

OXFORD YEAR ONE ACTIVITIES		INTERACTIONS
POSTNATAL FACE	<u>Automated 2D face screen</u> development & testing image collection	UCSD KLJ INDIANA TF UBC JW
	<u>Automated 3D face screen</u> development & testing image collection	EMORY CC UCSD KLJ/CC UMN JW
FETAL & NEONATAL FACE	<u>Fetal/neonatal face analysis</u> Profile U/S segmentation image provision & collection	UCSD CC (2D) PASS BRIGHTON NA
FETAL BRAIN	<u>U/S acquisition protocols</u> <u>Neurosonography FAS characterization</u> Component detection e.g. corpus callosum	UCSD CC (2D) PASS HO (3D)

## FETAL & NEONATAL FACE (& BRAIN)

- OXFORD-BRIGHTON subcontract negotiations (INITIATED)
- Canfield H1 hand-held 3D camera ordered for BRIGHTON
- BRIGHTON had to reapply for ethics extension from 2D to 3D
- Alison Noble (OXFORD) & Neil Aiton (BRIGHTON) have discussed neonatal trans-fontanelle imaging of corpus callosum
- Alison Noble (OXFORD) and Tina Chambers (UCSD) have discussed appropriate 2D U/S protocol for Ukraine



## FETAL BRAIN

- Alison Noble has completed interviews for Post-Doc; candidate selected (Ruobing Huang) needs visa/work permit but her imminent DPhil is close to project aims

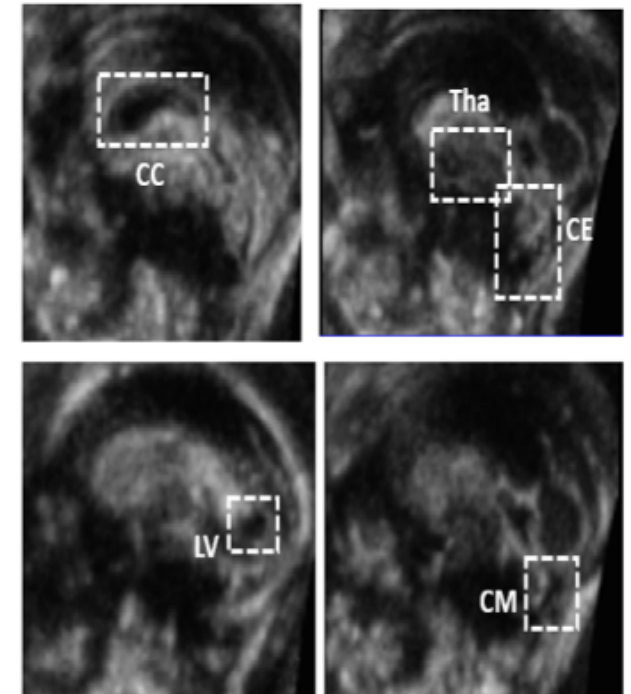
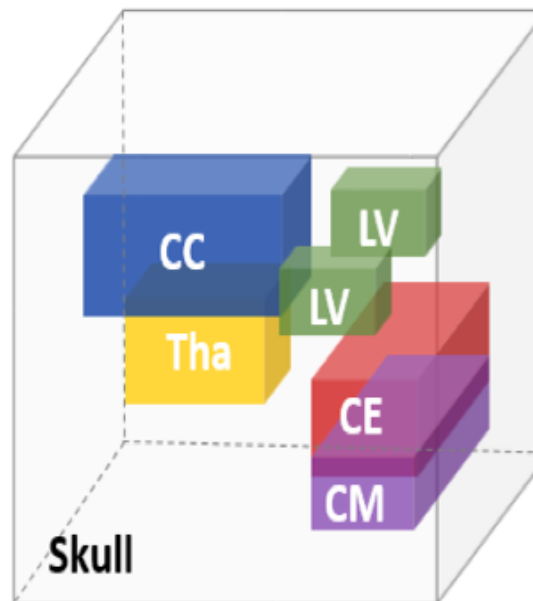
# Automatic Localization of Key Brain Structures in 3D Fetal Neurosonography

- Objectives:

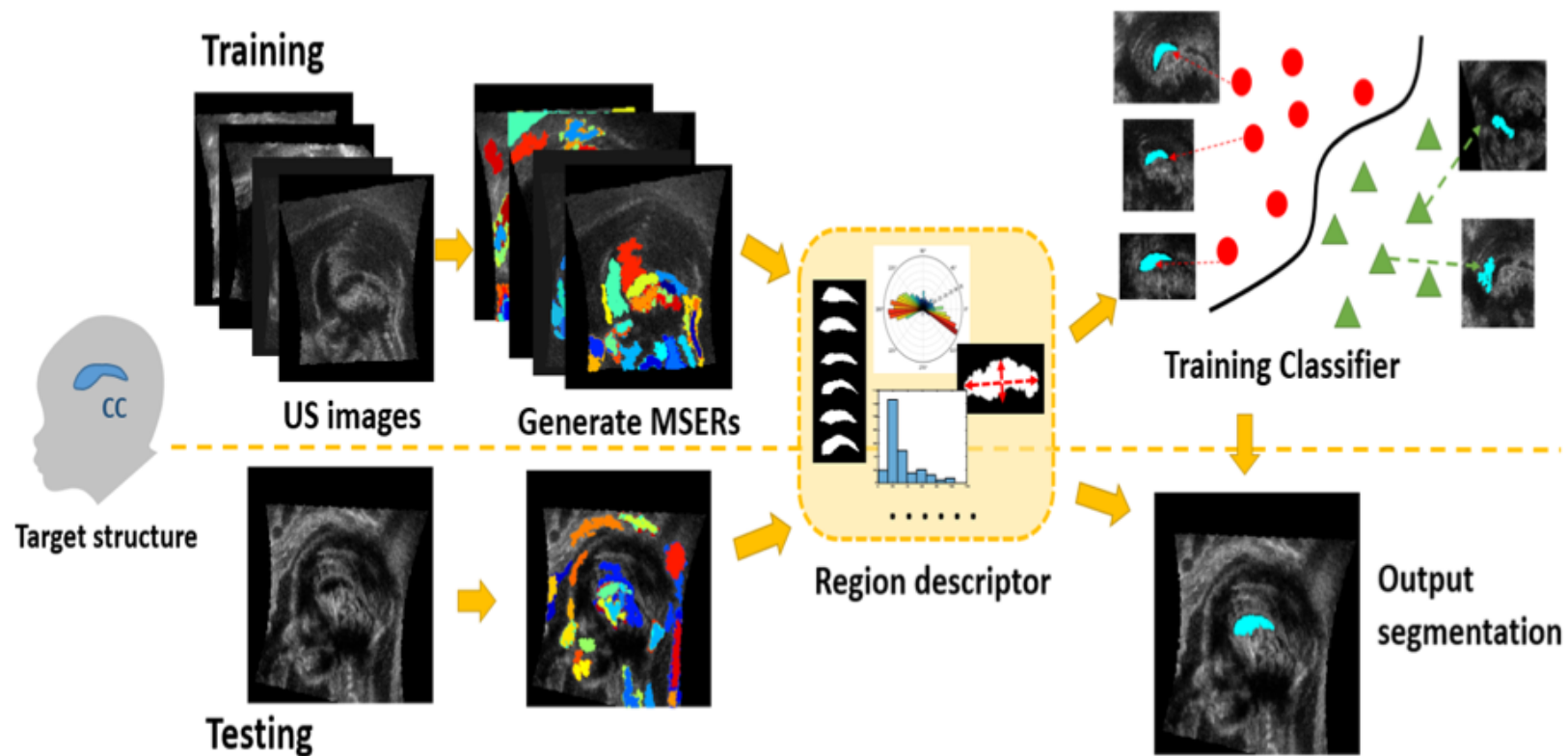
- Corpus Callosum (CC), Lateral Ventricles (LV), Thalami (Tha), Cerebellum (CE), and Cisterna magna (CM)

- Challenges:

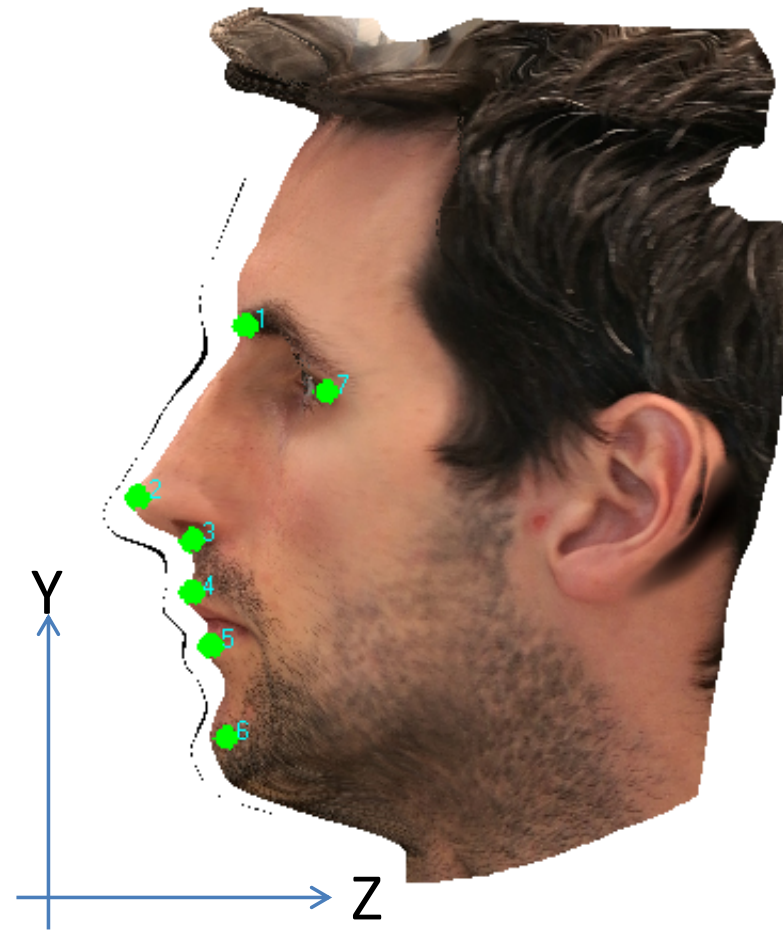
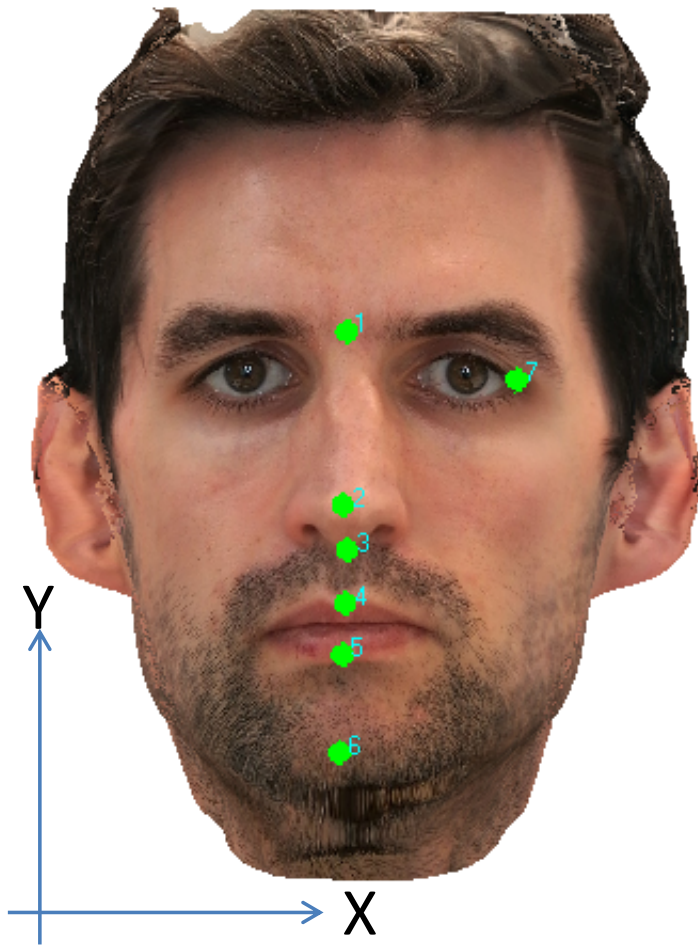
- Ultrasound speckles, varying contrast
- Biological difference among fetuses and age variations
- Varying skull orientations



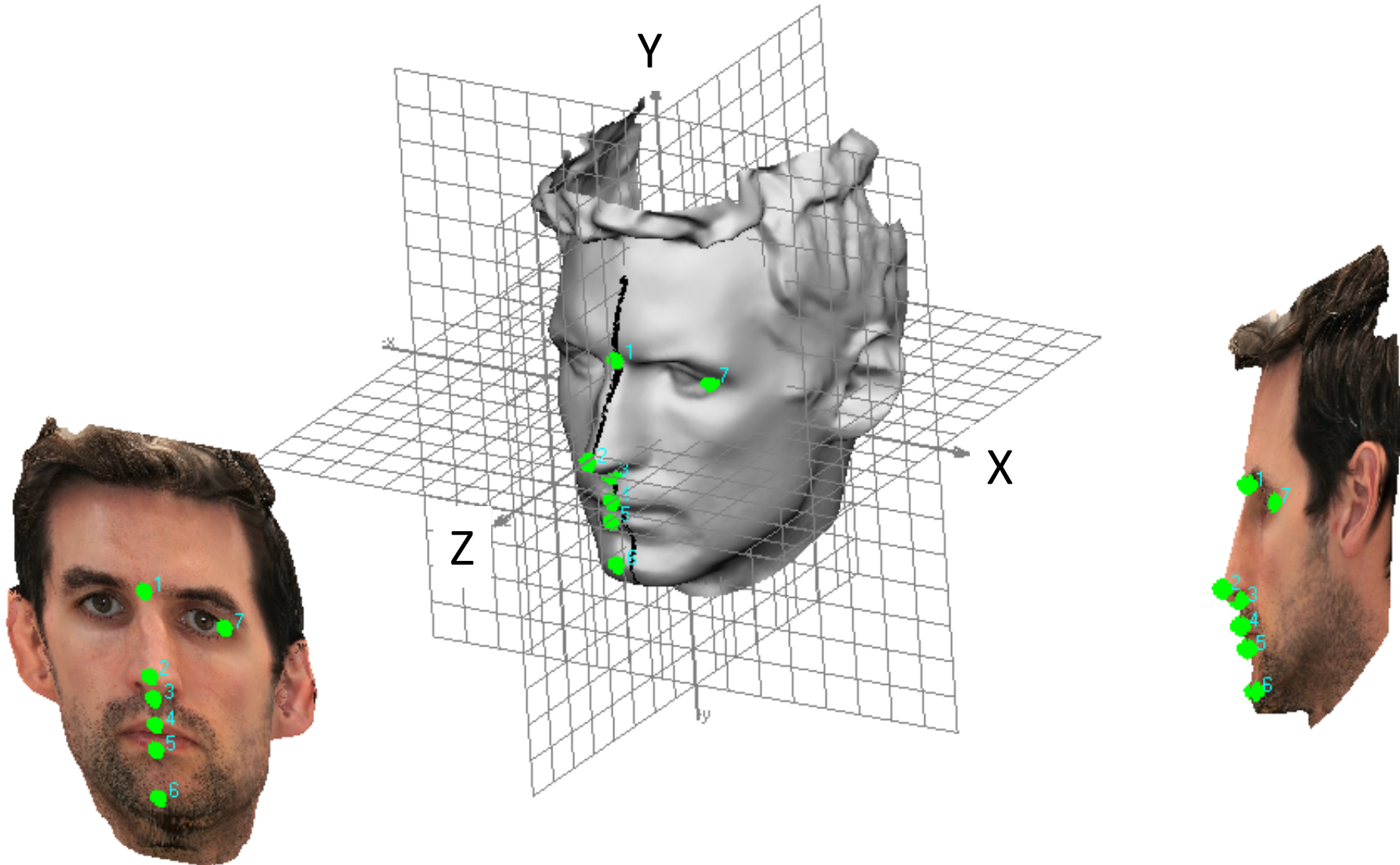
# Segmentation of fetal brain structures in 2D ultrasound images



