

PhD program

Environmental and neuroendocrine control of pubertal initiation in Atlantic salmon

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Co-supervisors: Berta Levavi-Sivan, Romain Fontaine

BASAM - Biokjemi og Fysiologi

iMPRESS
Improved production strategies
for endangered freshwater species



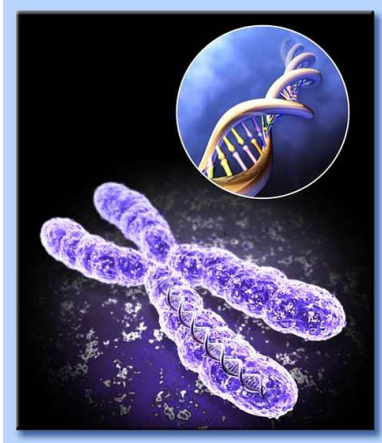
My background



UNIVERSITÀ
DEGLI STUDI
DE L'AQUILA



Biology



University
of
Amsterdam



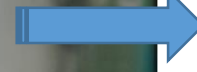
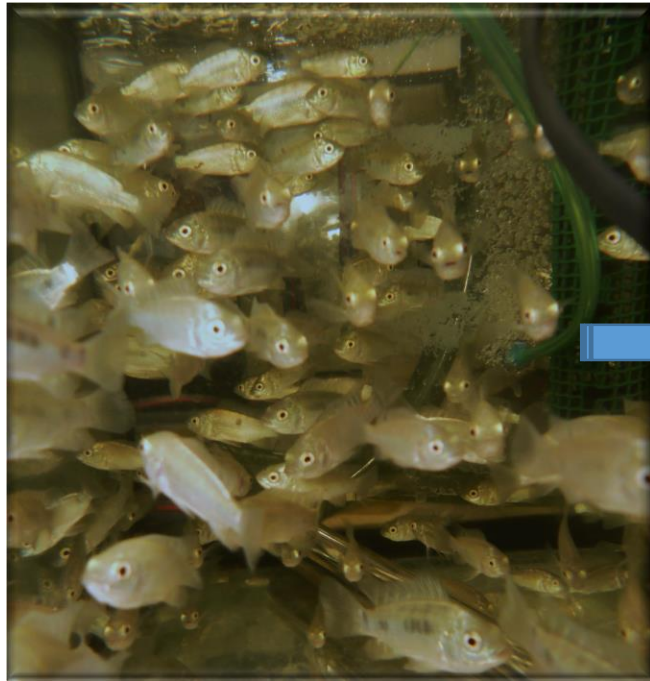
Limnology and
Oceanography



