EPTRI

European Paediatric Translational Research Infrastructure

PlaTox - Placenta Toxicology - human placental explants for drug testing

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EPTRI Stakeholders Roundtable

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The human placenta

- **barrier between mother and embryo / fetus**
- **bi-directional selective transport**
- **hormone production**
- **immunoregulation**

- **unique human organ freshly available**
- **enormous species difference**

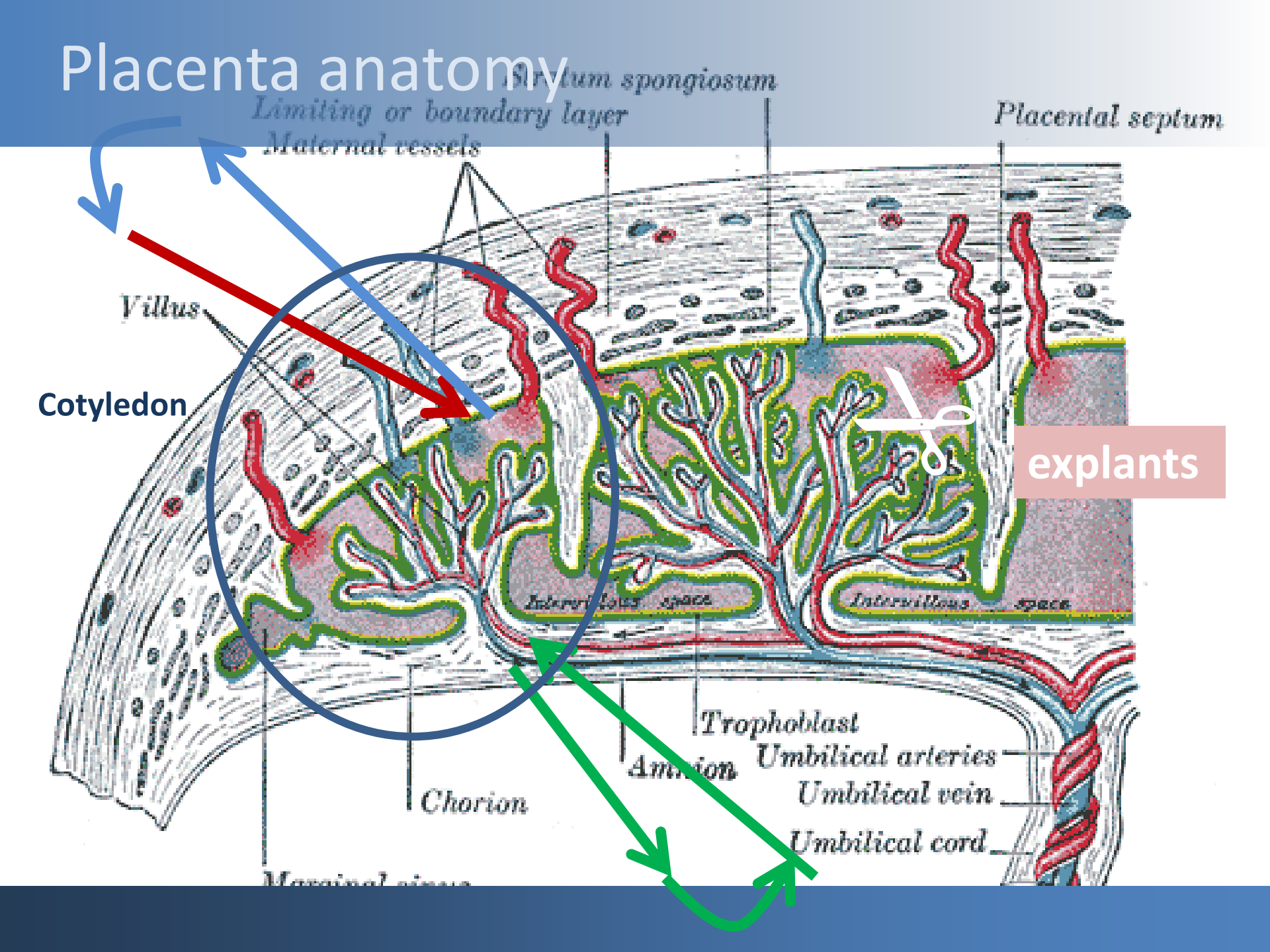
Placenta models

- **cells: isolated cells or cell lines, 2D or 3D**
- **whole placenta cotyledons**

