

# THE EFFECTS OF CANNABINOIDS ON MURINE EMBRYONIC DEVELOPMENT

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## Introduction & Objective

- In 2021 7.2% of pregnant woman used marijuana, an increase of 3.4% since 2002 [1]
- Leads to developmental irregularities, such as growth restriction, still birth, craniofacial abnormalities, and intellectual impairments [1]

### Objective

- Investigate prenatal cannabinoid exposure on murine embryos:
  - Overall growth of embryo
  - Kidney development
  - Digit separation
  - Cranial formation

## Methods

### Embryo preparation

- Mouse embryos were dissected at gestational day 14.5
- Each embryo was placed in 1% agarose gel
- iDISCO+ protocol was used for tissue clearing [2]



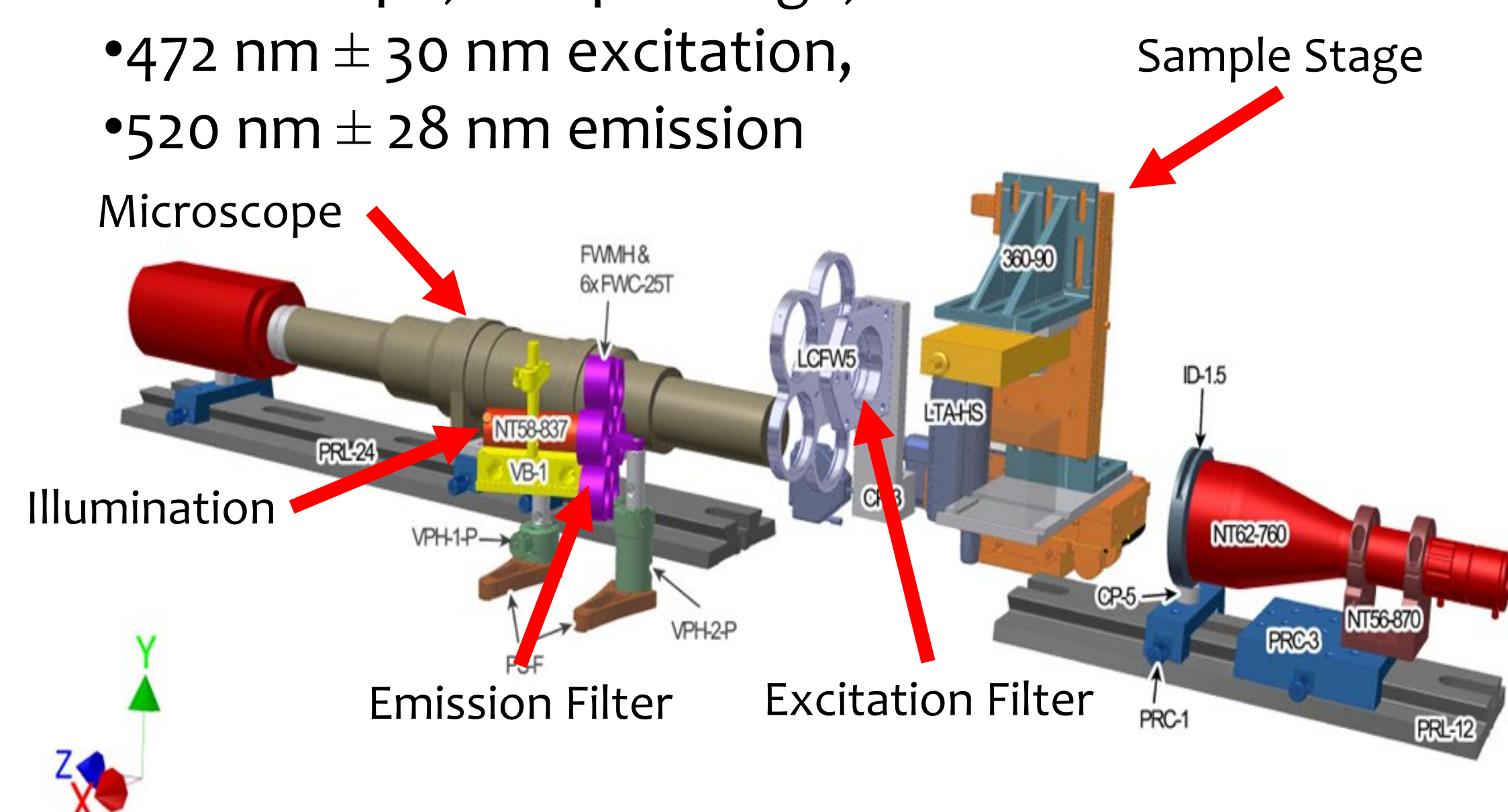
Embryo in agarose gel after clearing



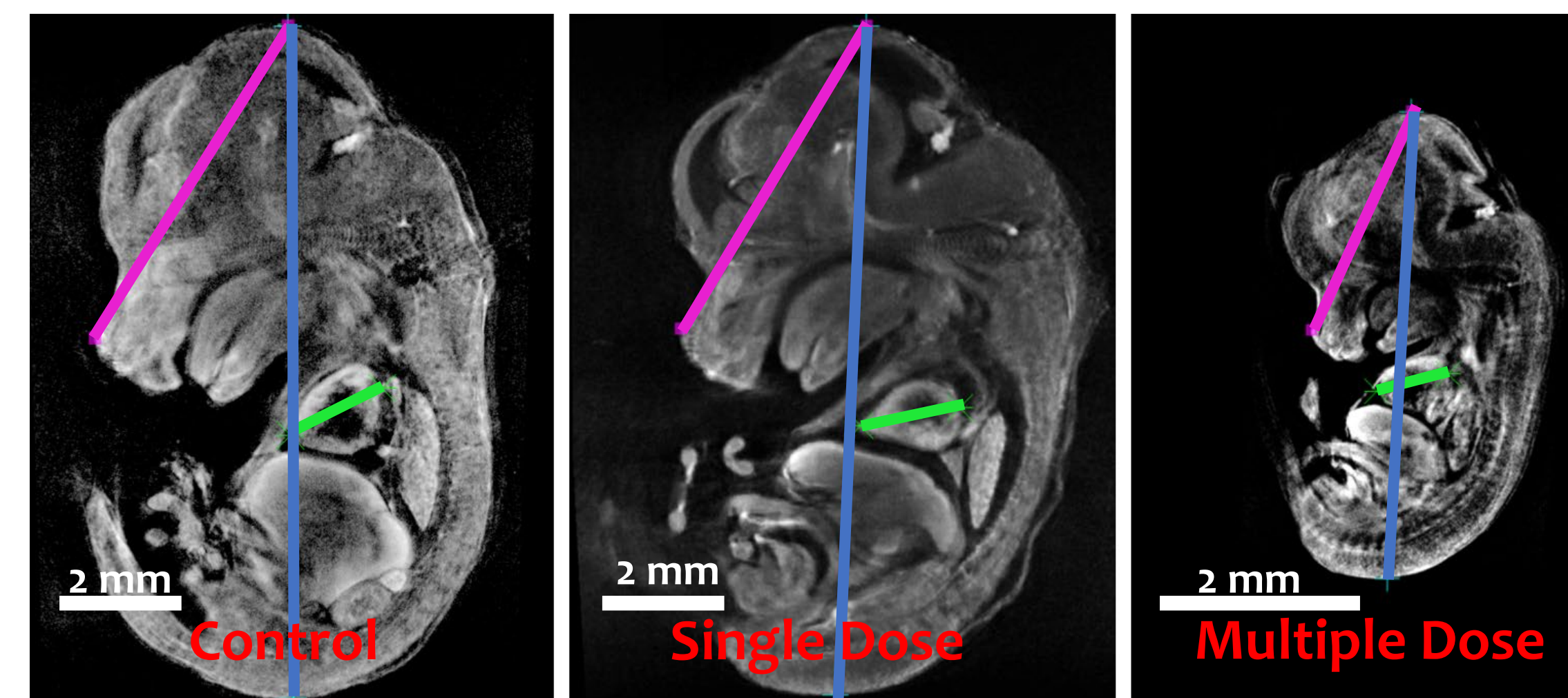
Embryo before clearing

### OPT Imaging Setup:

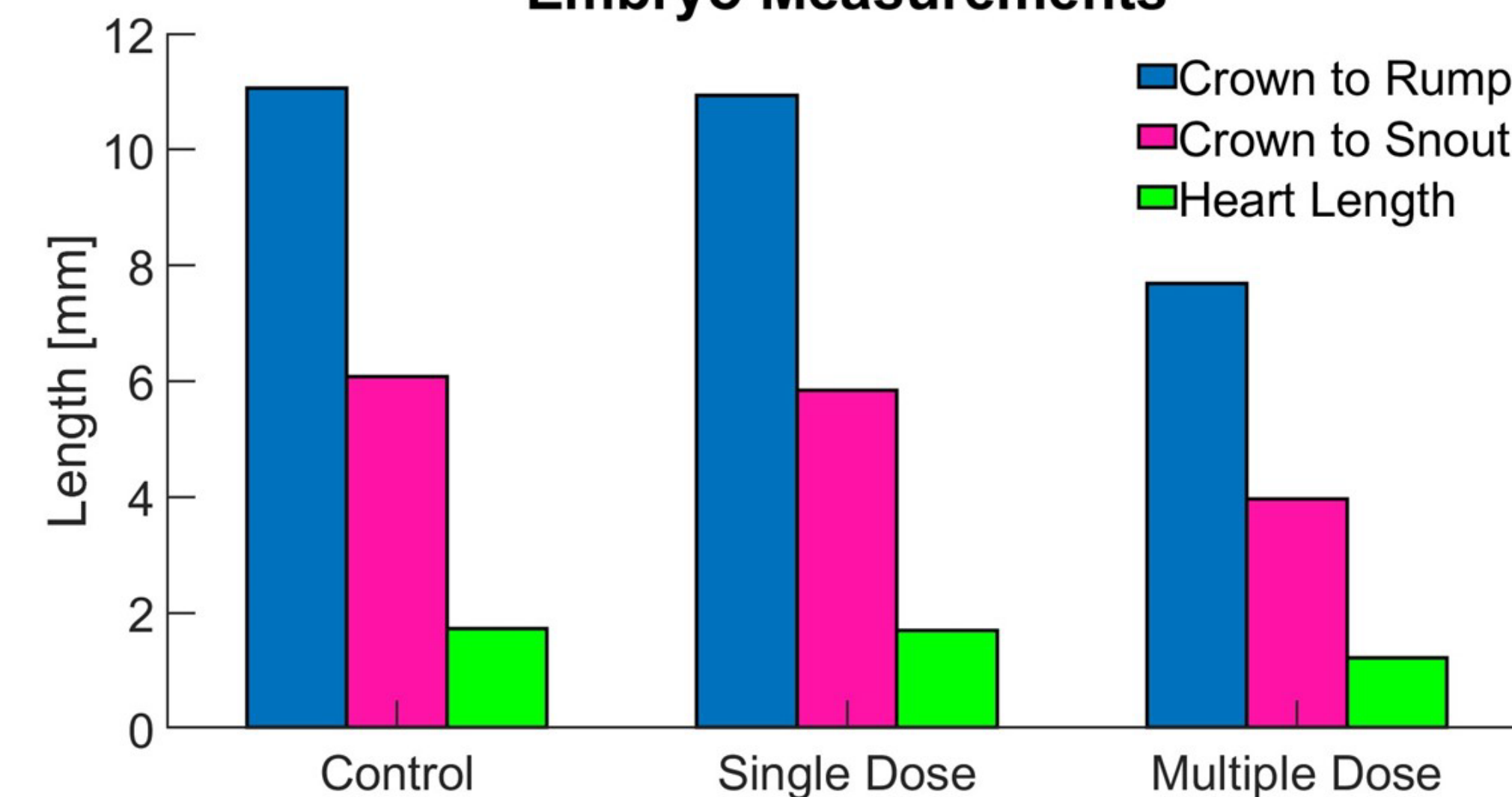
- The system consists of three main components
  - Microscope, Sample Stage, and Illumination [3]
  - 472 nm ± 30 nm excitation,
  - 520 nm ± 28 nm emission