Marine Biology



Master thesis in endocrinology



PhD - Puberty regulation in *Salmo salar*

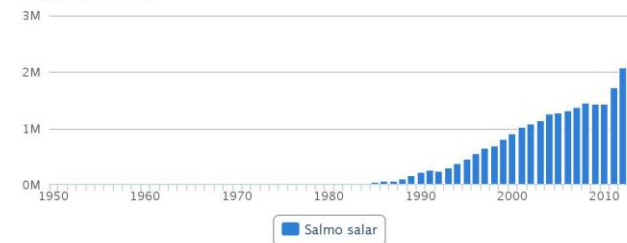


Importance

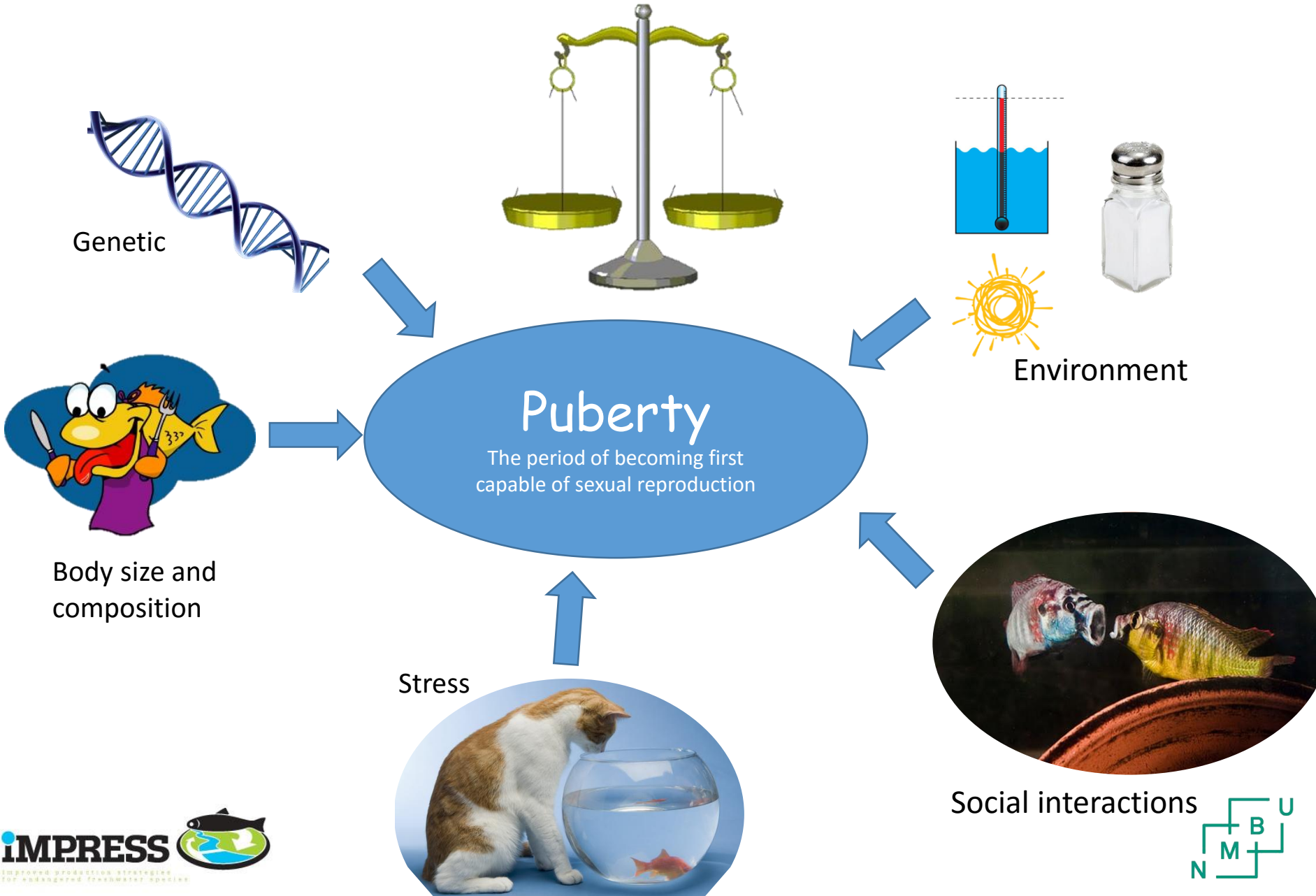
- Ecological
- Economical

Global Aquaculture Production for species (tonnes)

Source: FAO FishStat

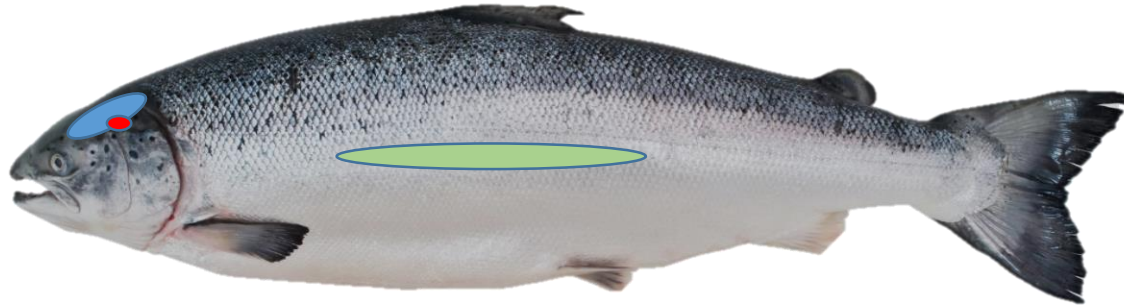


Puberty regulation



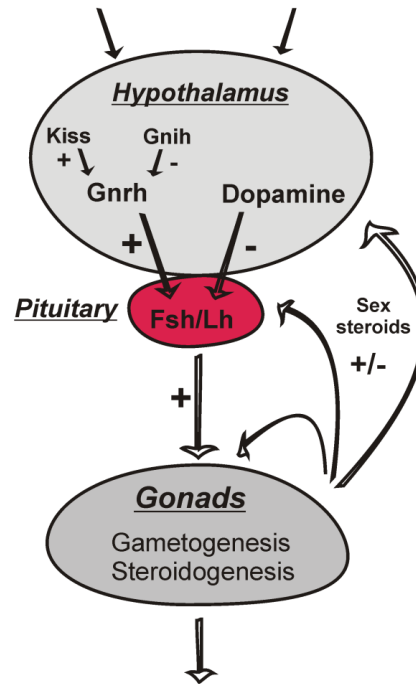
What controls puberty

Brain (Hypothalamus) - **pituitary** - **gonad** axes



Endogenous factors
(melatonin, leptin, NPY etc.)

Exogenous factors
(Temperature, photoperiod etc.)

