

# 10-Week Hatha Yoga increases right Hippocampal density compared to active and passive control groups: A controlled structural cMRI study



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## Abstract

**Background:** Hatha Yoga includes holding, stretching and strengthening exercises as well as breathing and meditation techniques. It became well known for its stress reducing effect and increasingly even for the positive impact in various cardiovascular and neurological diseases. According to morphological affects studies on meditation and mind body techniques point out stress and vegetative related areas. However, sport is also known for a similar effect. The current study was designed to evaluate potential Yoga specific changes in the autonomic system and brain structure in comparison with an active sport group and a passive control group. **Materials and Methods:** We conducted a longitudinal structural MRI study to investigate changes in gray matter (GM) density following a Yoga intervention. In order to check the repeatability of the results two data acquisition periods (cohorts) with the same study design were done. Yoga naive subjects (n=19/n=20) received a Yoga intervention once a week for 75 minutes over a period of 10 weeks. Control groups included active sport subjects (n=10/n=22) and passive subjects (n=17/n=14). All participants could choose their group assignment by their own preference. A longitudinal and group comparison was done by voxel-based morphometric analyses before and after the intervention. In addition, blood pressure and pulse were taken before and after the study period as a controlling instrument. Finally, the results of the two cohorts were reported into a comprising data set for a general conclusion on Yoga effects. **Results:** Initially, hippocampal GM density as well as the GM density the inferior parietal lobe, the Brodmann Area 44 both insulae, superior temporal gyri and in the Yoga group was significantly lower than in both control groups already before the intervention. It was equally and independently present in both cohorts. The longitudinal MRI measurements showed a significant increase in the right hippocampal GM density as a specific effect of the Hatha Yoga intervention. Coincidentally, the blood pressure measurement detected a significant reduction in both systolic and diastolic blood pressure only in the Yoga group but not in the sport or passive group. Pulse rate showed no significant group differences. The diastolic blood pressure reduction correlated significantly with the GM reduction in both insulae.

**Conclusions:** Various neurodegenerative and neuropsychiatric diseases as well as long lasting stress lead to structural shrinkage of the hippocampal GM. In contrast, stress reduction was shown to be associated with an increase in the hippocampal GM density. The Yoga specific effect in this study can be considered as positive impact on both stress management and its underlying neural structure. These effects have been already proven in prevention and therapy of neurodegenerative and neuropsychiatric diseases. The Yoga induced stress reduction can be furthermore supported by the findings of blood pressure reduction. Blood pressure is well known as an indirect indicator for stress reduction. The correlation of blood pressure and insular change provides new information on the structural and autonomic relation due to Yoga intervention.

Since the GM density of some stress related areas were twice detected lower in the two Yoga cohorts compared to both control groups, one may postulate a pre-existing but unconscious higher stress vulnerability when voluntarily deciding for the Yoga intervention.

## Biography:

In close contact with Indian yoga masters, Malvina Garner came into contact with the philosophy of yoga at a very young age. At the age of 16 she completed a yoga instructor course at SVYASA, Yoga University Bangalore, India. Three years later, she started to study medicine and to teach medical students and staff members yoga at University of Saarland, Germany. During that time, she started her structural MRI study on the effects of yoga and sports to students. Once finishing her studies in 2016, Malvina Garner worked as an internal physician for almost 2 years. Following her strong interest and enthusiasm for brains and neuroscience she, then, changed her specialization: She is now working as an assistant physician and neuroscientist at the Saarland University Hospital for Diagnostic and Interventional Neuroradiology. Her research interest lies in MRI studies on yoga, meditation and breathing. For her research work she has already been awarded a Recognition award of "Alois Lauer Foundation" as well as a first price award for oral presentation at the "22nd International conference on frontiers in Yoga research and its applications", India.



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