

A Transvertebral Ultrasound Therapy Spine-Specific Phased Array: Configuration and Simulation

Pallavi Jha*

Ortho Spine Institute, Patna, India

The design and simulation of the performance of two phased spine-specific arrays in sonic targets spanning the thoracic spine with the goal of generating controlled foci in the spinal canal effectively. Using multi-layered ray acoustics simulation, two arrays (256 elements each, 500 kHz) were created: a four-component array with dedicated components for sonicating through the paravertebral and transvertebral paths, and a two-component array with spine-specific adaptive focusing. Using forward simulation in neutral and flexed spines to explore methods that minimise spine-induced insertion failure, mean array efficiency (canal focus pressure/water focus pressure) was assessed. The effects of target-specific four-component array reconfiguration and lower frequency sonication (250 kHz) on array efficiency and focal measurements were investigated.

When the two- and four-component efficiencies were [Formula: see text] percent and [Formula: see text] percent, respectively, spine flexion improved four-component efficiency ([Formula: see text] percent), but not two-component efficiency ([Formula: see text] percent). ([Formula: see text] percent). The efficiency of a target-specific four-component re-configuration was dramatically improved ([Formula: see text] percent). Both arrays developed managed foci centred inside the canal with 50 percent pressure contour measurements of 10.8-11.9 mm (axial), 4.2-5.6 mm (lateral), and 5.9-6.2 mm, respectively (vertical).

However, simulation at 250 kHz doubled the lateral focal dimensions while improving two- and four-component efficiency ([Formula: see text] percent and [Formula: see text] percent, respectively).

Simulation shows that in the thoracic spinal canal, the spine-specific arrays are able to generate controlled focal points.

The complex geometry of the human spine presents geometrical and acoustical challenges for transspine ultrasound focusing, and the design of these spine-specific ultrasound arrays is crucial to the clinical translation of focused ultrasound for the treatment of spinal cord disease.

How to cite this article: Pallavi Jha "A Transvertebral Ultrasound Therapy Spine-Specific Phased Array: Configuration and Simulation" *J Spine*10

*Address for Correspondence: Jha P, Ortho Spine Institute, Patna, India, E-mail: lavipal18j@gmail.com

Copyright: © 2021 Jha P. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Received 02 February 2021; **Accepted** 18 February 2021; **Published** 26 February 2021