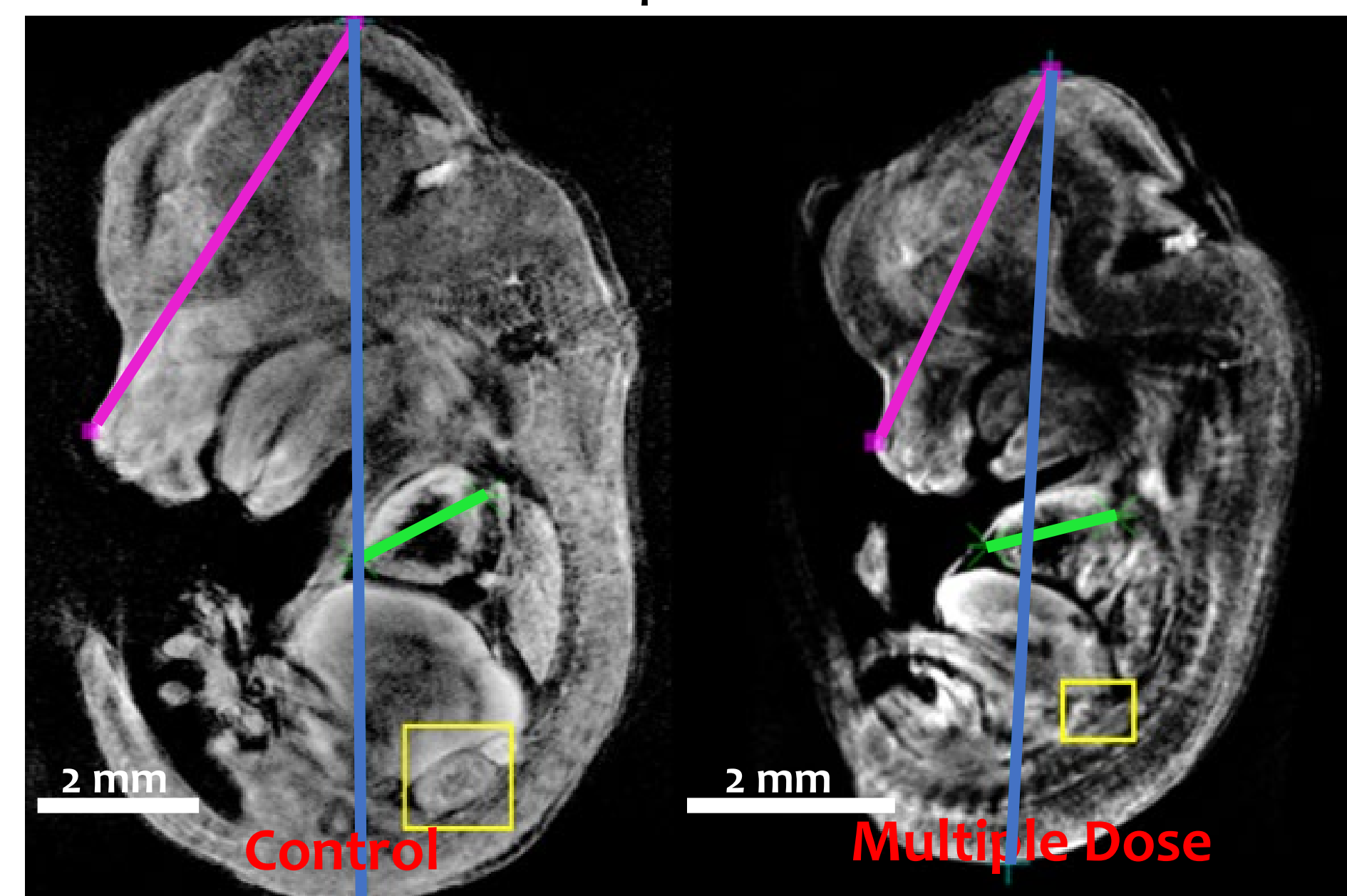
## Results



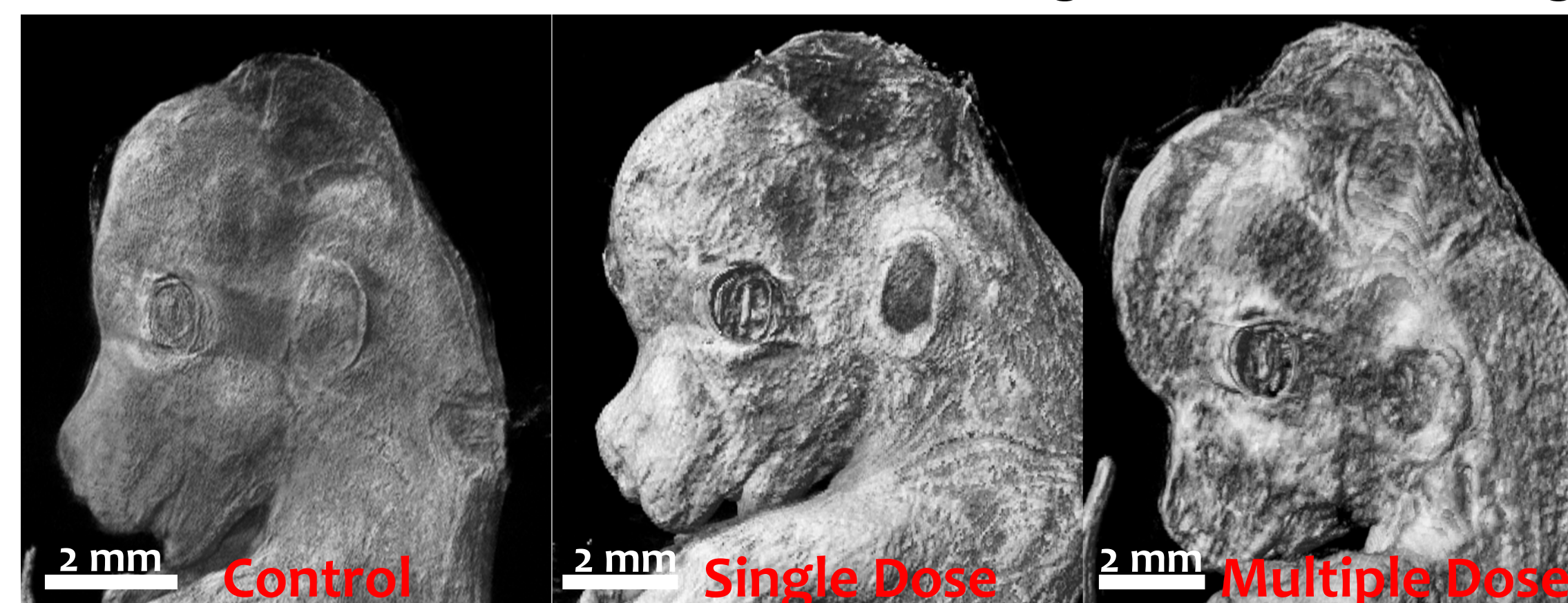
