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P15

# Large-scale unbiased eye atlases in MRI

**Jaime Barranco[1,2,3,4], Adrian Luyken[5], Philip Stachs[6], Óscar Esteban[2], Yasser Aleman[2], Sönke Langner[5,7], Oliver Stachs[5,8], Benedetta Franceschiello[3,4,*], Meritxell Bach Cuadra[1,2,*]**

[1]CIBM Center for Biomedical Imaging, Lausanne, Switzerland; [2] Department of Radiology, Lausanne University Hospital and University of Lausanne, Lausanne, Switzerland; [3] School of Engineering, Institute of Systems Engineering, HES-SO Valais-Wallis, Sion, Switzerland; [4] The Sense Innovation and Research Center, Lausanne and Sion, Switzerland; [5]Department of Ophthalmology, Rostock University Medical Center, Rostock, Germany; [6]Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany; [7]Institute for Diagnostic and Interventional Radiology, Pediatric and Neuroradiology, Rostock University Medical Center, Rostock, Germany; [8]Department Life, Light & Matter, University of Rostock, Rostock, Germany; *These authors provided equal last-authorship contribution.

Contact: jaime.barranco-hernandez@chuv.ch | jaimebarran@gmail.com

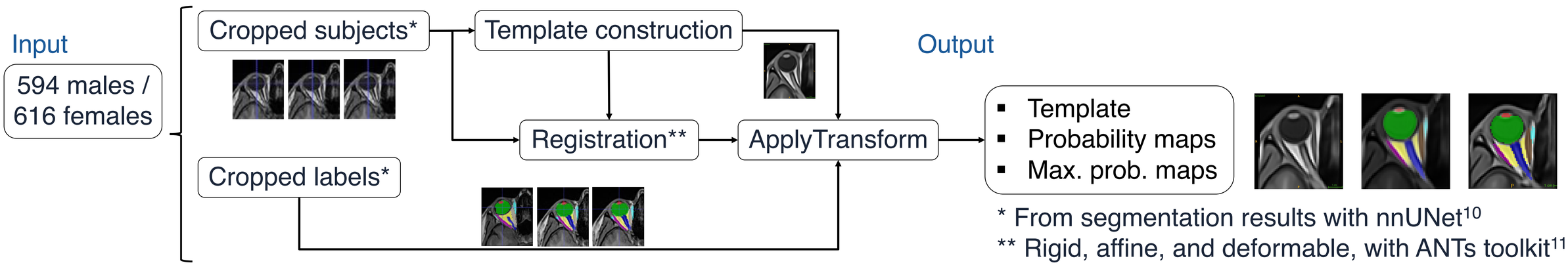
## BACKGROUND

- **Brain** anatomical and probability atlases have played a pivotal role in **neuroimaging** research, offering a **standardized framework** for spatial normalization and quantitative analysis across diverse populations[1,2,3].
- However, they are **currently lacking** in the field of **ophthalmic imaging**.
- A recent study[4] has developed eye atlases in MRI, covering various contrasts (T1w pre-contrast, T1w post-contrast, T2w TSE, and T2w FLAIR) based on 100 images, **but they are not public**.
- Despite this first effort, there is still the need for **large-scale unbiased eye atlases per sex** (males and females), recommended by clinicians, as sex anatomical differences may play a crucial role in various diseases[6,7,8,9], e.g. **endocrine orbitopathy**.

## AIMS

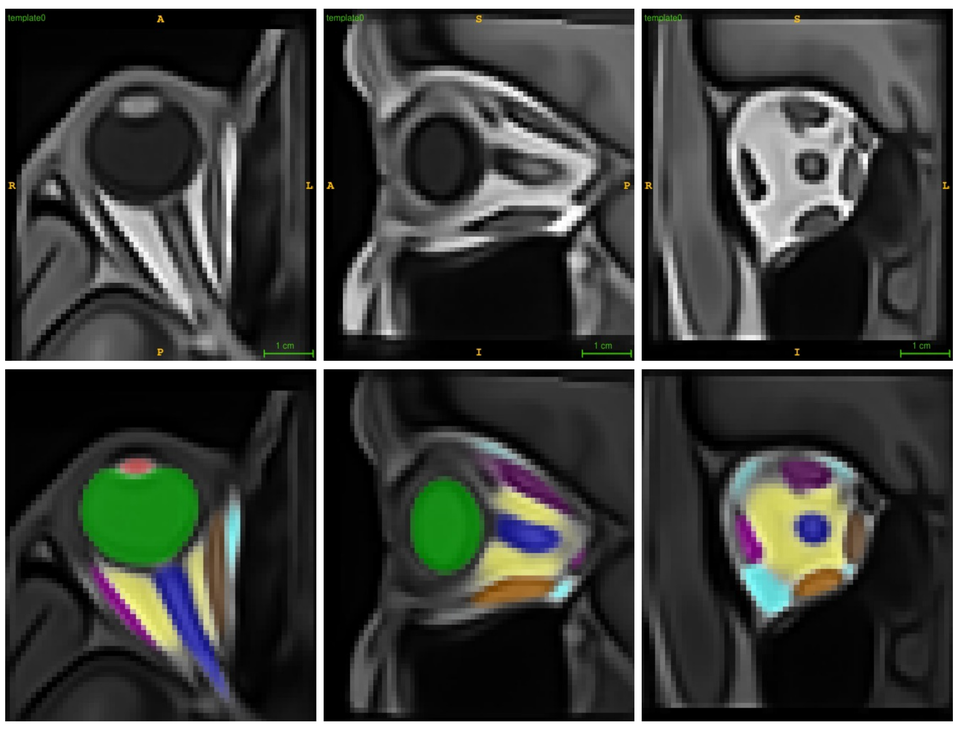
The goal is to provide **the first public large-scale unbiased atlases per sex in MRI**, T1w images in our case, along with their detailed labels for **healthy eye and orbit structures**. The availability of these atlases will facilitate the diagnosis and treatment of a wide range of **ocular diseases**, improving surgical planning, and enhancing our understanding of sex-specific variations in eye anatomy and physiology.