# Project 2D photos into 3D model

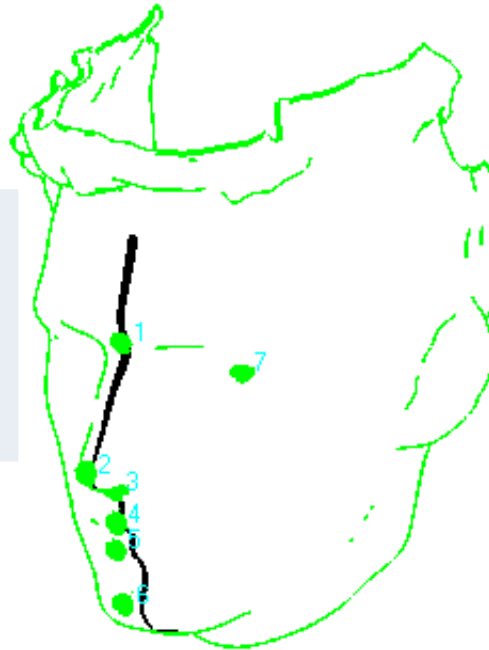


# Project 2D photos into 3D model



# FAS vs Control Discrimination

ACCURACY  
0.937

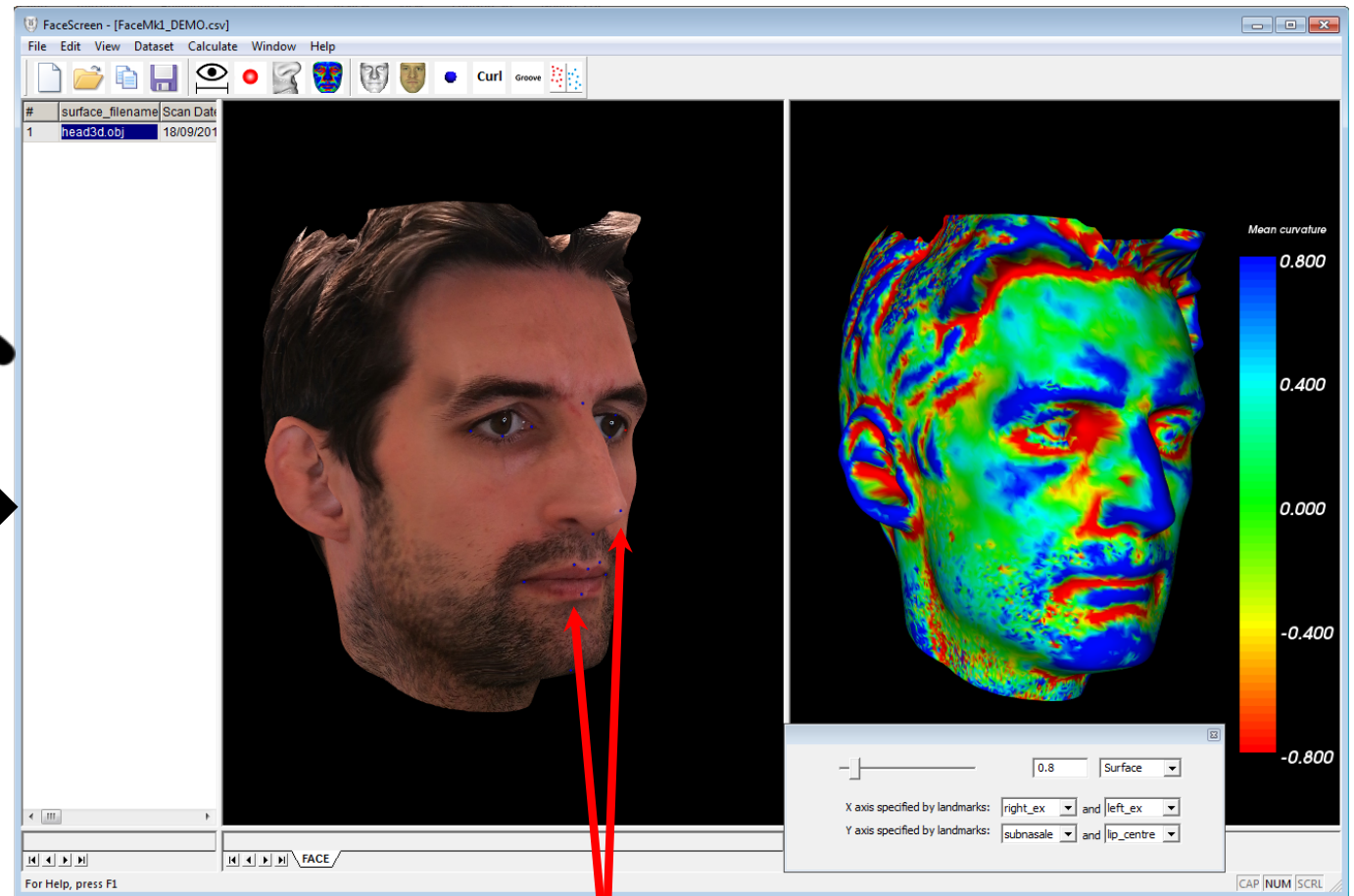




# Bellus 3D Camera for Smartphone & Tablet



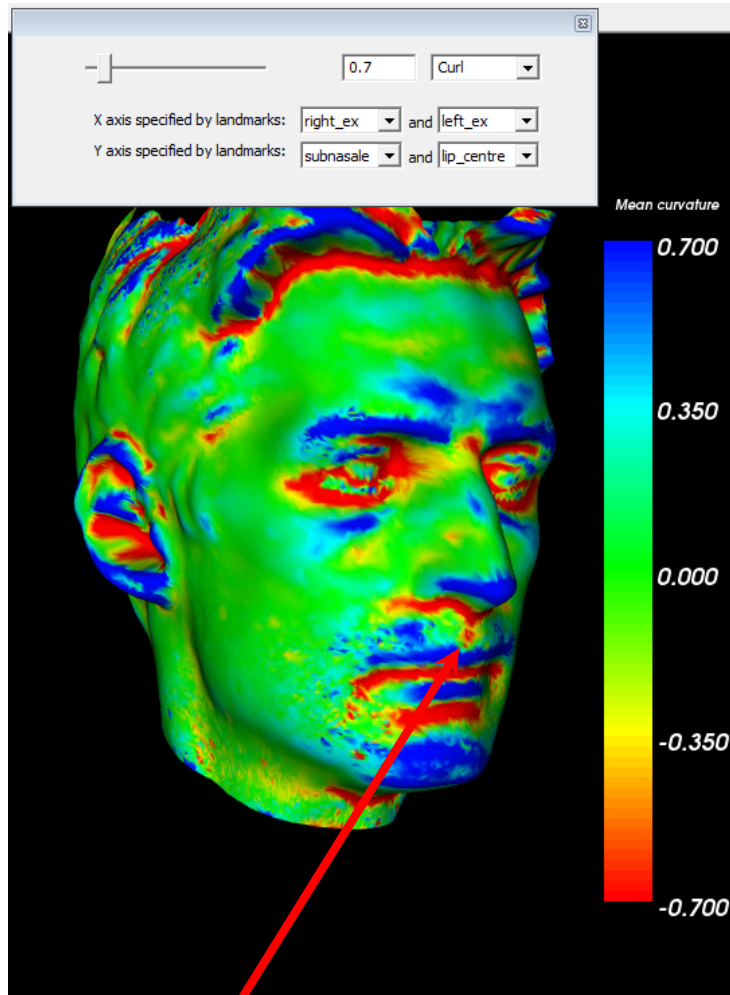
# 3D Image FaceScreen Software



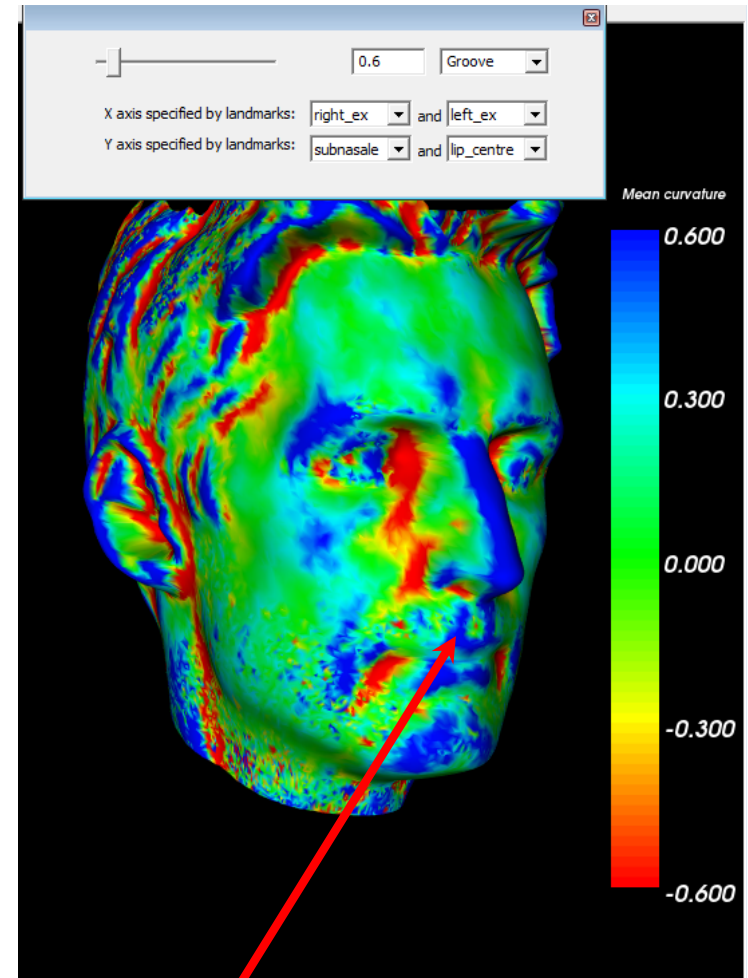
Camera provides 3D face landmarks  
FaceScreen shows landmarks and curvature of face



# FaceScreen Upper Lip Analysis

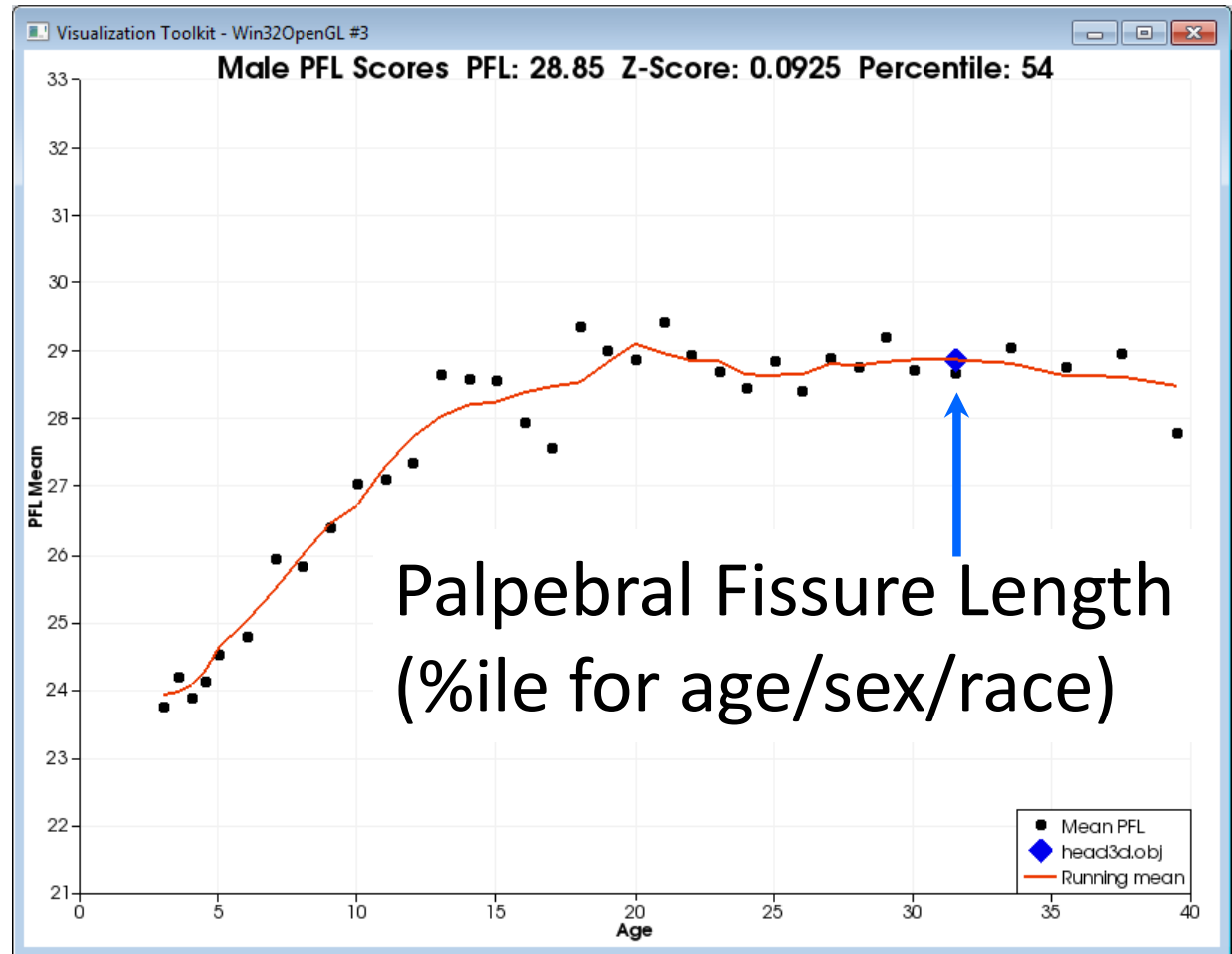


indentation of philtrum



prominence of philtral pillars

# FaceScreen Palpebral Fissure Analysis



---

**Thank you.**

---

**Olivia Weeks** <[weeksog@gmail.com](mailto:weeksog@gmail.com)>  
To: Jill Vander Velde <[vanderv@mail.sdsu.edu](mailto:vanderv@mail.sdsu.edu)>

Sun, Nov 5, 2017 at 6:36 AM

Dear Jill,

Thank you very much for the opportunity to present during the CIFASD meeting. I am looking forward to the April meeting in Vancouver when I can meet everyone face to face.

Attached is a .PDF version of our slides for the archive (via google drive). If google drive is hard for you to access, I can switch to dropbox quite easily. Our institution would like us to keep the slides nonpublic until publication, so the secure website for the CIFASD group sounds like a good way to share with the community.

Cheers  
Olivia

 **10\_25\_2017 FASD Conference Slides\_10 min.pdf**

On Wed, Oct 25, 2017 at 1:34 PM, Jill Vander Velde <[vanderv@mail.sdsu.edu](mailto:vanderv@mail.sdsu.edu)> wrote:

Thank you for joining us for the start of our CIFASD monthly meeting today Olivia.

If you have any slides you'd like me to archive with the meeting recording (in a secure section of our website for PIs and Advisory Committee members only), please feel free to email them to me.