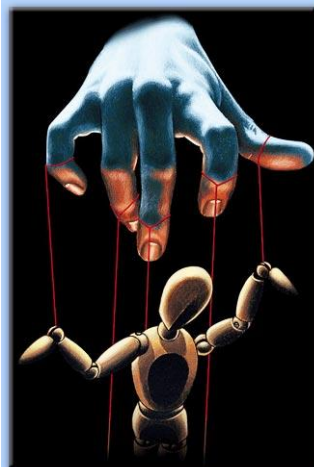


Puberty

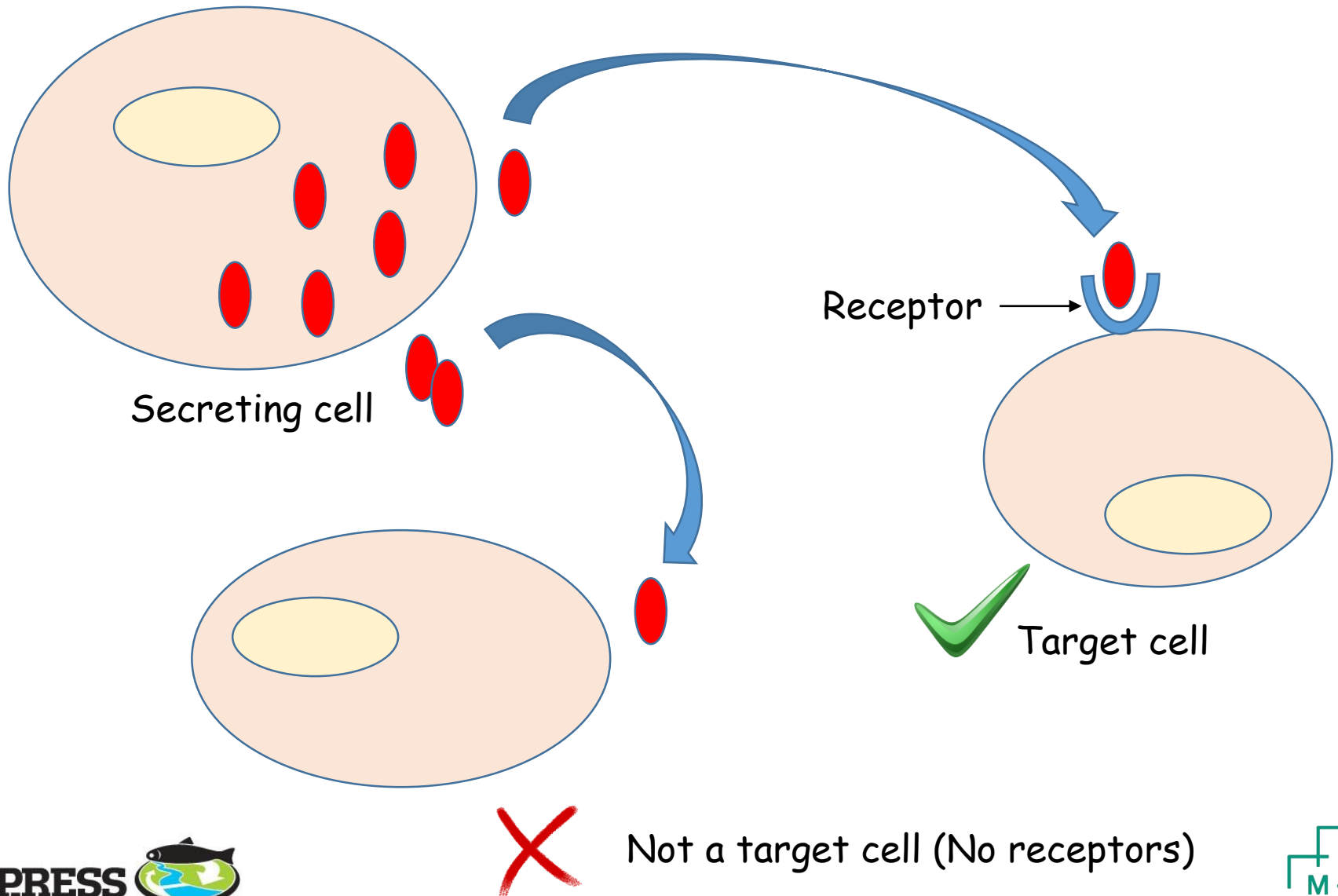
Do fish need Lh for puberty, or can Fsh stand-in for it?

- Several evidences suggest a **key role of Fsh in triggering puberty in fish.**
 - In salmonids Fsh plasma levels are elevated at the beginning of and during the testis growth period while Lh is undetectable until approaching the spawning season
(Gomez et al., 1999; Campbell et al., 2003)
 - In juvenile male sea bass treatment with recombinant Fsh elevated androgen plasma levels and stimulated spermatogenesis
(Mazon et al., 2014)
- **Information** on the regulation of Fsh release is rather **fragmentary**

My task - Identify major regulators of Fsh secretion.

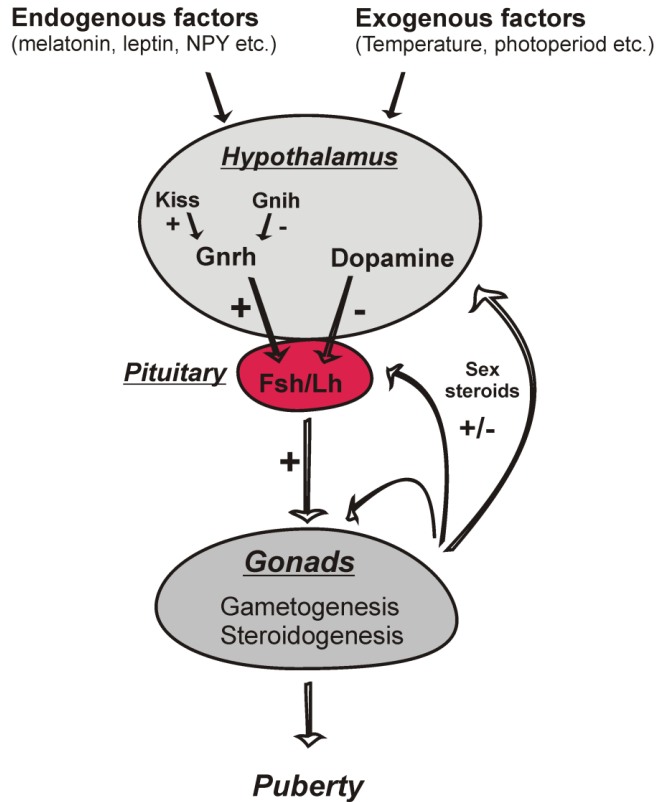


How to identify potential regulators?



