



Can ultrasound contrast agents increase the treatment envelope?

Citation

McDannold, Nathan, Natalia Vykhodtseva, Costas Arvanitis, Margaret Livingstone, and Ferenc Jolesz. 2015. "Can ultrasound contrast agents increase the treatment envelope?" *Journal of Therapeutic Ultrasound* 3 (Suppl 1): 030. doi:10.1186/2050-5736-3-S1-030. <http://dx.doi.org/10.1186/2050-5736-3-S1-030>.

Published Version

doi:10.1186/2050-5736-3-S1-030

Permanent link

<http://nrs.harvard.edu/urn-3:HUL.InstRepos:17820917>

Terms of Use

This article was downloaded from Harvard University's DASH repository, and is made available under the terms and conditions applicable to Other Posted Material, as set forth at <http://nrs.harvard.edu/urn-3:HUL.InstRepos:dash.current.terms-of-use#LAA>

Share Your Story

The Harvard community has made this article openly available.
Please share how this access benefits you. [Submit a story](#).

[Accessibility](#)

ORAL PRESENTATION

Open Access

Can ultrasound contrast agents increase the treatment envelope?

Nathan McDannold^{1*}, Natalia Vykhodtseva¹, Costas Arvanitis¹, Margaret Livingstone², Ferenc Jolesz¹

From Current and Future Applications of Focused Ultrasound 2014. 4th International Symposium Washington, D.C, USA. 12-16 October 2014

Background/introduction

Currently, thermal ablation via transcranial MRI-guided focused ultrasound is restricted to centrally-located regions in the brain. This limitation is the result of skull heating when the focal region is steered to more peripheral regions in the brain, along with other factors such as limitations in beam steering in the currently-available clinical brain focused ultrasound systems. The treatment envelope could be expanded if the time averaged acoustic power needed for ablation could be reduced.

Methods

The introduction of ultrasound contrast agents – preformed microbubbles that are injected intravenously – can reduce the power needed to ablate tissue. These commercially-available microbubble agents respond strongly to an acoustic field, even at low intensities, and greatly magnify the resulting bioeffects.

Results and conclusions

This presentation will provide a summary of animal data obtained in small animals and in nonhuman primates at our institution and by others that tested contrast-enhanced ultrasound ablation. Overall, these studies have demonstrated that ablation can be achieved at time-averaged acoustic power levels at least an order of magnitude less than what is needed for thermal ablation.

The huge reduction in acoustic power that can be achieved with ablation combined with ultrasound contrast agents may enable a substantial increase in the “treatment envelope” for transcranial focused ultrasound systems. New methods are being developed to control the procedure and to ensure that unwanted tissue effects do not occur outside of the focal region. These developments,

along with other unresolved issues with this mode of ablation will be topics for discussion.

Acknowledgements (Funding)

Funding: Focused Ultrasound Foundation; NIH grants P01CA174645, P41EB015898.

Authors' details

¹Brigham & Women's Hospital, Boston, Massachusetts, United States.

²Harvard Medical School, Boston, MA, United States.

Published: 30 June 2015

doi:10.1186/2050-5736-3-S1-O30

Cite this article as: McDannold *et al.*: Can ultrasound contrast agents increase the treatment envelope? *Journal of Therapeutic Ultrasound* 2015 3(Suppl 1):O30.

Submit your next manuscript to BioMed Central and take full advantage of:

- Convenient online submission
- Thorough peer review
- No space constraints or color figure charges
- Immediate publication on acceptance
- Inclusion in PubMed, CAS, Scopus and Google Scholar
- Research which is freely available for redistribution

Submit your manuscript at
www.biomedcentral.com/submit



¹Brigham & Women's Hospital, Boston, Massachusetts, United States
Full list of author information is available at the end of the article