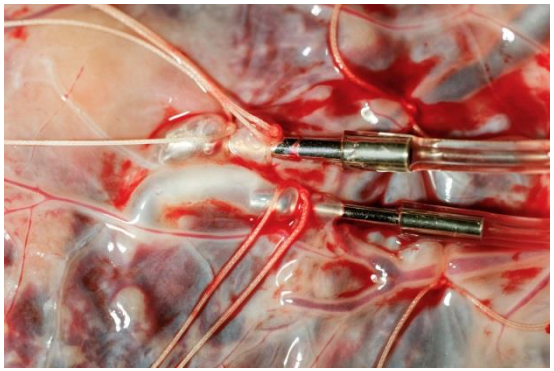
  for placenta perfusion
- **placenta explants (fragments)**

  → aim of PlaTox

Placenta anatomy



Placenta perfusion – fetal circuit

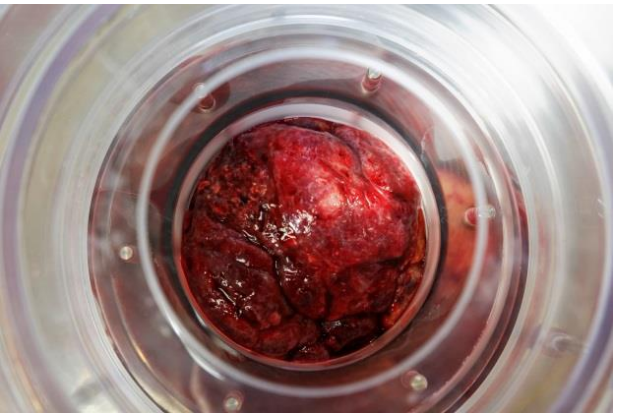


Aim: to test

- transfer
- accumulation

of test substances

Placenta perfusion – maternal circuit



Placenta models

PlaTox

	exposure time	availability	reproducibility	work load / n
cell lines	unlimited	unlimited	high	low
placenta explants	a few days	high	patient-dependent	low
isolated cells	a few days	limited		medium
one side perfusion	8 hours	1-2 / day		medium
dual perfusion	8 hours	3 / week		high

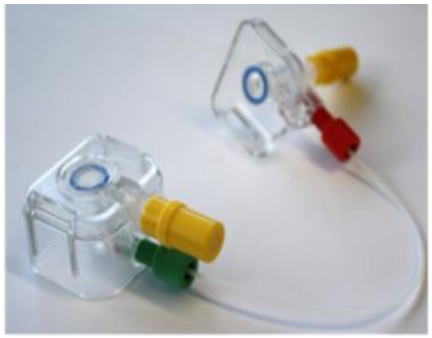
> 14 days

> 96 samples

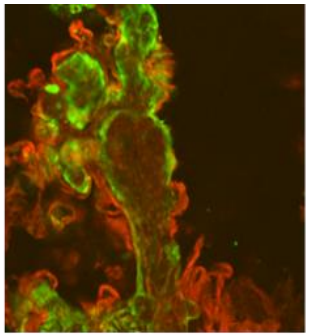
Göhner C, Pfarrer C, Faas M, Ernerudh J, Cline JM, Buse E, Markert UR.
The placenta in toxicology. Part IV. Battery of toxicological test systems based on human placenta.
Toxicol Pathol 2014;42:345-51.

