weeks



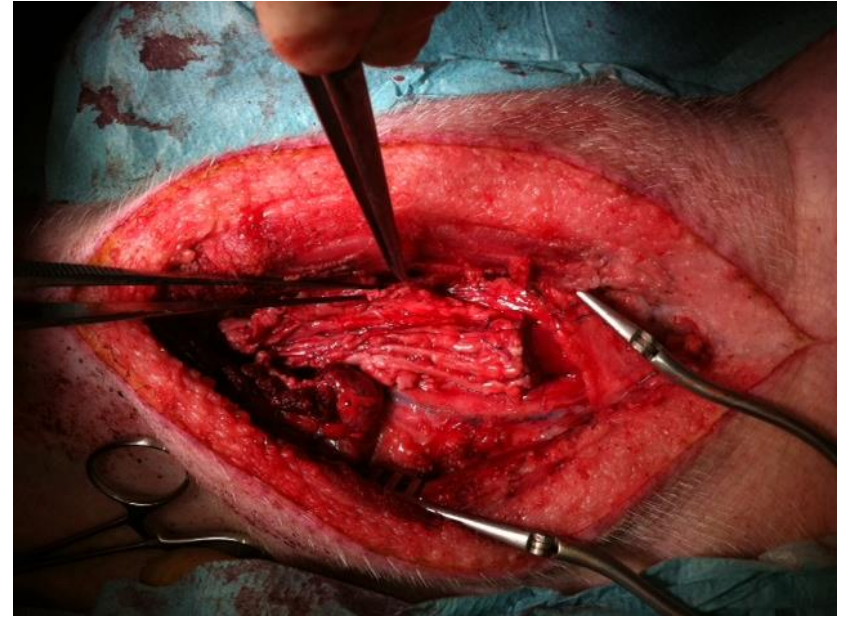
HE x 10



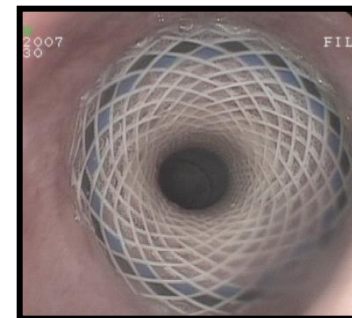
Desmine x 10

Remplacement oesophagien

Tranplant pédiculé sous-cutané pré-sternal

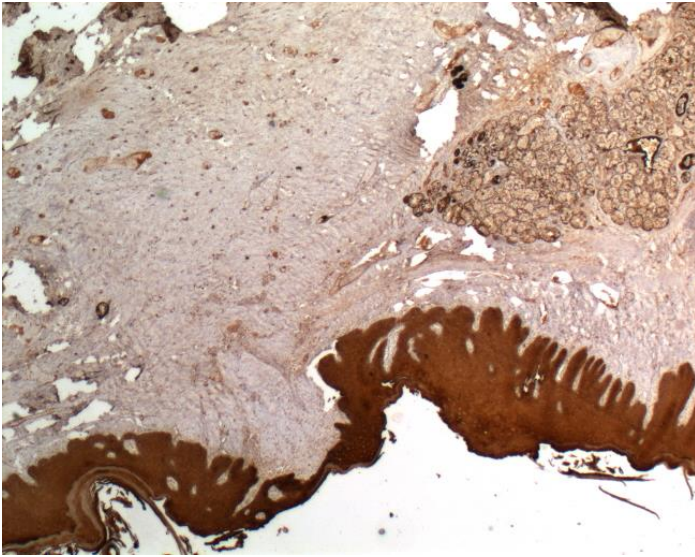