Candidates

Some of the main hormones and neurotransmitters involved in the BPG axis



- Dopamine -
- GnRH +
- Kiss +
- GnIH -
- Melatonin Circadian-Circannual rhythms

Fish collection

December 2015

Institute of marine research – Station of Matre. Norway.



3 groups

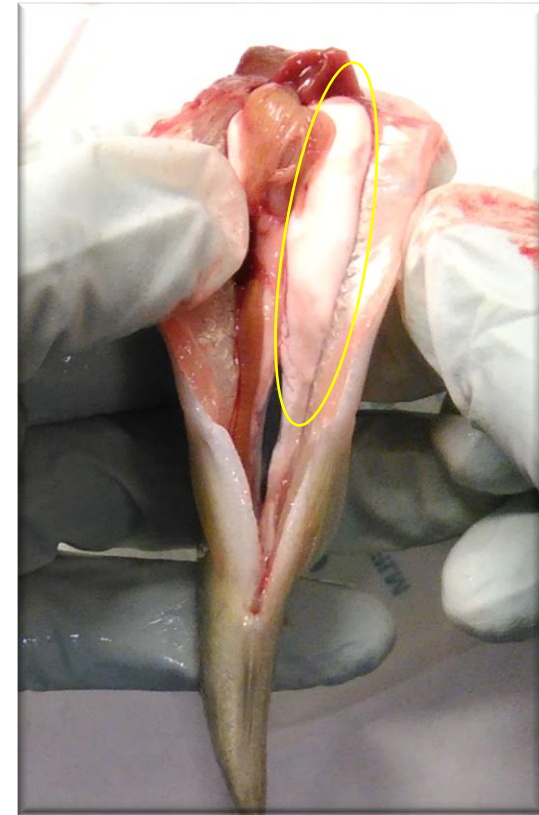
Juveniles Females



Juvenile males



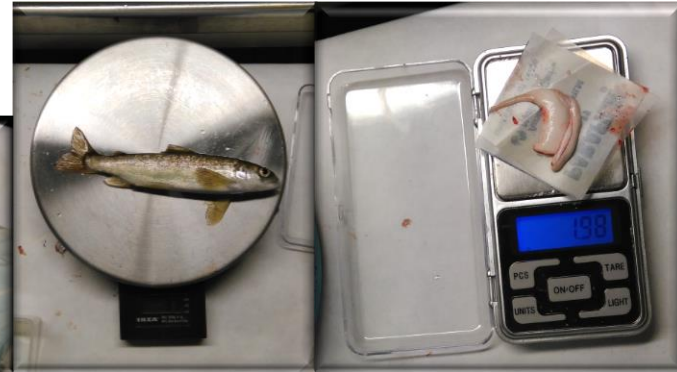
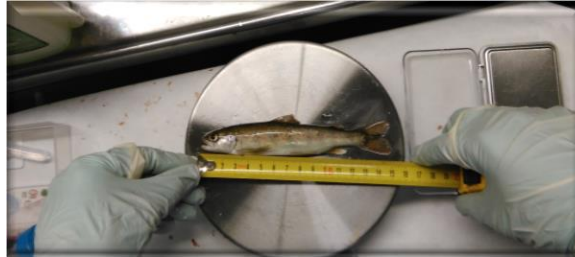
Mature males