Placenta explant culture devices

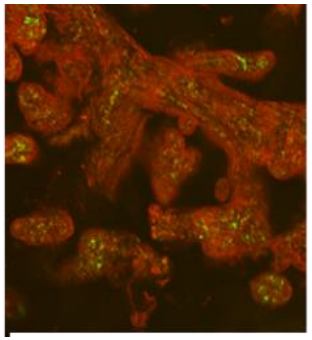
bioreactor for superfusion

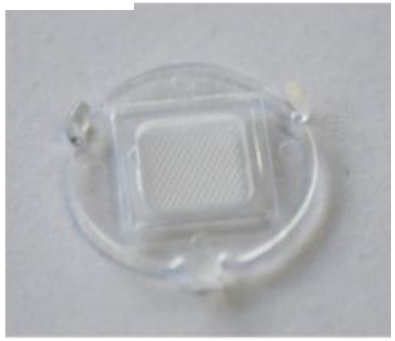


TissGrid®



MatriGid®

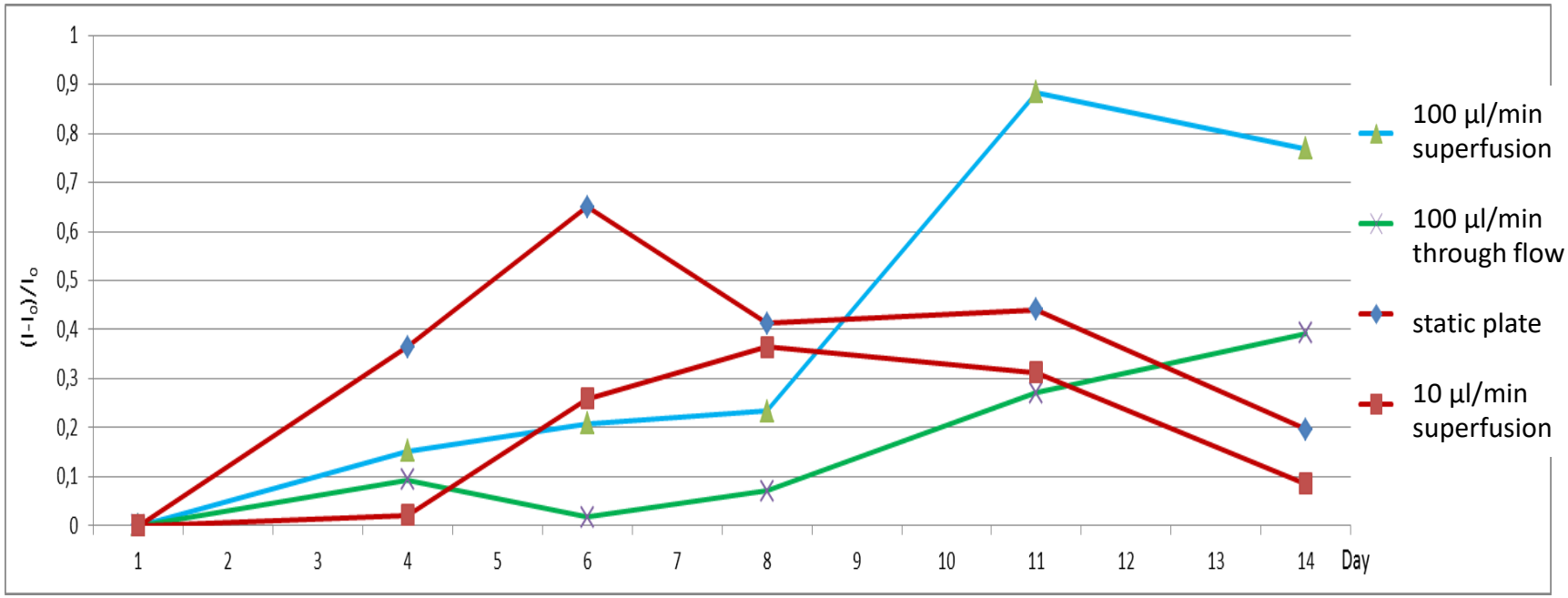