+/- endoprothèse oesophagienne



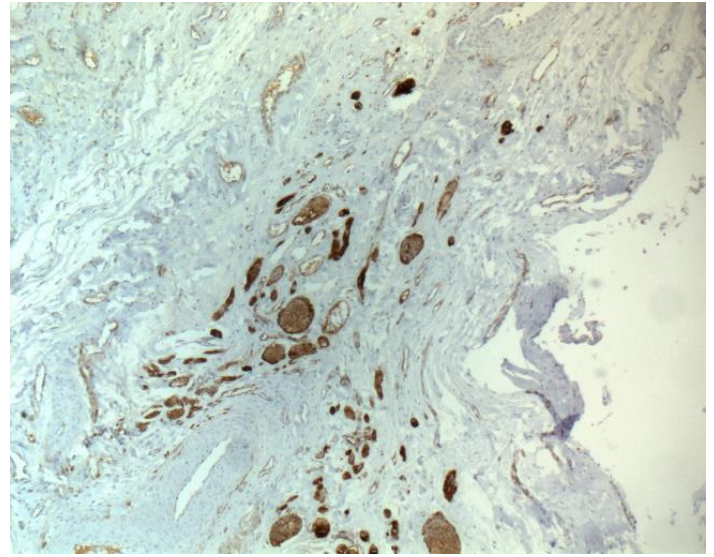


7 mois – 4 mois endoprothèse

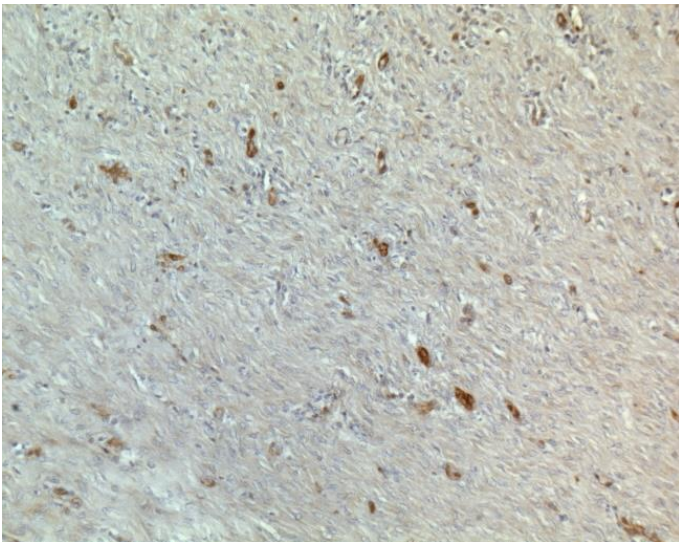


AE1/AE3 - épithélium

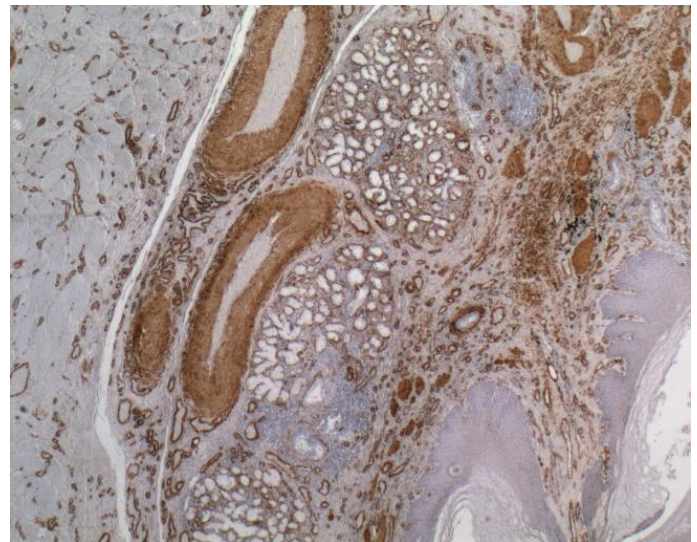
7 Mois



Desmine (muscle)