## METHODS

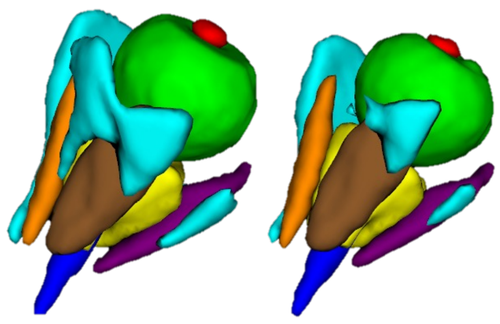



## RESULTS

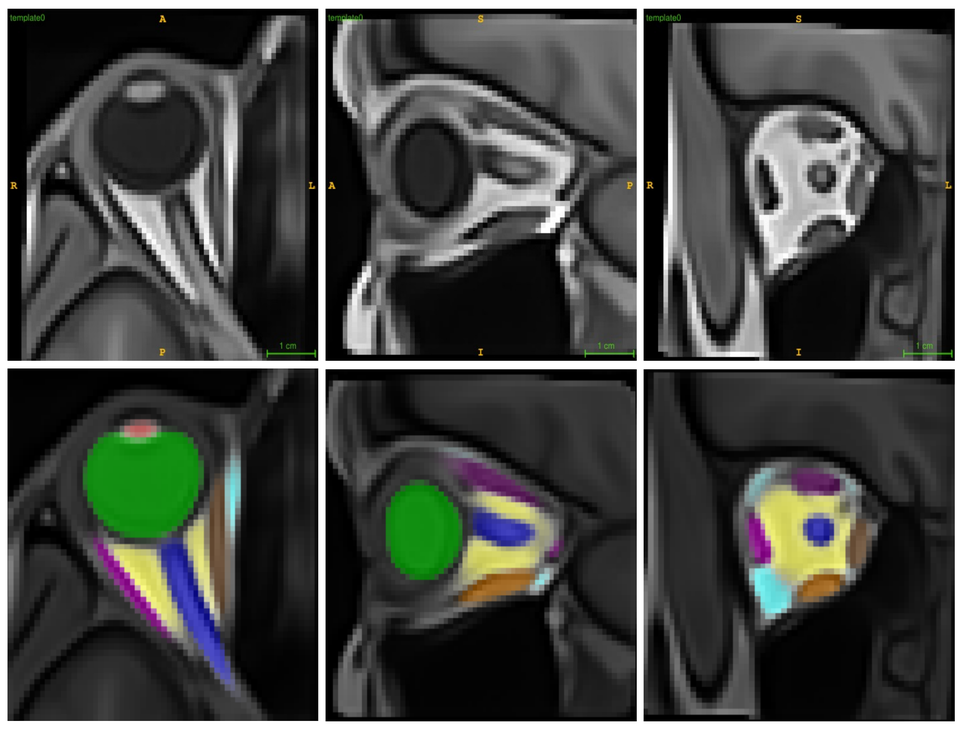
Atlas 594 males



Volumetry ($mm^3$) M I F
- lens: 85 I 67
- globe: 5551 I 5158
- optic nerve: 589 I 526
- int. fat: 2795 I 2293
- ext. fat: 2269 I 1434
- lat RM: 457 I 413
- med RM: 746 I 689
- inf RM: 608 I 531
- sup RM: 853 I 690



Atlas 616 females



## CONCLUSION

- These atlases offer a valuable resource for advancing the study of **ocular anatomy** and can significantly support the accuracy of eye-related research and clinical applications, as has been largely demonstrated for brain studies.
- Furthermore, they enable **colocalization and navigation** within the eye, serving as a standardized spatial reference. This facilitates the exploration of quantitative geometric measurements of eye morphology and structures, even in the presence of systematic population differences.
- **Publicly availables** at Zenodo! DOI: 10.5281/zenodo.13325371

## QR codes

Preprint

Atlases

MIAL

MatTechLab

## References

[1]Dickie, D. A. et al. (2017), [2]Cabezas, M. et al (2011), [3]Fonov, V. et al. (2009), [4]Lee, H. H et al. (2024), [5]Jain, S. (2023), [6]Hierl, K. V. et al. (2022), [7]Patra, A. et al. (2021), [8]Klinge, I. et al. (2010), [9]Zetterberg, M et al. (2016), [10]Isensee et al. (2021), [11]Avants, B. et al. (2009).

## Partner Institutions

## Funded by