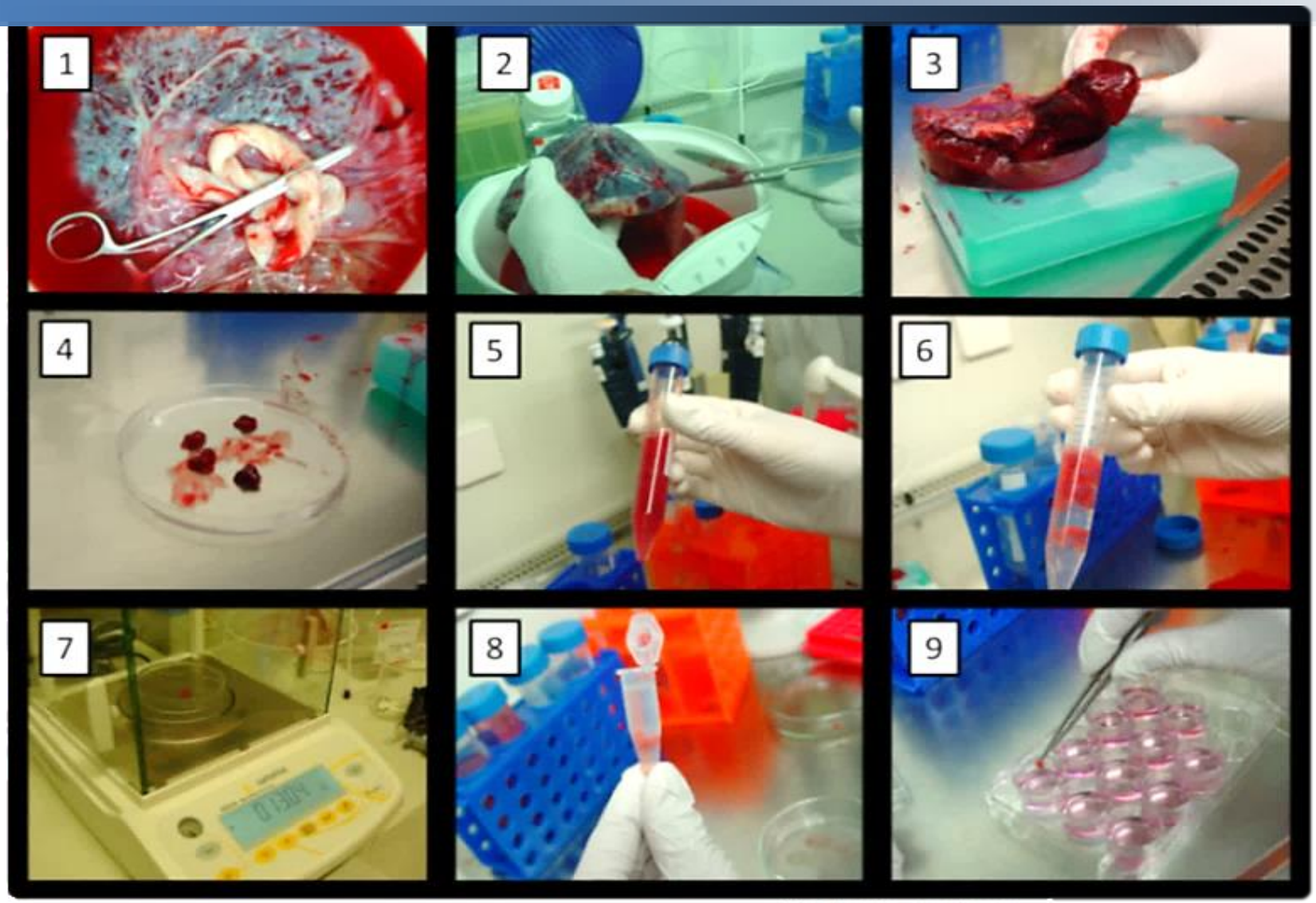
placenta villous tissue

syncytiotrophoblast

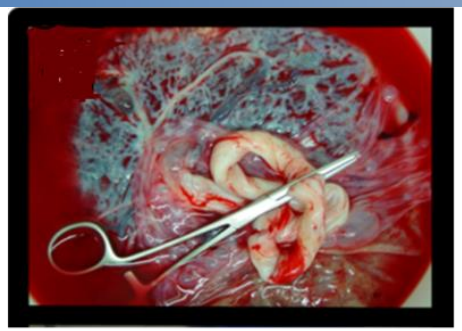
Placenta explant estradiol production



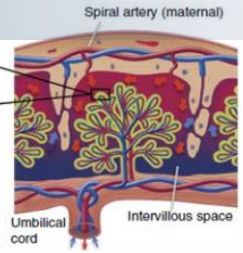
Placenta explant preparation