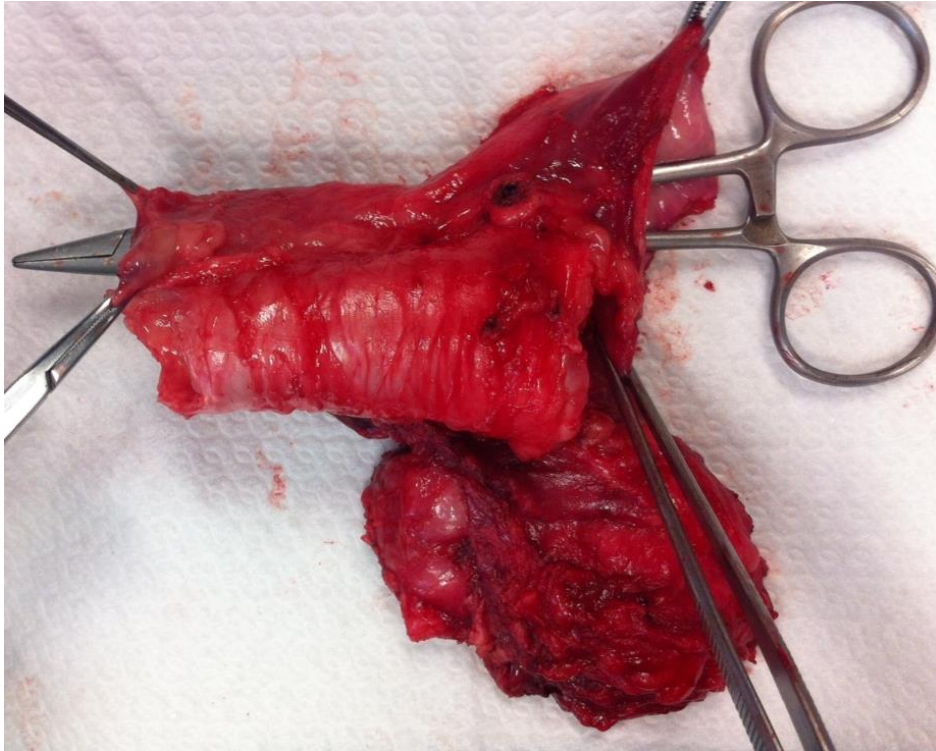


PS 100 (nerfs)

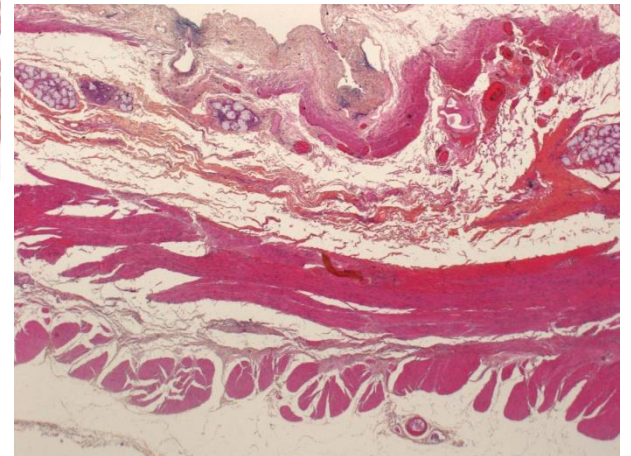
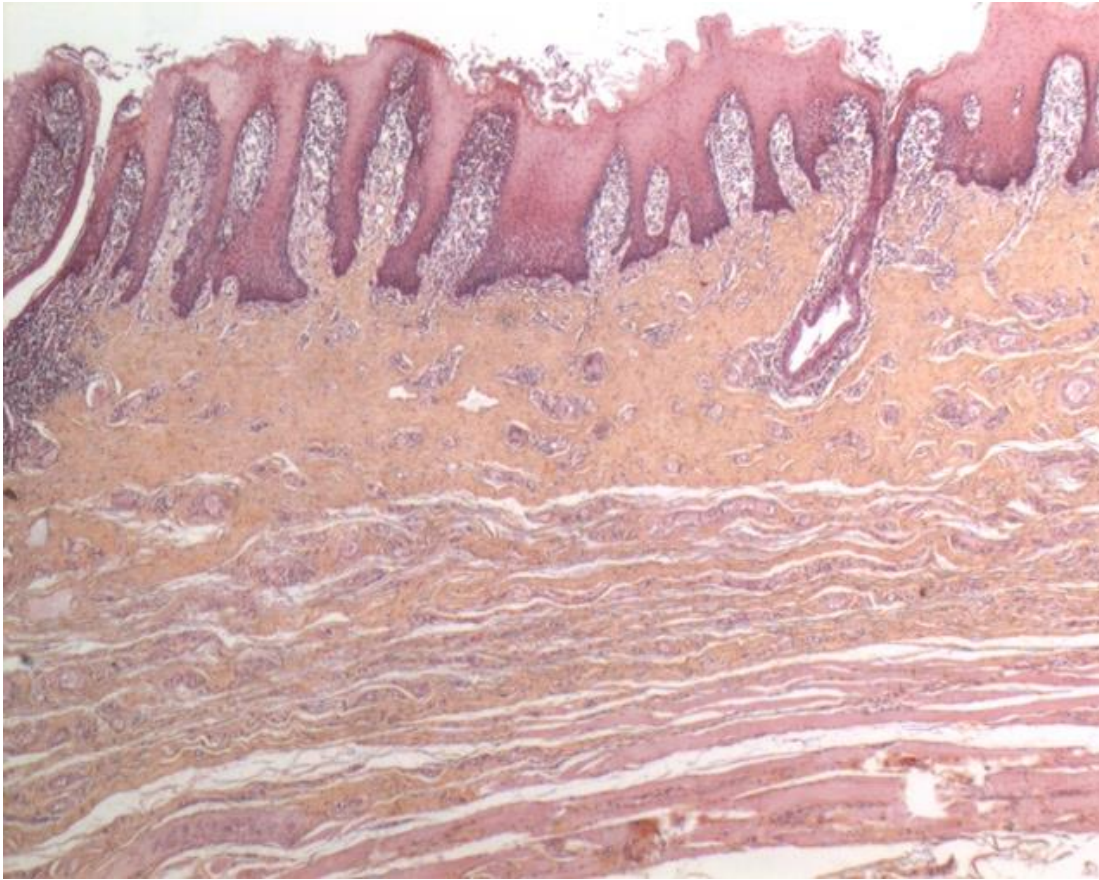