Sampling



Anesthesia



Morphologic data

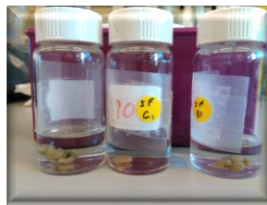
3 sets of samples



1) qPCR



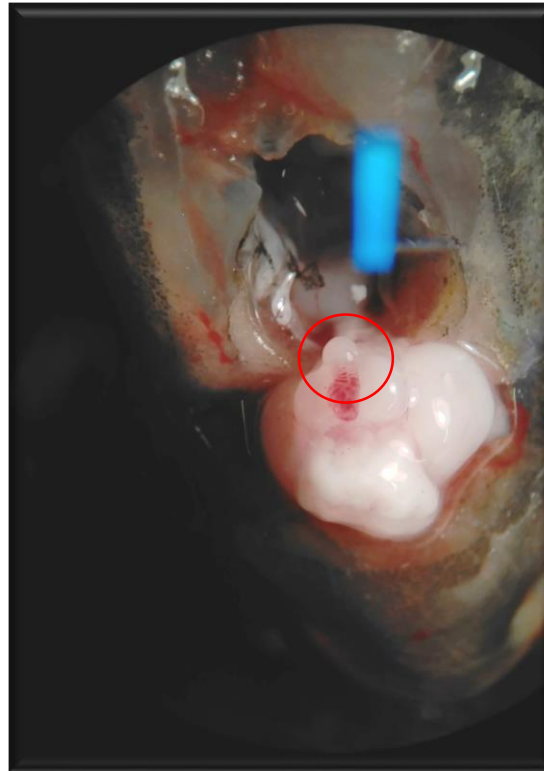
2) Immuno/ *In situ* hybridization



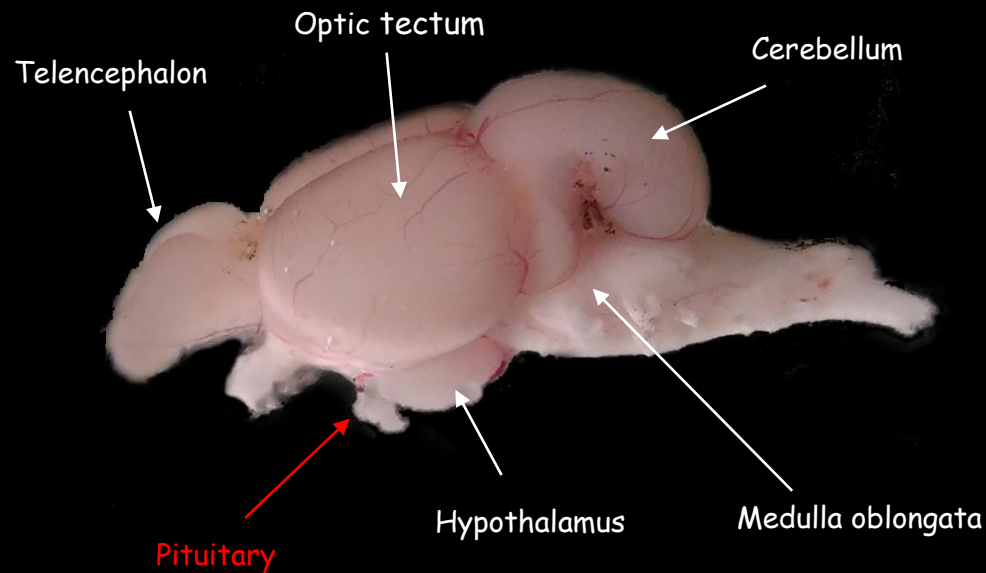
3) Histology

1 - qPCR screening

Which receptors are expressed in the pituitary?



qPCR screening



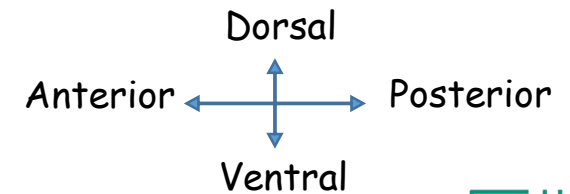
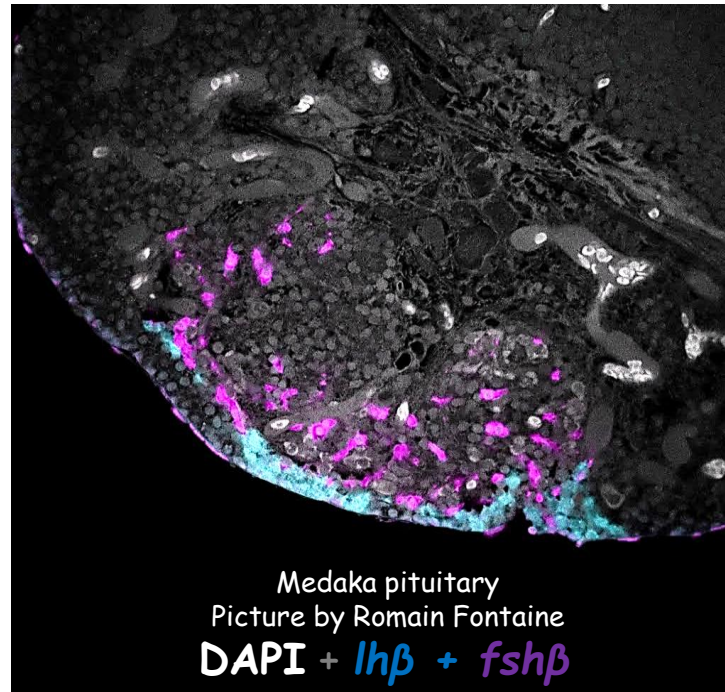
	Gene	Accession number
Melatonin Receptors	melr 1a	XM_014212815.1
	melr 1al	XM_014213248.1
	melr 1aa	XM_014195255.1
	melr 1aal	XM_014208973.1
	melr 1bl	XM_014163127.1
	melr 1bbl	XM_014215140.1
	melr 1cl	XM_014196791.1

	Gene	Accession number
Dopamine Receptors	d2	XM_14165852.1
	d2	XM_14243609.1
	d3 (1)	XM_014159431.1
	d3 (2)	XM_014181529.1
	d4 (1)	XM_014124769.1
	d4 (2)	XM_014127515.1
	d4 (3)	XM_014127671.1
	d4 (4)	XM_014152990.1
	d4 (5)	XM_014169905.1
	d4 (6)	XM_014176626.1
d4 (7)	XM_014186702.1	
d4 (8)	XM_014207615.1	

- GnRH
- Kiss

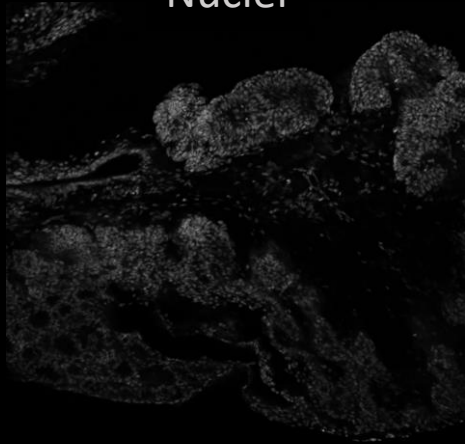
2 - Immuno/ *In situ* hybridization

Which receptors are expressed in Lh and Fsh cells?

