

# L'embryon *in vitro*

## Etats de pratiques et résultats

**In vitro conceived embryos :  
state of ART-derived research and results**

**Les recherches sur l'embryon humain *in vitro*:  
aspects scientifiques et éthiques  
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# EVOLUTION of FRENCH LAW REGARDING RESEARCH ON HUMAN EMBRYOS

- 1994 : research is strictly forbidden
- 2004 -2011: prohibition is maintained but derogations are possible under strict control
- 2013 : research is now authorized whereas still being strictly controlled

# WHICH EMBRYOS CAN BE USED FOR RESEARCH IN FRANCE?

- Cryopreserved embryos devoided of parental project (need confirmed consent from parents)
- Embryos used for PGD analysis (and showing genetic defect)
- Embryos discarded (no transferred nor frozen because of poor quality)

# WHAT ARE THE CONDITIONS FOR RESEARCH ON HUMAN EMBRYOS?

- Authorization of the protocole by the « Agence de la biomédecine »
- Creation of embryos for research is forbidden
- An embryo cannot be transferred if it has been subjected to experimentation

# THE SITUATION of EMBRYO RESEARCH IN THE WORLD: 4 CATEGORIES OF LEGISLATION

- Permissive : Belgian, UK, Sweden... (for Europe), Russian, Japan, South Korea,...
- Permissive with restrictions : Denmark, Spain, Greece, Netherland, Portugal, Swiss... (for Europe), Australia, Canada, India...
- Restrictive : Germany, Italy... (for Europe), USA
- Strict prohibition : Austria, Poland...
- France : evolution of law regimen  
(prohibition → permissive with restrictions)

## A FEW COMMENTS...

- OVIEDO International convention on human beings rights, prohibits the creation of embryos dedied to research; it has been signed by many european countries
- Some countries make a distinction between embryos within 14 days of development (sometimes called « pre-embryos » as in UK), where research is widely permitted, and beyond (where it is forbidden)

# ASSISTED REPRODUCTIVE TECHNOLOGY FRENCH IVF/ ICSI RESULTS (2013)

Cycles*	Deliveries (%)	Newborns (%)
88 182	15 963 (18.1%)	17 919 (20.3%)

\*IVF, ICSI and FET; donor or non-donor cycles

Oocytes*	Embryos (%)		
540 090	286 384 (53.0%)		
	Transferred 85 467 (29.8%)	Cryopreserved 57 492 (20.1%)	Discarded 143 425 (50.1%)

\*IVF, ICSI; autologous gametes



14 262 newborns  
17.5% implantation rate

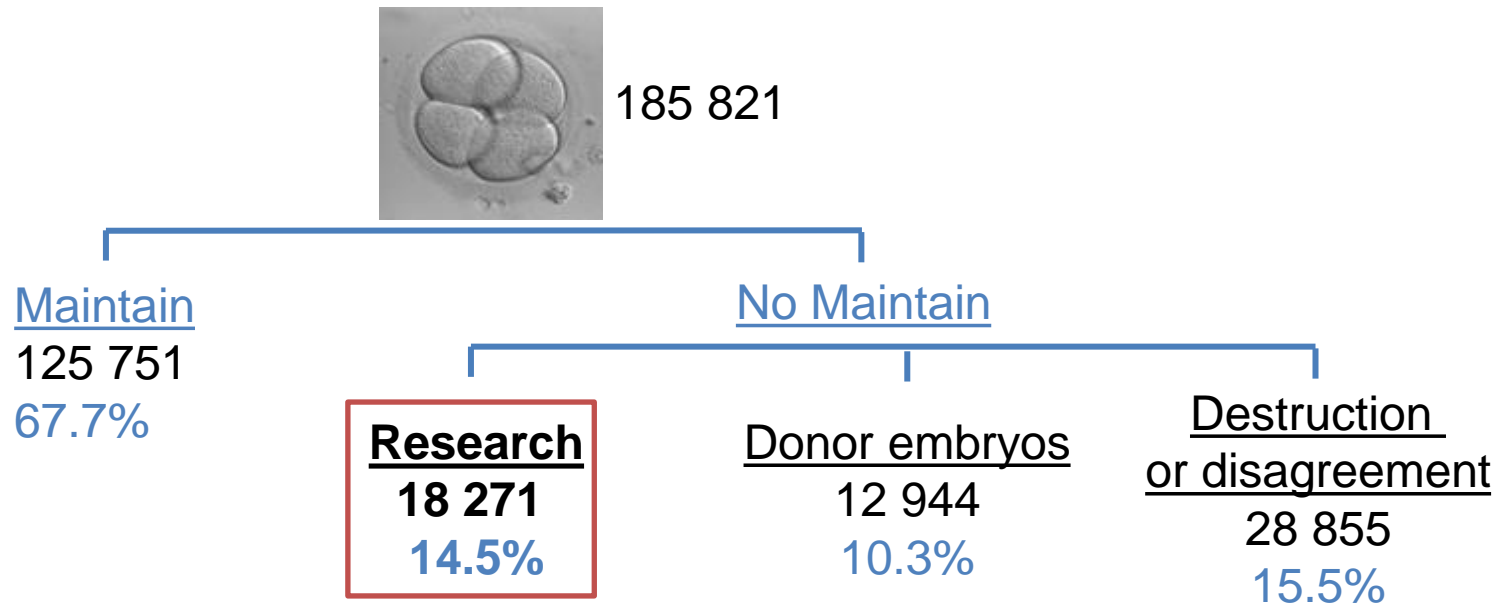
# FUTURE of CRYOPRESERVED EMBRYOS

- French legislation (Guide des Bonnes Pratiques en AMP, 2010)
- Request once a year
- Two possibilities:
  - Maintain
  - Or no maintain of the parental project (to be confirmed 3 months later)
    - STOP cryopreservation (→ destruction)
    - Donation to an infertile couple
    - Donation for research