Actine muscle lisse (vaisseaux)

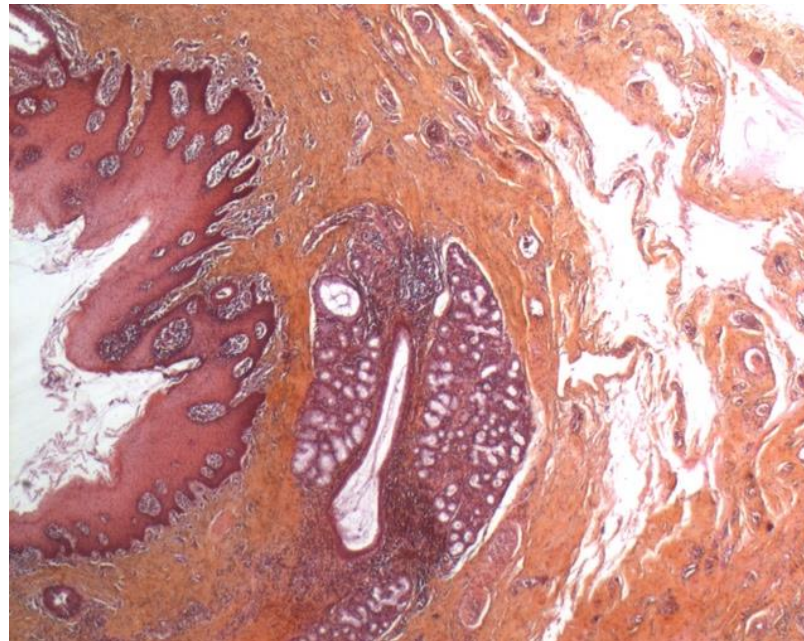
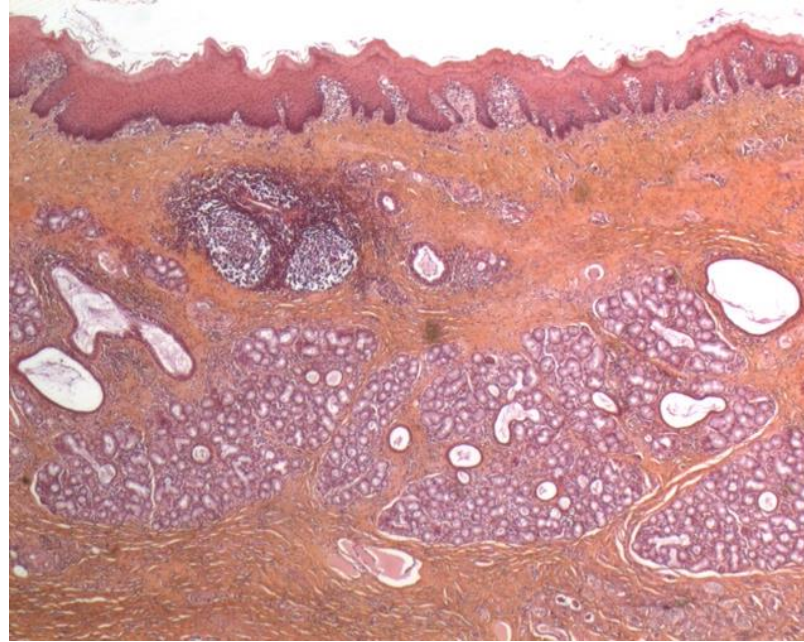
12 mois