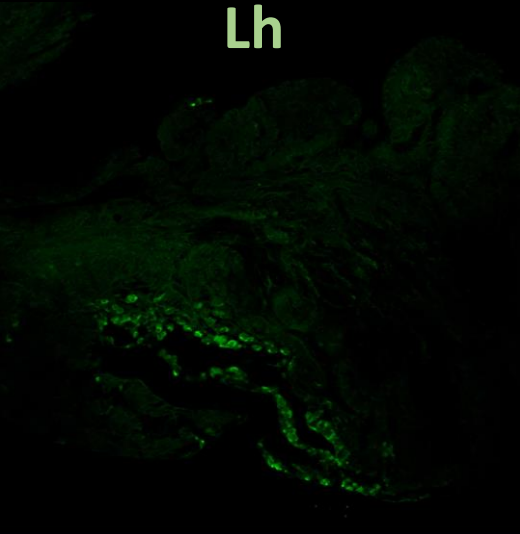


Lh immunofluorescence Pituitary

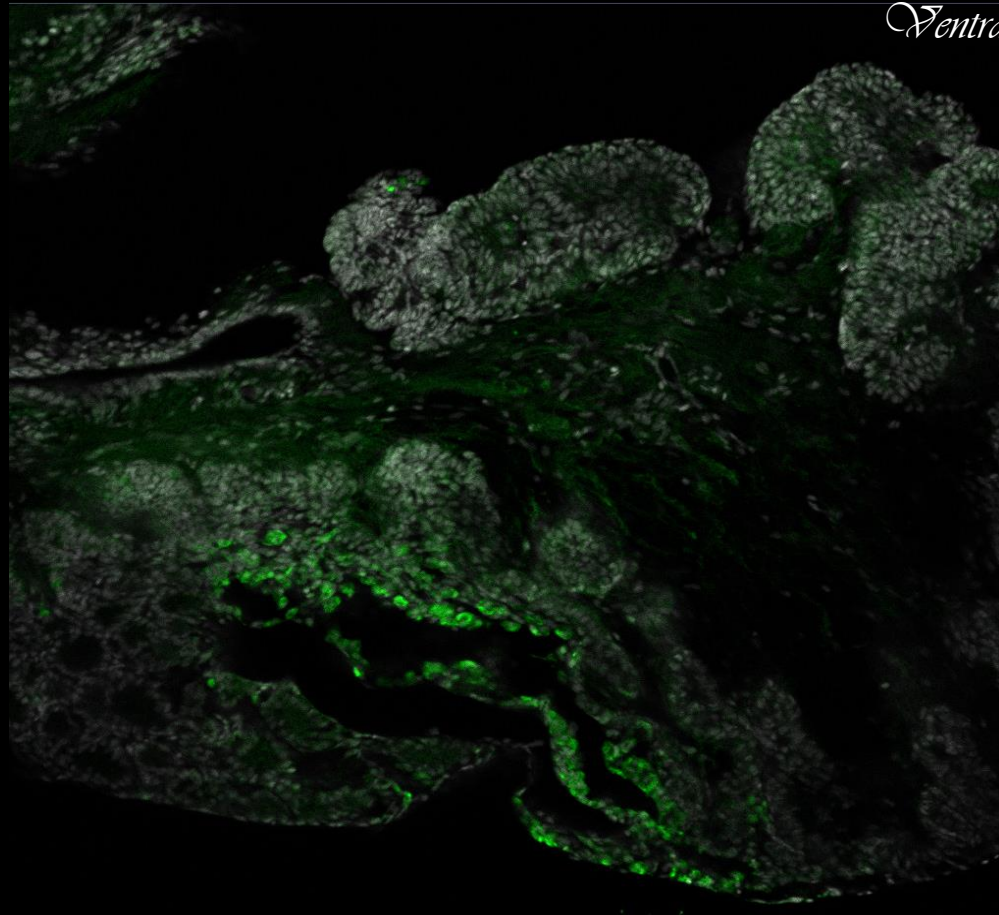
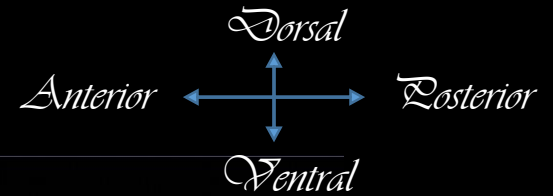
Nuclei

