



# Visual perceptual learning occurs during ultrasound training but is quickly lost without continued experience.

Olivia Mescher BS, Cassidy Musick MS, Briana Landis BS, Randal Anderson MD, Anthony Pappas PhD  
Rocky Vista University, College of Osteopathic Medicine

## Introduction

Accurate processing of visual scenes, including medical images, can occur rapidly (150-200 msec) if the observer is familiar with the scene<sup>2,3</sup>. Our study investigates the impact of a formal 1-yr ultrasound (US) training program on medical students' ability to identify anatomic structures in US images.

Three groups of participants were included in this study:

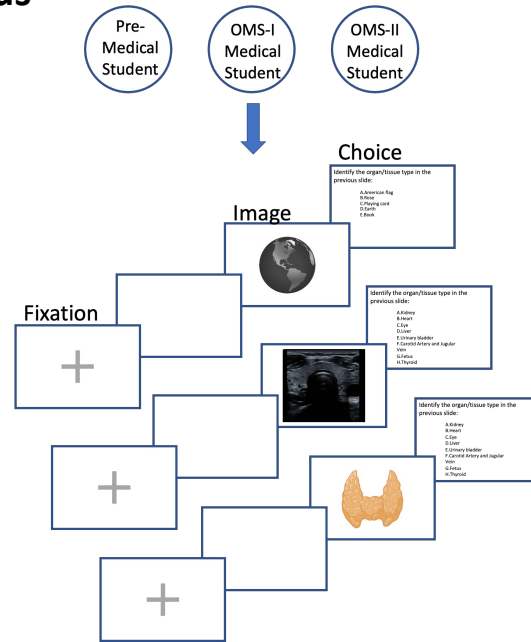
1. Pre-medical students (PMs) with no formal US training.
2. 1<sup>st</sup> year osteopathic medical students (OMS-I) tested two days after completing a year of formal US training.
3. 2<sup>nd</sup> year osteopathic medical students (OMS-II) tested 6 months after completing a year of formal US training.

## Purpose

To determine 1) if one year of US training enables medical students to correctly identify anatomic structures in US images presented for 200 msec, and 2) if continued US extracurricular experience affects student performance.

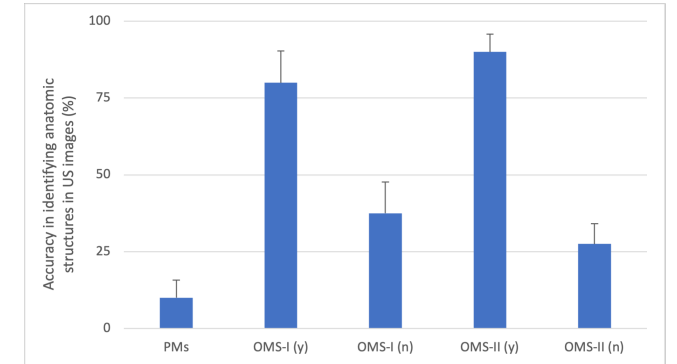
We hypothesize that a year of US training during medical school enables automatic visual processing of US images.

## Methods



**Figure 1. Task and study design.** A PowerPoint presentation containing five conventional US images, one 3-D reconstructed US image<sup>1</sup>, five anatomical cartoon images and four images of commonplace objects as controls. As a control, each image was presented at random twice throughout the task. Responses were only marked correct when participants accurately identified the anatomic structure twice. Only participants that correctly identified the fetal face and control objects were included in our analysis. Prior to the task, all participants indicated whether they engaged in extracurricular US experiences prior to participating in this study.

## Results



**Figure 2. Extracurricular US experience significantly enhances accuracy in identifying anatomic structures in rapidly-presented US images.** Medical students with a formal US training performed better than PMs in identifying anatomic structures (OMS-I  $\mu=55.7\% \pm 10.0\%$ ; OMS-II  $\mu=48.3\% \pm 10\%$ ; PMs  $\mu=10.7\% \pm 5.8\%$ ). However, extracurricular US experience (y) significantly enhanced this ability in OMS-I and OMS-II, compared to students that just received the formal training (n).

## Conclusion

Our study shows that one year of US training during medical school enables rapid, automatic visual processing of US images. However, this ability is significantly enhanced if students decide to engage with US beyond their curricular requirements.

Future studies will determine whether this ability is lost during the third year of medical training, when students begin clinical rotations and do not have regular access to the US imaging modality.

## References

1. 3D reconstructed image: Case courtesy of Dr. Servet Kahveci. <a href="https://radiopaedia.org/?lang=us">Radiopaedia.org</a>. From the case <a href="https://radiopaedia.org/cases/60110?lang=us">https://radiopaedia.org/cases/60110?lang=us</a>: 60110</a>
2. Melissa L.-H. V6, John M. Henderson: The time course of initial scene processing for eye movement guidance in natural scene search. *Journal of Vision* 2010;10(3):14. doi: <https://doi.org/10.1167/10.3.14>.
3. Waite S, Kolla S, Jeady J, et al. Tired in the Reading Room: The Influence of Fatigue in Radiology. *J Am Coll Radiol*. 2017;14(2):191-197. doi:10.1016/j.jacr.2016.10.009