Sincerely, Jill

--  
Olivia Weeks  
PhD Candidate, Biological and Biomedical Sciences  
Goessling Laboratory  
Brigham & Women's Hospital  
Harvard Medical School  
[weeksog@gmail.com](mailto:weeksog@gmail.com)



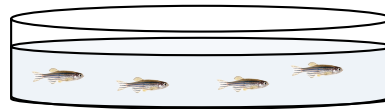
# ***FINDING FUTURE IN THE PAST: FETAL ALCOHOL EXPOSURE ALTERS RISK FOR ADULT OBESITY AND METABOLIC SYNDROME***

Olivia Grace Weeks, G5 Goessling Laboratory

# Zebrafish as a Model for FASD

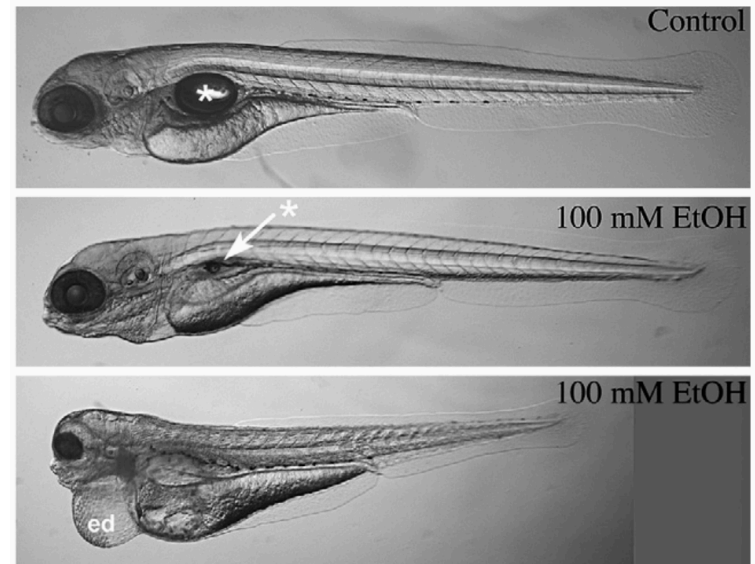
Submerge embryos in ethanol water during key developmental periods

12 hpf – 5 dpf  
0% - 1% EtOH



## Phenotypes

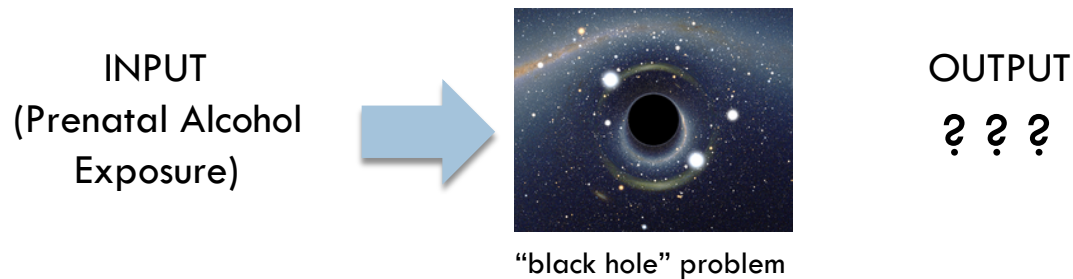
- ✓ **Short stature** (Marrs et al., 2010)
- ✓ **Cardiac defect, recovers with age** (Li et al., 2016; Dlugos and Rabin, 2010)
- ✓ **Altered eye diameter, vision** (Bilotta et al., 2004; 2002)
- ✓ **Craniofacial malformation** (McCarthy et al., 2013; Eberhart's group)
- ✓ **Narrowed arteries and aorta, recovers with age** (Li et al., 2016)
- ✓ **Altered kidney formation**
- ✓ **Disrupted hepatic maturation**
- ✓ **Abnormal exocrine pancreas structure during development**



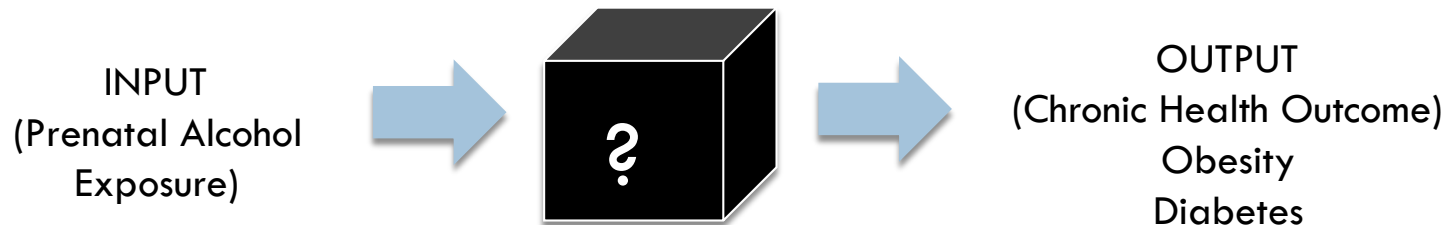
(Marrs et al., 2010)

# Underappreciated Implications of Fetal Alcohol Exposure on Adult Health Outcomes

**Question: What happens to animals with fetal alcohol exposure when they grow up?**



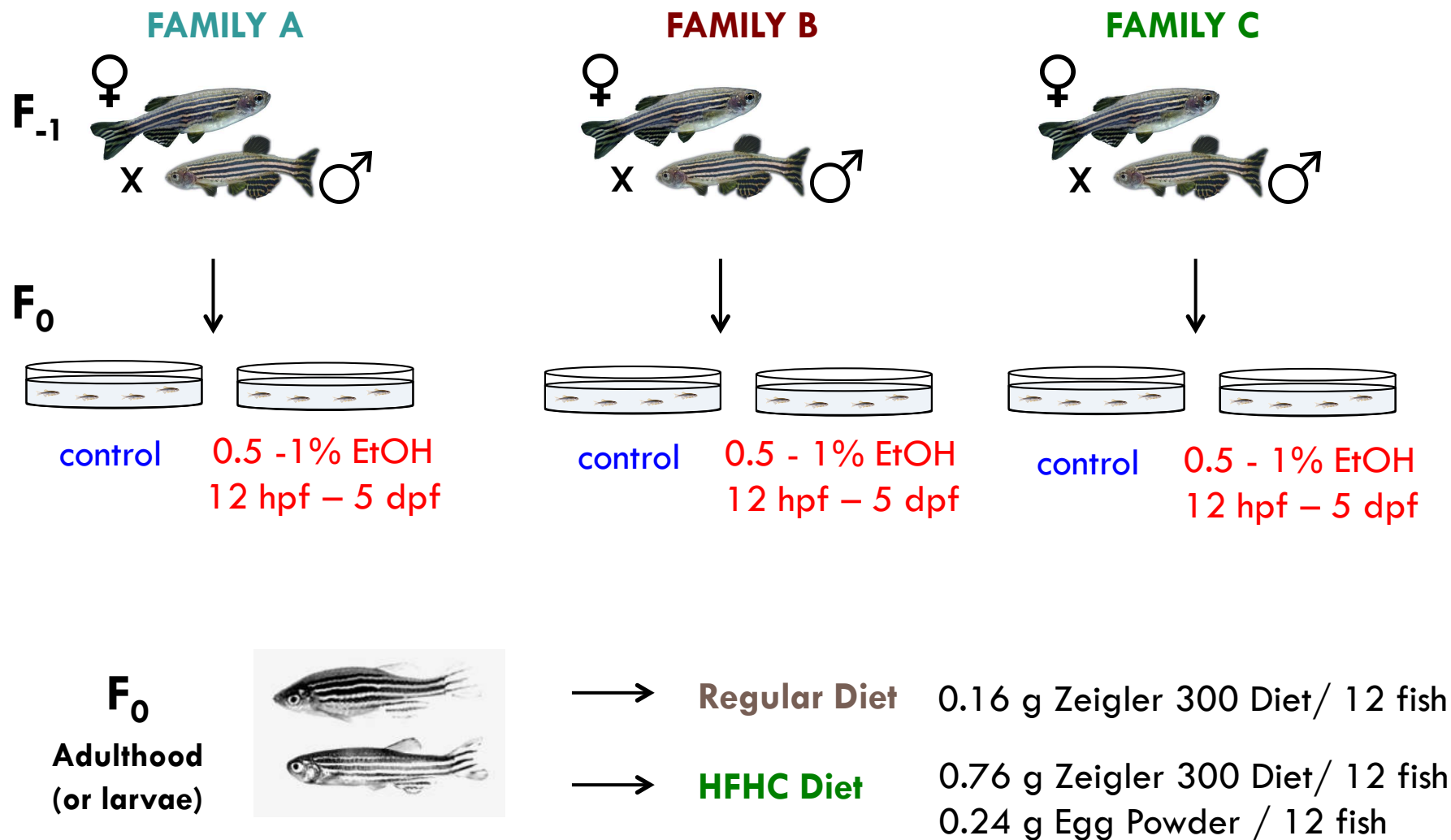
**GOAL 1: Understand the Outputs (generate the “black box” problem)**