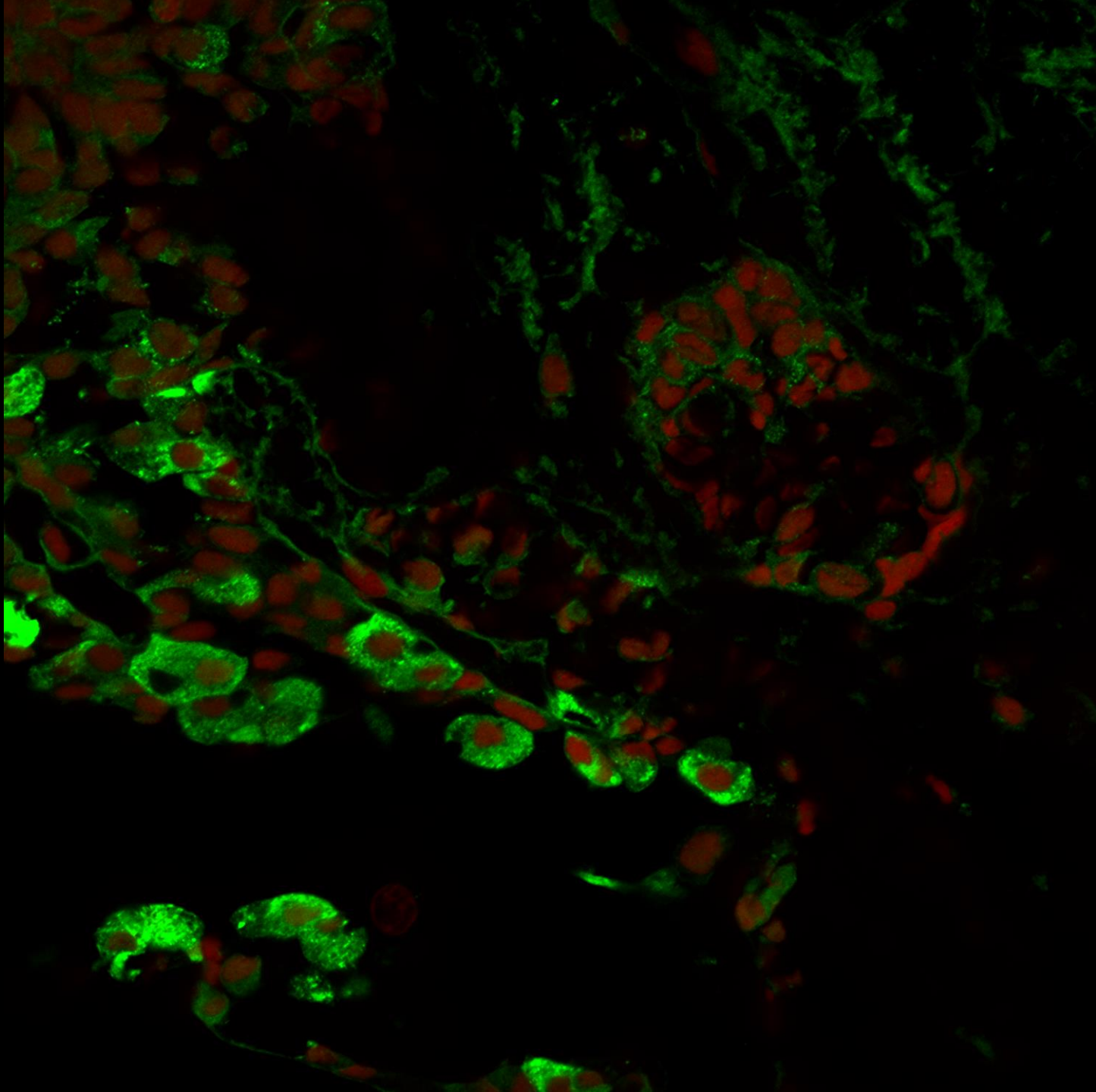


Lh



Lh antibodies (Medaka)
developed by Susann Burow
in Levavi-Sivan laboratory

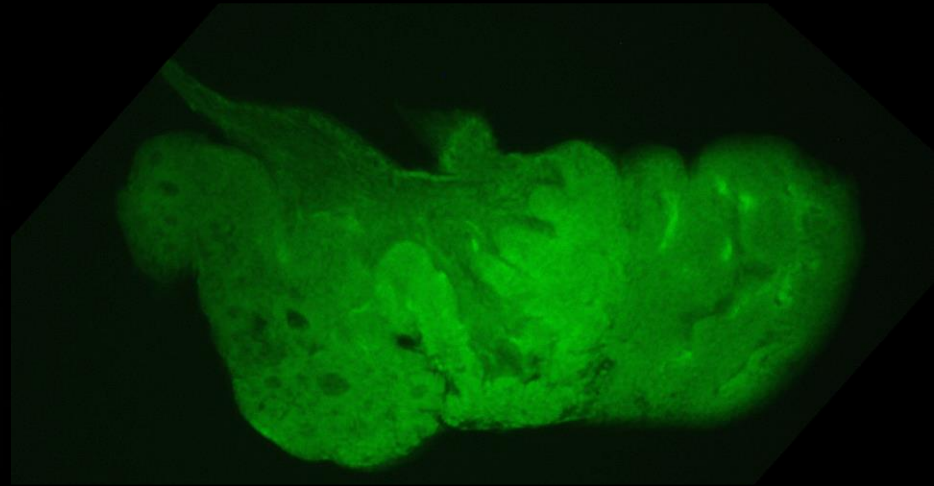
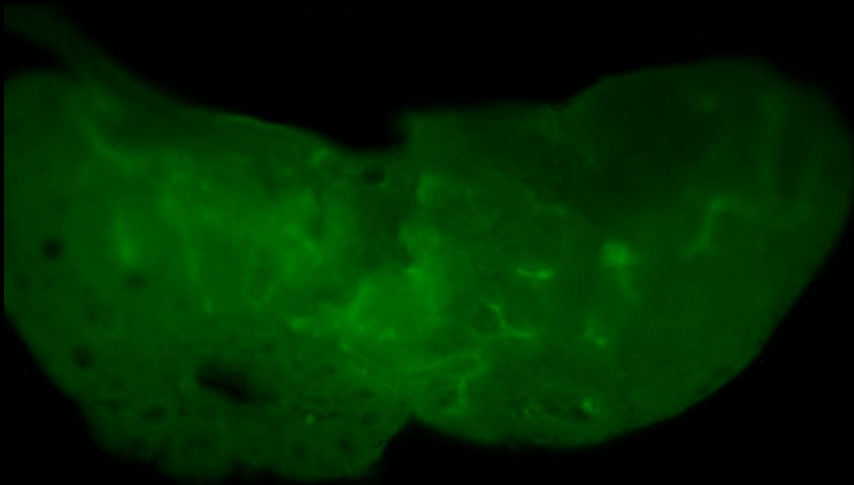