Embryo Measurements



Growth decreased with higher cannabinoid metrics exposure



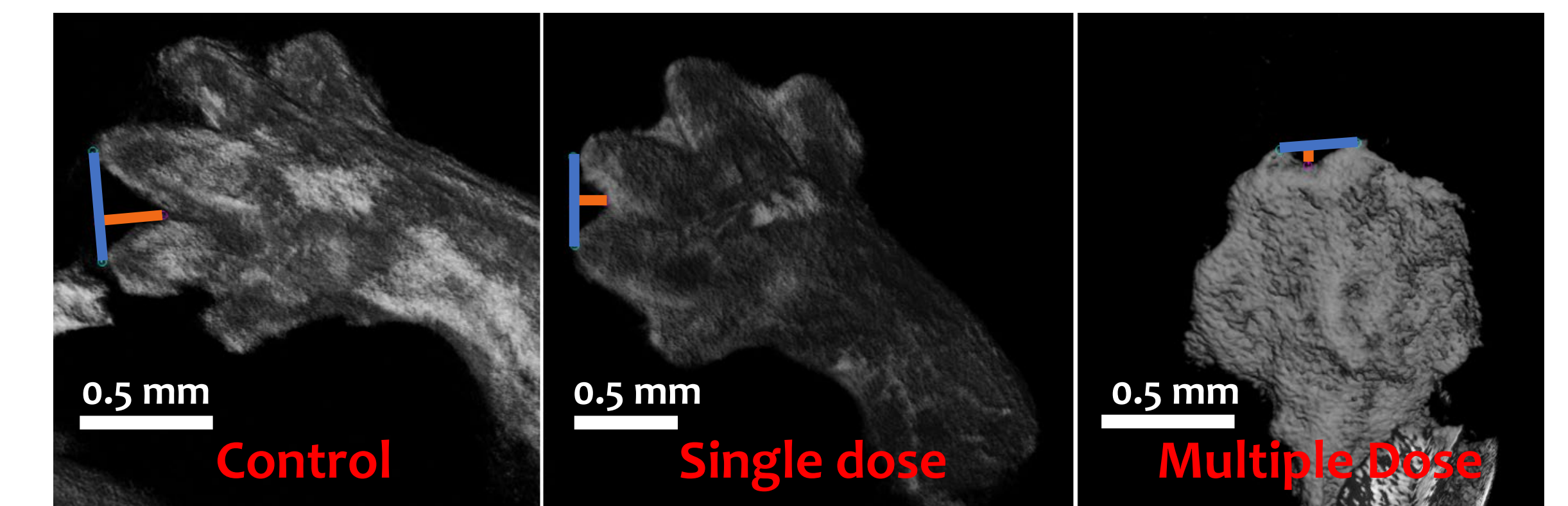
An example of the kidney decreasing due to increasing