**GOAL 2: Decipher the Mechanism(s)**



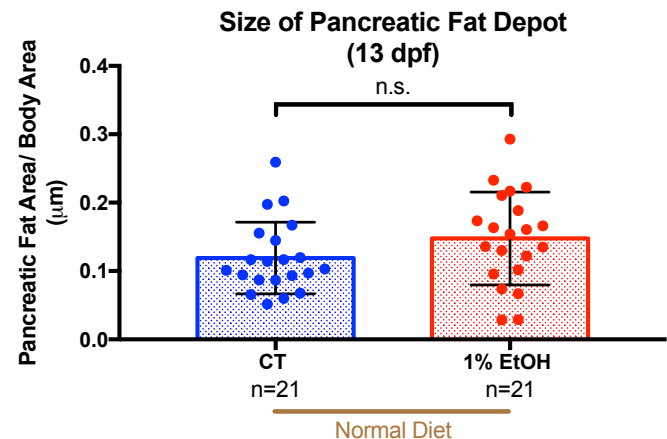
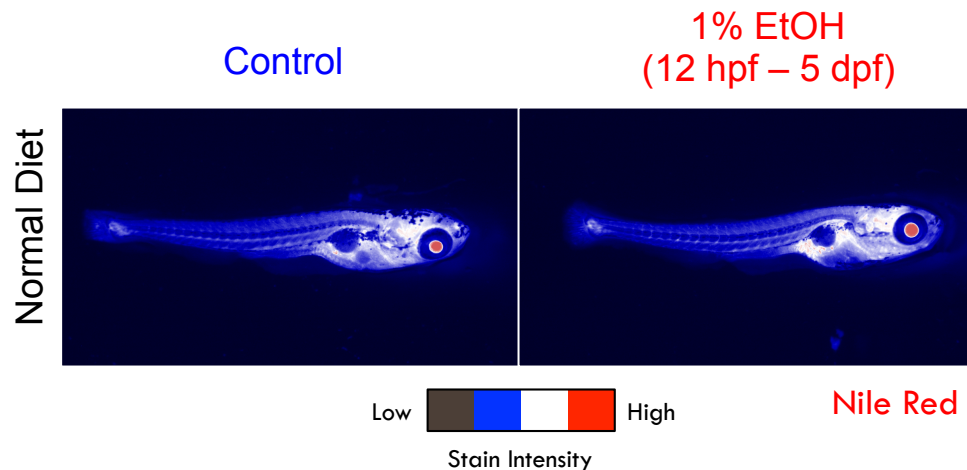
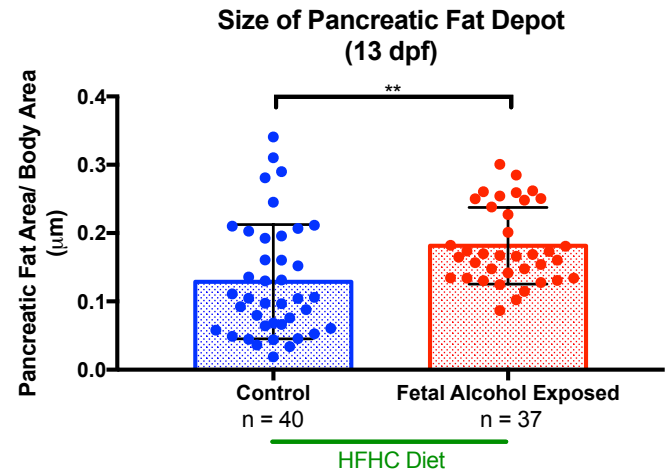
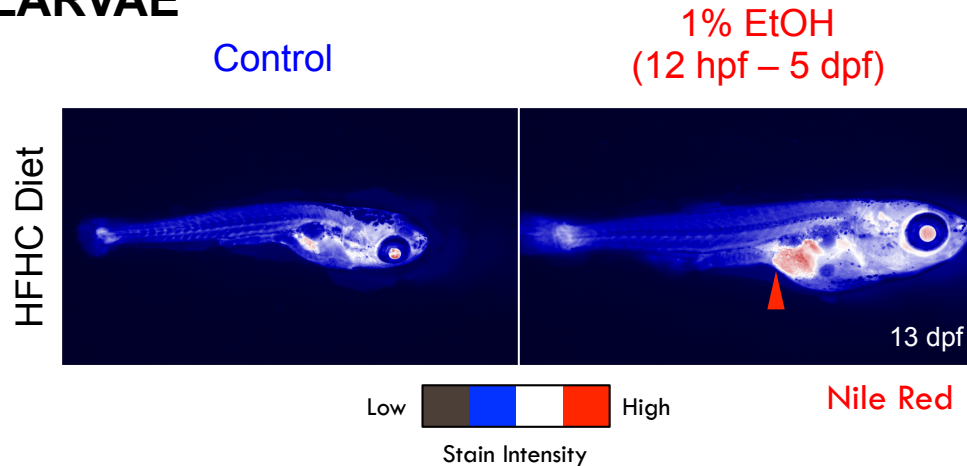
# 1. Generate a Zebrafish Population with Prior Fetal Alcohol Exposure (FAE) for Obesity and Diabetes Studies





# Is Fetal Alcohol Exposure a Risk Factor for Diet-Induced Obesity in Larvae?

## LARVAE

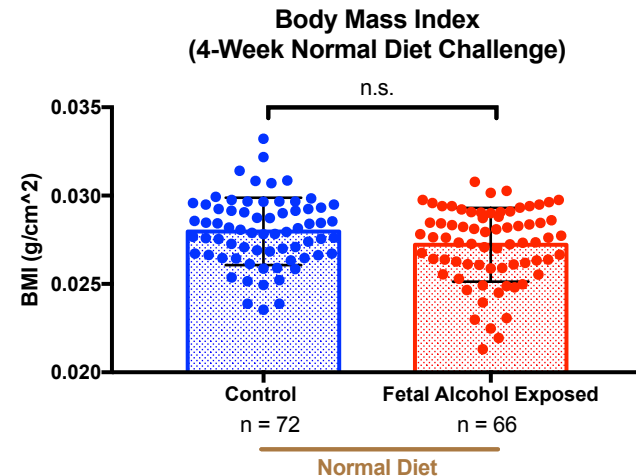
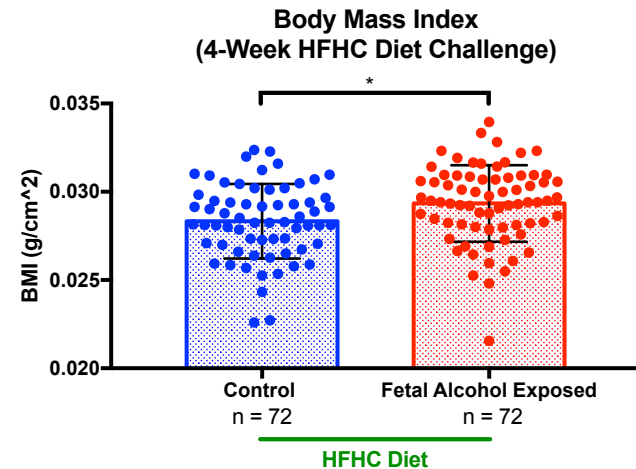
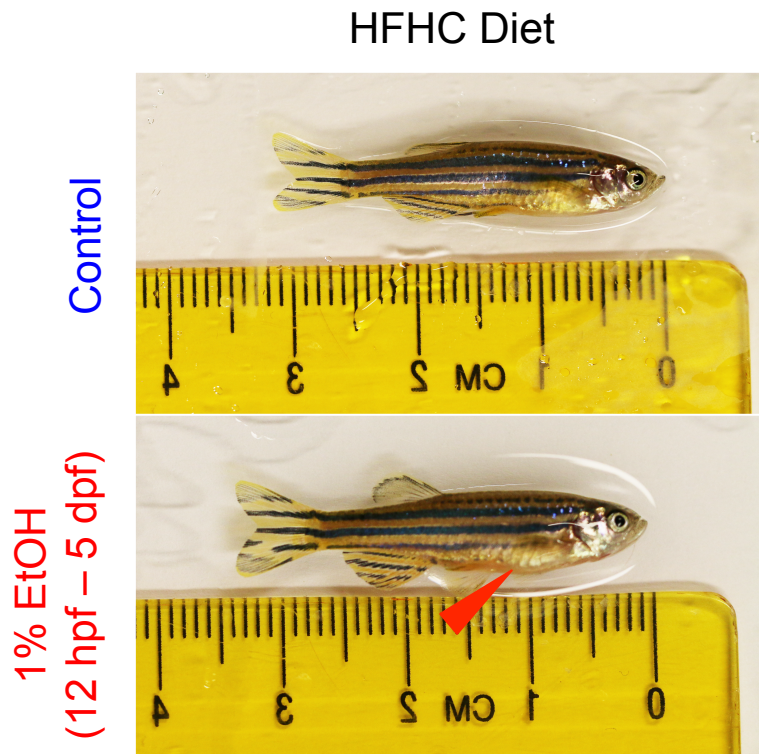