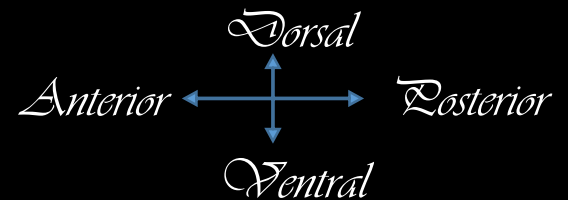
Nuclei

Lh

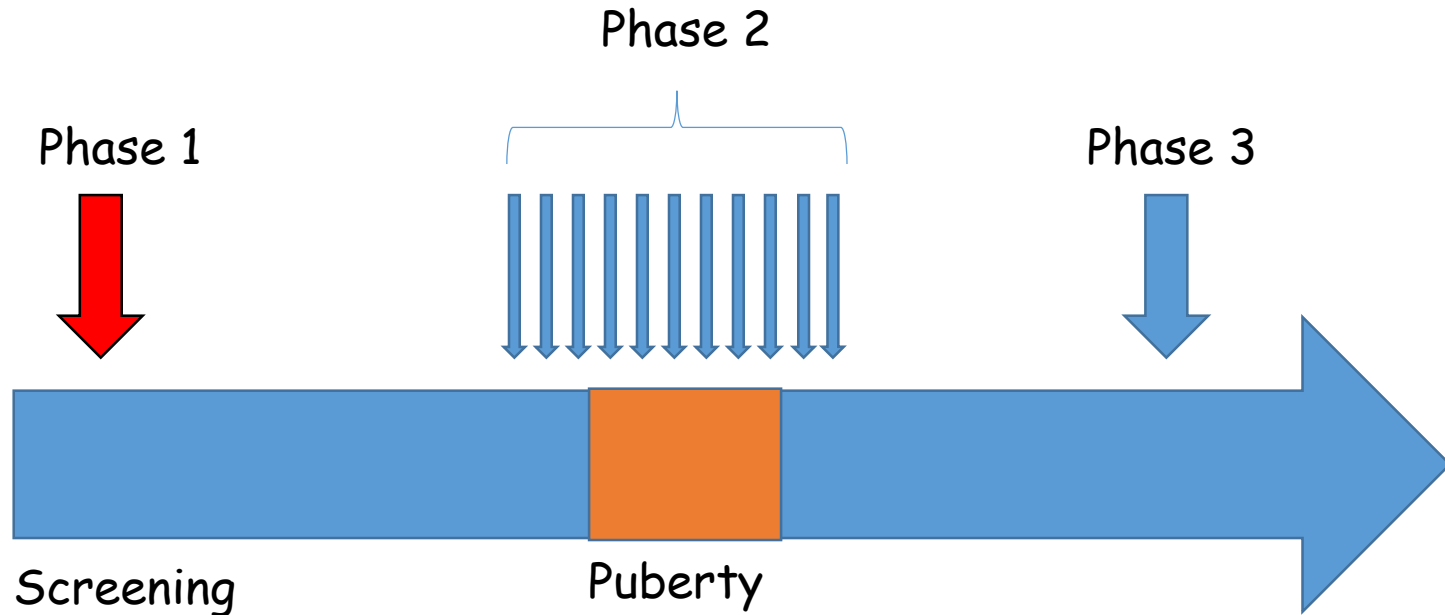
Fsh immunofluorescence Pituitary



Fsh antibodies (Medaka)
developed by Susann Burow
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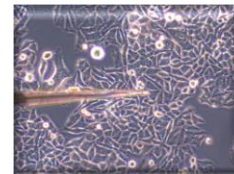
Future prospect



- Identify possible regulators of Fsh secretion
- Juveniles vs adults

- Deeper insight on the first stages of puberty

- Test the effects of environmental factors hormones and brain neuropeptides on gonadotropes activity



3A
In vitro



3B
In vivo



Thank you for listening
Thanks to my team



Kjetil Hodne, Eirill Ager-Wick, Romain Fontaine, Lotte Slenders, Guro Sandwik,
Susann Burow, Kristine von Krogh, Finn-Arne Weltzien, Rasoul Nourizadeh-Lillabadi



Tusen takk
Dankjewel
Grazie mille
Merci beaucoup



Any questions?