# FUTURE of CRYOPRESERVED EMBRYOS

- Results (31.12.2013, Biomedecine Agency)



- Embryos used for research since 2007: **1 428** (S. Arrabal, Biomedecine Agency)
  - 2007 - 2010: ~ 150 à 200 per year (peak in 2009 : 487)
  - From 2011 : ~ 50 per year

# AUTHORIZATIONS DELIVERED by BIOMEDECINE AGENCY since 2007 (31.12.2013)

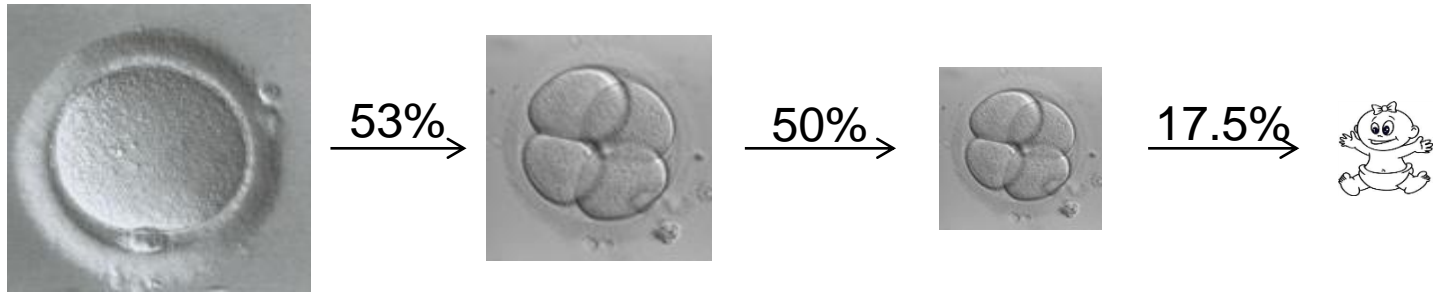
235 decisions  
210 authorizations (36 teams)



<b>Authorizations for research</b>	<b>73</b>
<b>Authorizations for importation</b>	<b>56</b>
<b>Authorizations for conservation</b>	<b>34</b>
<b>Substantial modifications</b>	<b>14</b>
<b>Research renewals</b>	<b>29</b>
<b>Ended researchs</b>	<b>25</b>
<b>Rejections</b>	<b>13</b>
<b>Authorization revocations</b>	<b>17</b>
<b>Prorogations</b>	<b>2</b>

# WHICH TYPES of RESEARCH PROJECTS?

- For the embryo itself

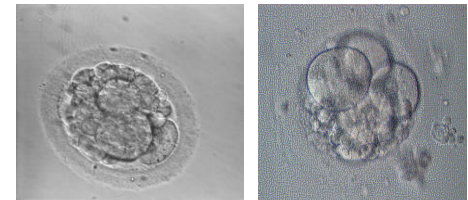


- Improve ART
  - Identify markers of embryos with the best chances of evolution
- For our knowledge of embryo development (cellular differentiation, gene expression, ...)
  - “Embryo genome editing”: to correct a defect (Liang *et al.*, Protein Cell, 2015)
- BUT evident ethical problems raised +++** (Vogel, Science, 2015; Lanphier *et al.*, Nature, 2015)

# WHICH EMBRYOS FOR RESEARCH?

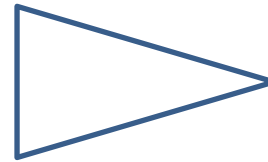
## ETHICAL CONCERNS

- “Spare” cryopreserved embryos and donated for research
  - Could a woman be ‘intentionally’ over-stimulated so as to ensure a good number of ‘spare’ embryos?
  - Would it be fair to subject embryos for research from couples who have been unable to cryopreserve their embryos for financial constraints?
- “Poor quality” discarded embryos?
  - When to make the choice? day 2? day 3? blastocyst stage?  
11.8 – 19.7% of poor quality embryos were frozen at day 5/6 with a delivery rate of ~ 15-17% (Poulain *et al.*, RBM, 2014; Kaartinen *et al.*, RBM, 2015)
  - What to do with these discarded embryos?
- Embryos created for research?  
Forbidden in France and many EU countries



# WHY SO FEW EMBRYOS ARE ACTUALLY USED FOR RESEARCH?

**Research**  
**18 271**  
**14.5%**



**Used**  
**1 428**  
**<10%**

- Is it specific to France? Ethical concerns?
- How to promote a better link between IVF centers and scientists?
- Is it realistic to set up “platforms” for human embryo research?
- Difficulties of funding (prohibition of the use of EU funds for research which results in destruction of human embryos (except hESC)).

# CONCLUSION

- There is a high heterogeneity between european countries, regarding research on human embryos
- French legislation has progressively moved from a prohibited to an authorized – but still strictly controlled- regimen
- However, the number of experiments using embryos given for research, remains surprisingly low