# Is Fetal Alcohol Exposure a Risk Factor for Diet-Induced BMI Gains in Adults?

## ADULT MALES

### 4 Week Diet Challenge

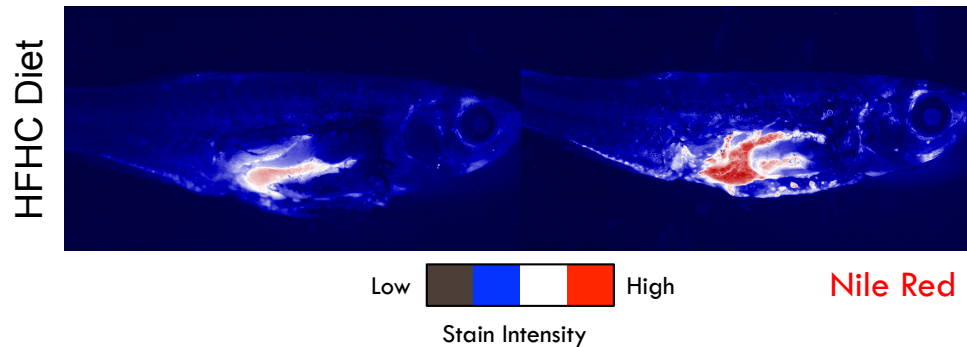


# FASD Adults Rapidly Develop Increased Visceral Adiposity Following Dietary Challenge

ADULT ♂

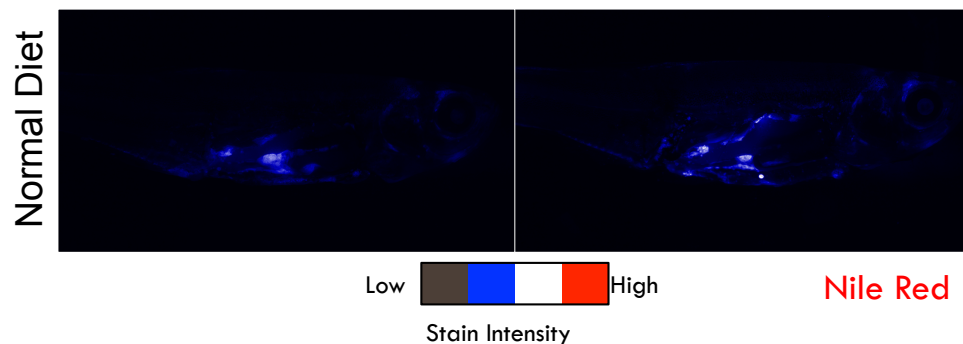
Control

1% EtOH  
(12 hpf – 5 dpf)

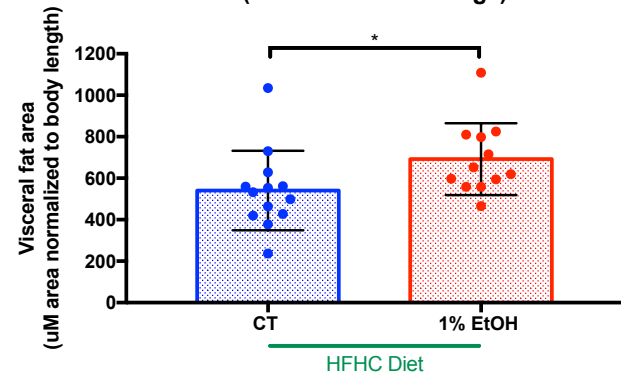


Control

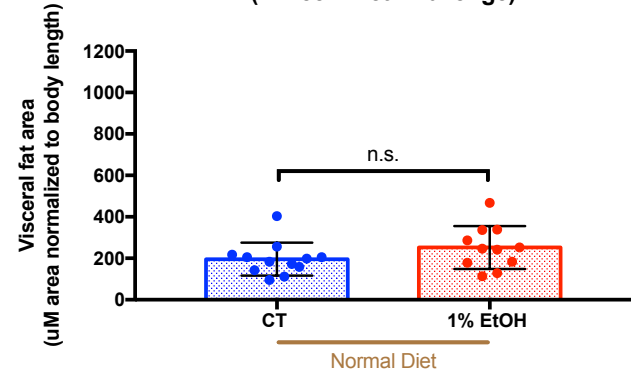
1% EtOH  
(12 hpf – 5 dpf)



F<sub>0</sub> Visceral Fat Quantification  
(4 Week Diet Challenge)

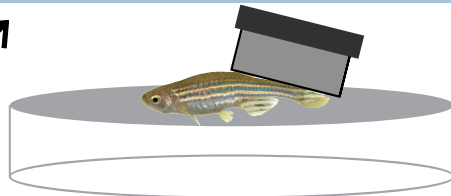


F<sub>0</sub> Visceral Fat Quantification  
(4 Week Diet Challenge)