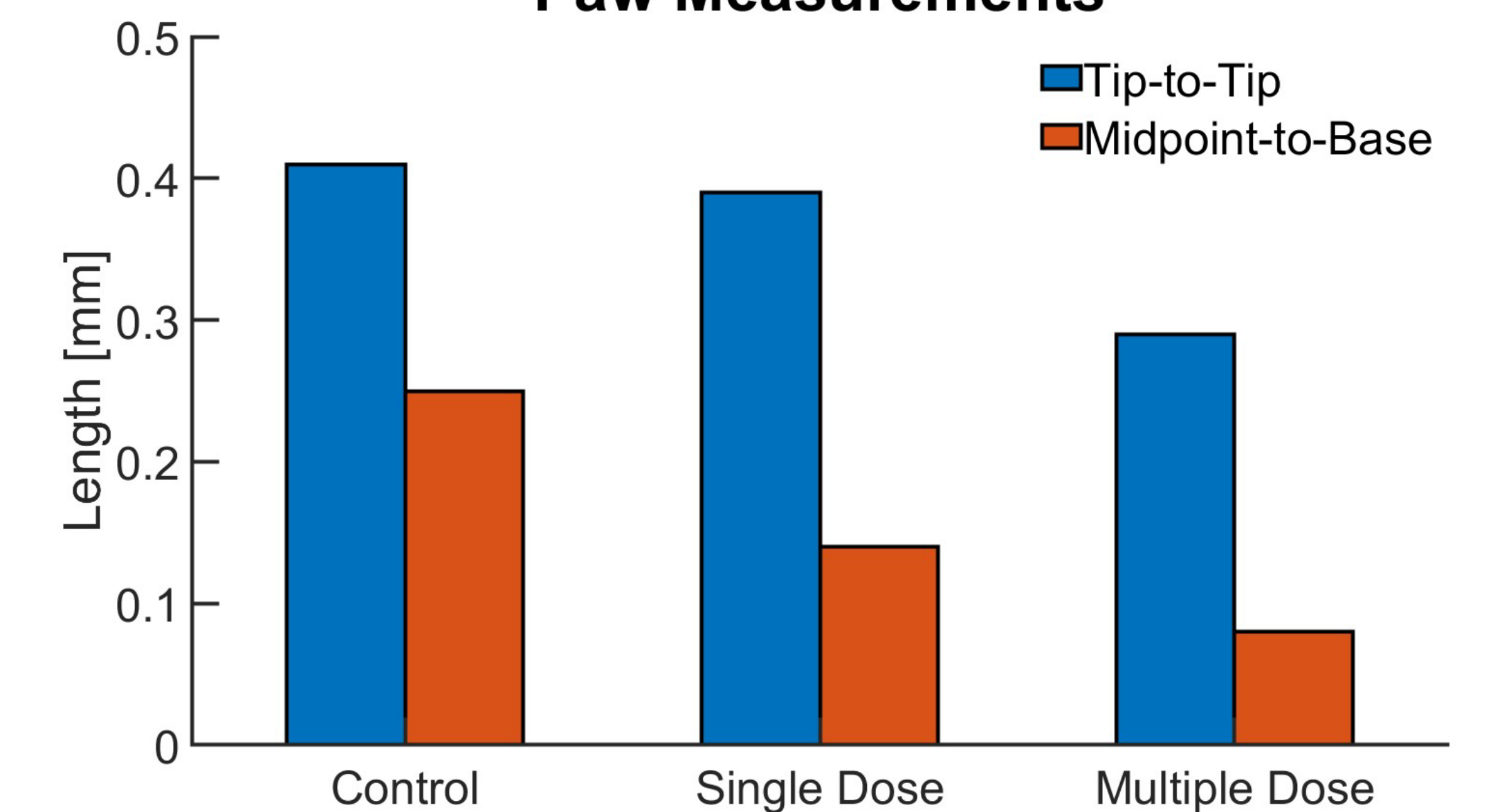
### Microcephaly

- Noticeable difference of the snout
- Incomplete ear formation
- Reduced snout and jaw development
- The cranium becomes increasingly malformed

## Results



Paw Measurements



## Conclusion

- Prenatal cannabinoid exposure led to distinct development abnormalities in murine embryos
- Embryos exposed to multiple doses showed severe growth restriction and structural malformations
- Both crown-rump length (CRL) and crown-snout length (CSL) declined significantly with increasing dosage
- CRL of multiple dosed embryos was reduced by 29.14% in the multiple-dose group
- Heart length only showed minor changes, indicating growth stunting rather than developmental delay
- Exposure to cannabinoid impaired digit separation in a dose-dependent manner
- Optical Projection Tomography (OPT) is a powerful tool for high throughput structural imaging of developmental defects in murine embryos
- The observed morphological disruptions highlight a clear, dose-dependent risk for birth defects associated with cannabinoid exposure during embryogenesis

## References

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- DISCO. (2016, December). Whole-mount staining bench protocol (methanol).
- Wong, M. D., Dazai, J., Walls, J. R., Gale, N. W., & Henkelman, R. M. (2013). Design and implementation of a custom built optical projection tomography system.

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