Placenta explant models



explant



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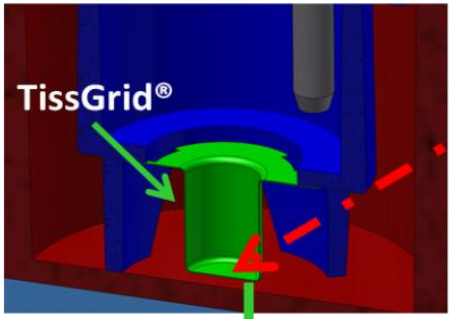
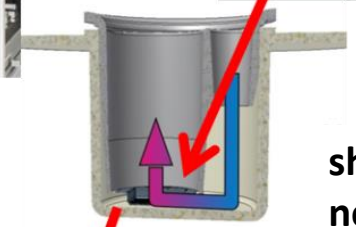
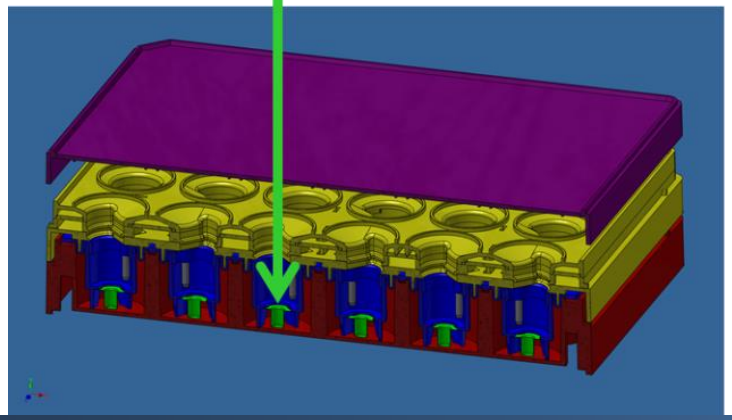