12 mois



12 mois



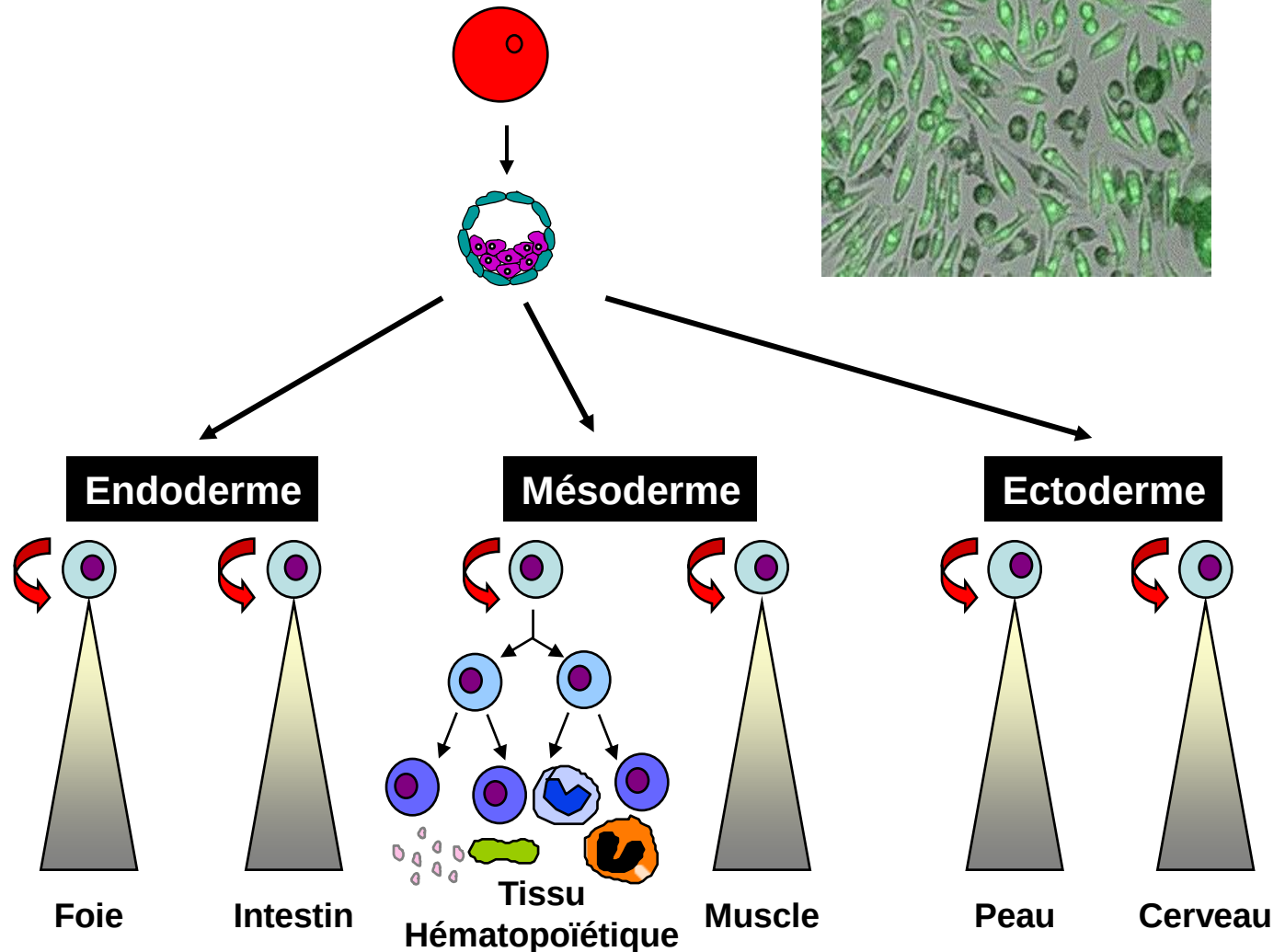
Les cellules souches sont caractérisées par des stades de maturation différents

TOTIPOPENTE

PLURIPOTENTES

MULTIPOTENTES

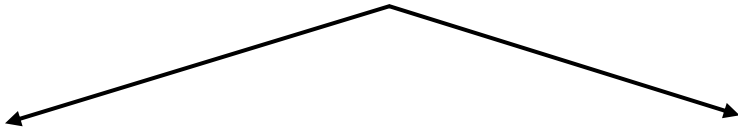
¢ MATURES



Cellules souches adultes

Fonctions:

- donner naissance aux cellules matures d'un tissu donné (= homéostasie)
- réparer un tissu donné en cas de dommages



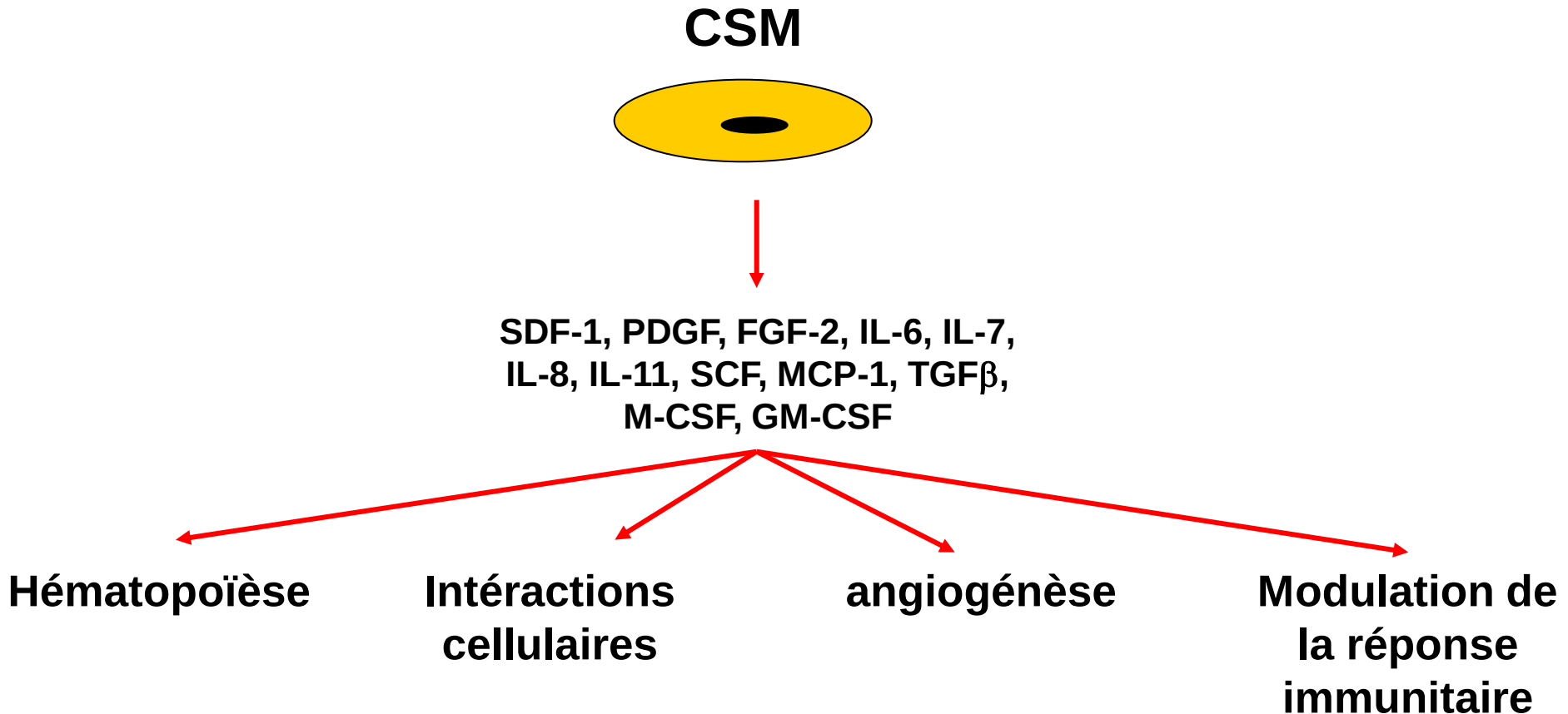
Auto-renouvellement
(= réservoir de cellules
Souches)

Division → Différenciation
(= acquisition des
caractéristiques du tissu
à réparer)

Cellules souches mésenchymateuses (CSM)

Rationnel pour leur utilisation

Synthèse de peptides, cytokines, chémokines



1. Analyse des conditions d'ensemencement des CSM
2. Etude comparative chez le cochon : Myoblastes - CSM