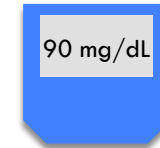


# Is Fetal Alcohol Exposure a Risk Factor For Altered Blood Glucose Homeostasis in Zebrafish?

ADULT ♂

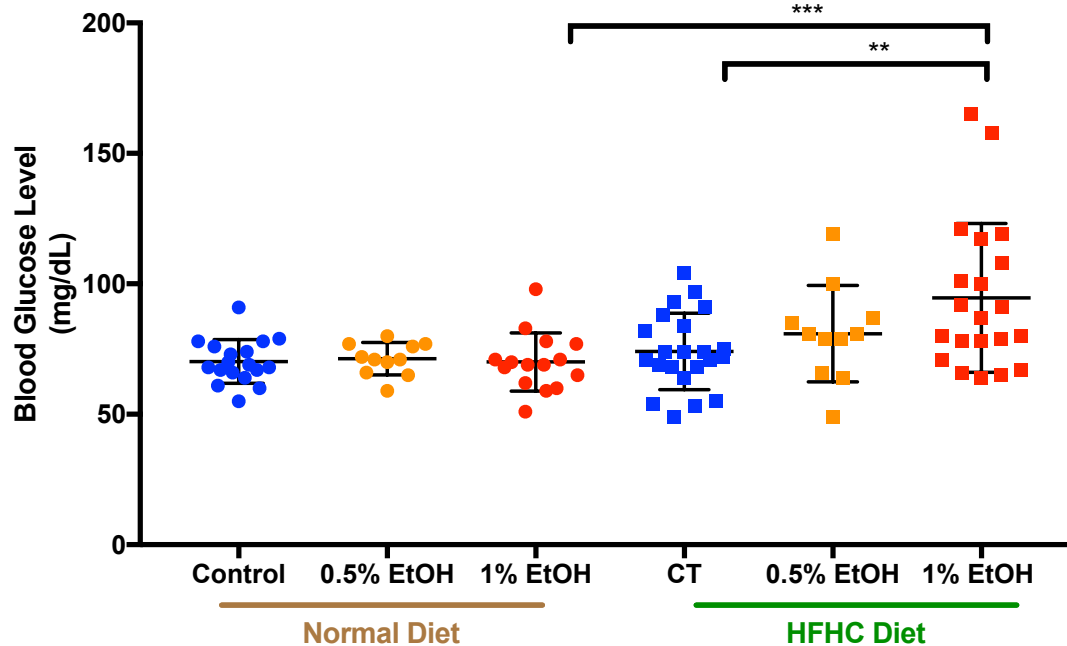


1. Remove Tail



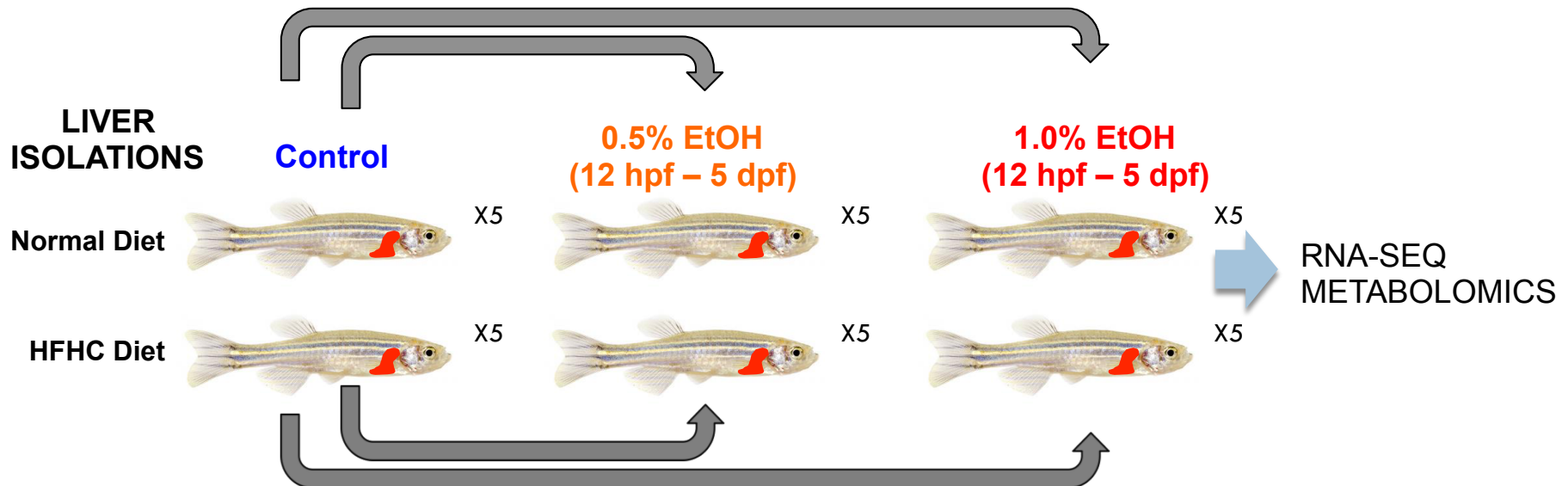
3. Measure Glucose

F<sub>0</sub> Fasting Blood Glucose Level



# Ongoing Experiments

1. Identify the metabolic and molecular mechanisms leading to rapid progression of fetal alcohol exposed zebrafish to metabolic syndrome



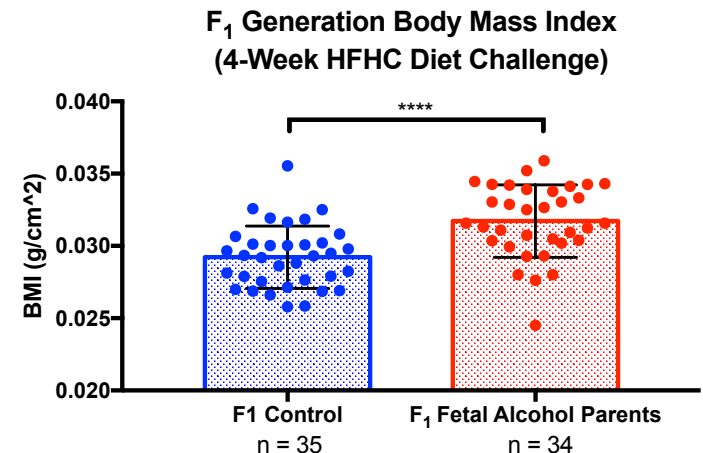
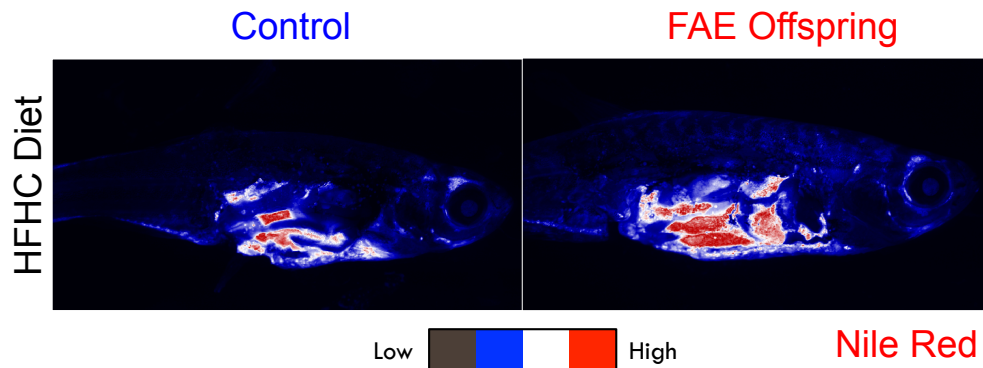
- Identified 68 commonly dysregulated transcripts under normal diet conditions and 186 under HFHC diet
- Fetal alcohol exposed fish are metabolically distinct from control siblings

# Ongoing Experiments

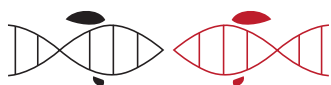
2. Evaluate the intergenerational effects of fetal alcohol exposure on metabolism, BMI, visceral fat deposition, and blood glucose regulation

**PILOT STUDY (NEEDS REPLICATION, GERMLINE SPECIFIC OUTCROSSES)**

**ADULT ♂**



# Acknowledgements



## Goessling Lab

**Wolfram Goessling, MD, PhD**

Kristen Alexa, PhD

**Katie Lee Hwang, PhD**

Emily Kurdzo, PhD

Sahar Nissim, MD, PhD

Arkadi Shwartz, PhD

Chad Walesky, PhD

Paul Wrighton, PhD

Isaac Oderberg, PhD

Gal Chaturantabut, PhD

Scott Freeburg

**Kyle Labella\***

**Allison Tsomides**

**Isabelle Iversen\***

Jake Henderson

Ellie Quenzer

Iris Bally

**Lavinia Goessling**



## Collaborators

Michael Charness, MD (Brigham and Women's Hospital)

Matthew Steinhauser, MD (Brigham and Women's Hospital)

Sebastian Akle (PhD Candidate, Sunyaev Lab, Brigham & Women's Hospital)

Gabriel Bosse, PhD (Randy Peterson Lab, University of Utah)

North Lab (Beth Israel Deaconess Medical Center)

Asara Lab (Beth Israel Deaconess Medical Center)

Center for Cancer Computational Biology (Dana Farber Cancer Institute)

## Funding

Sternlicht Directors Fund Research Fellowship

Albert J. Ryan Fellowship

Ruth L. Kirschstein Predoctoral Individual National Research Service Award, NIAAA

Biogen Innovation Grant Program