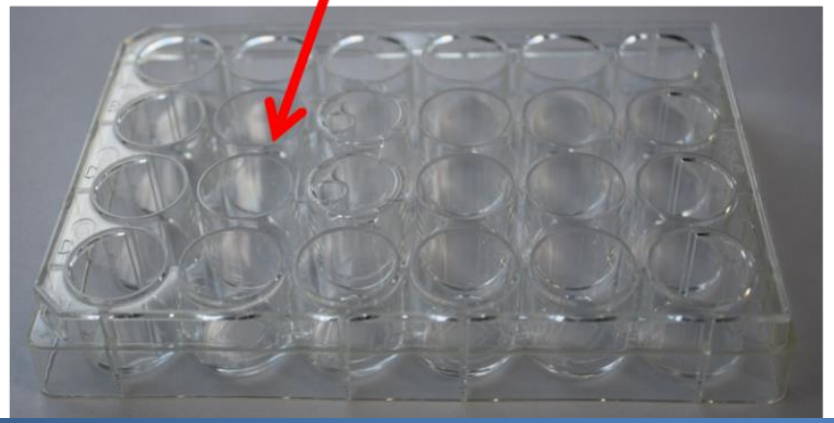
automatized punch

long term culture superfusion



short term culture normal plate





Placenta explant toxicity assessment

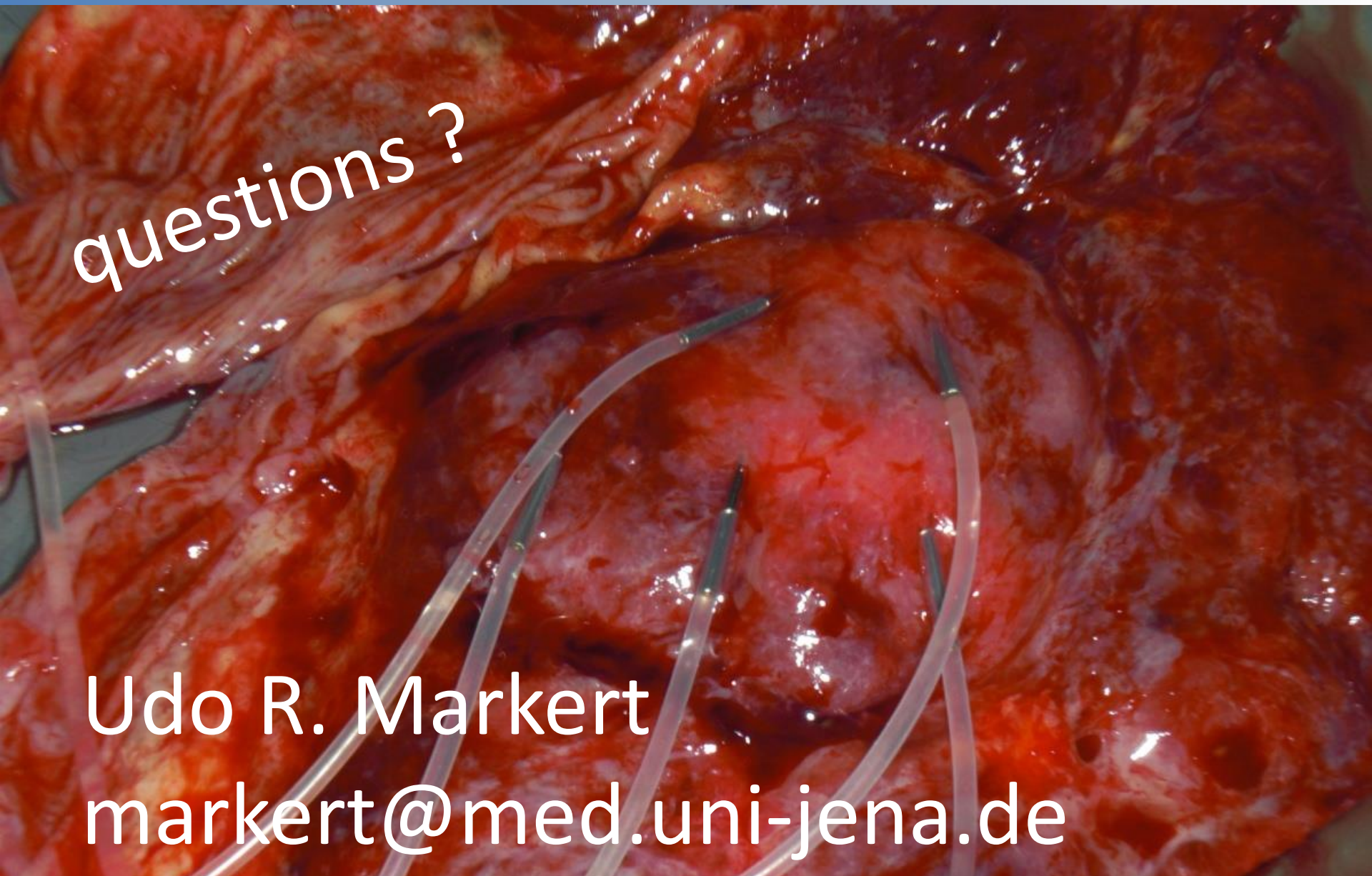
- **all common methods**

  after incubation with test substances

(e.g. immunohistochmistry, PCR, ….omics, sequencing, single cell analyses, immunodetection)

- **cytotoxicty**
- **hormonal disruption**
- **inflammation reactions**
- **metabolic changes**

Thank you for your attention !



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