

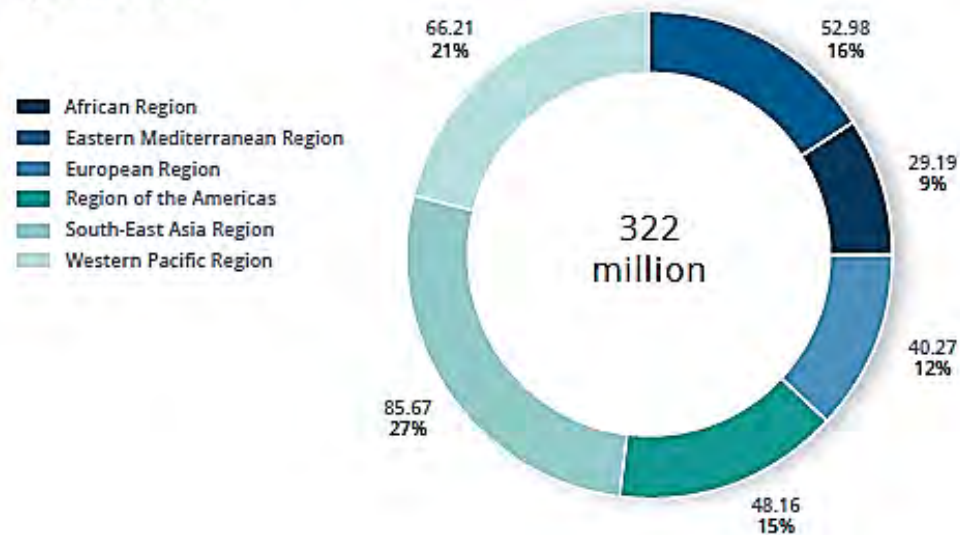


Yoga Therapy in depression: Neurobiological Mechanism

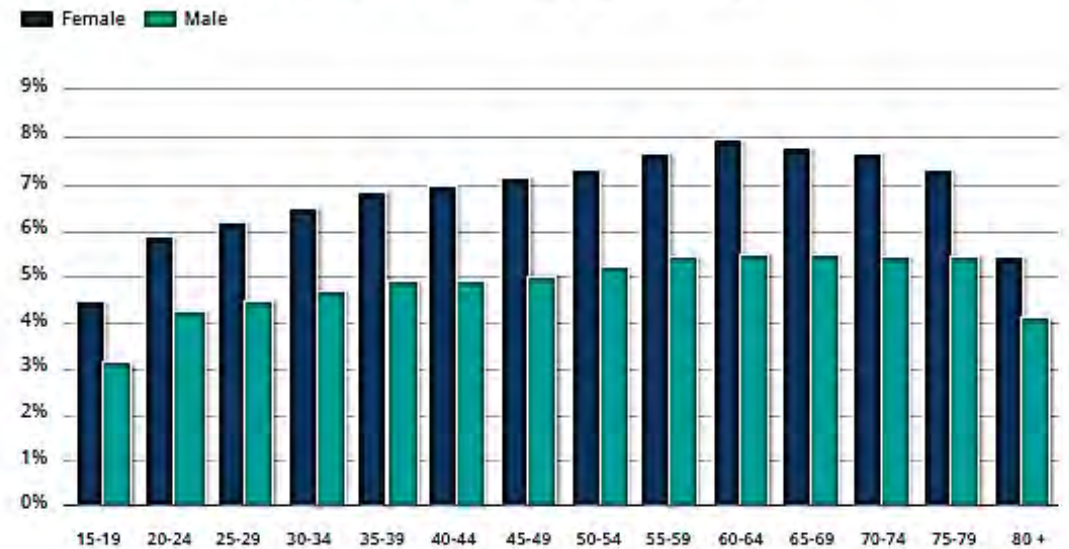
Dr B.N.Gangadhar, MD, DSc
Senior Professor of Psychiatry
&
Director NIMHANS

Depression – leading cause of disability globally

**Cases of depressive disorder (millions),
by WHO Region**

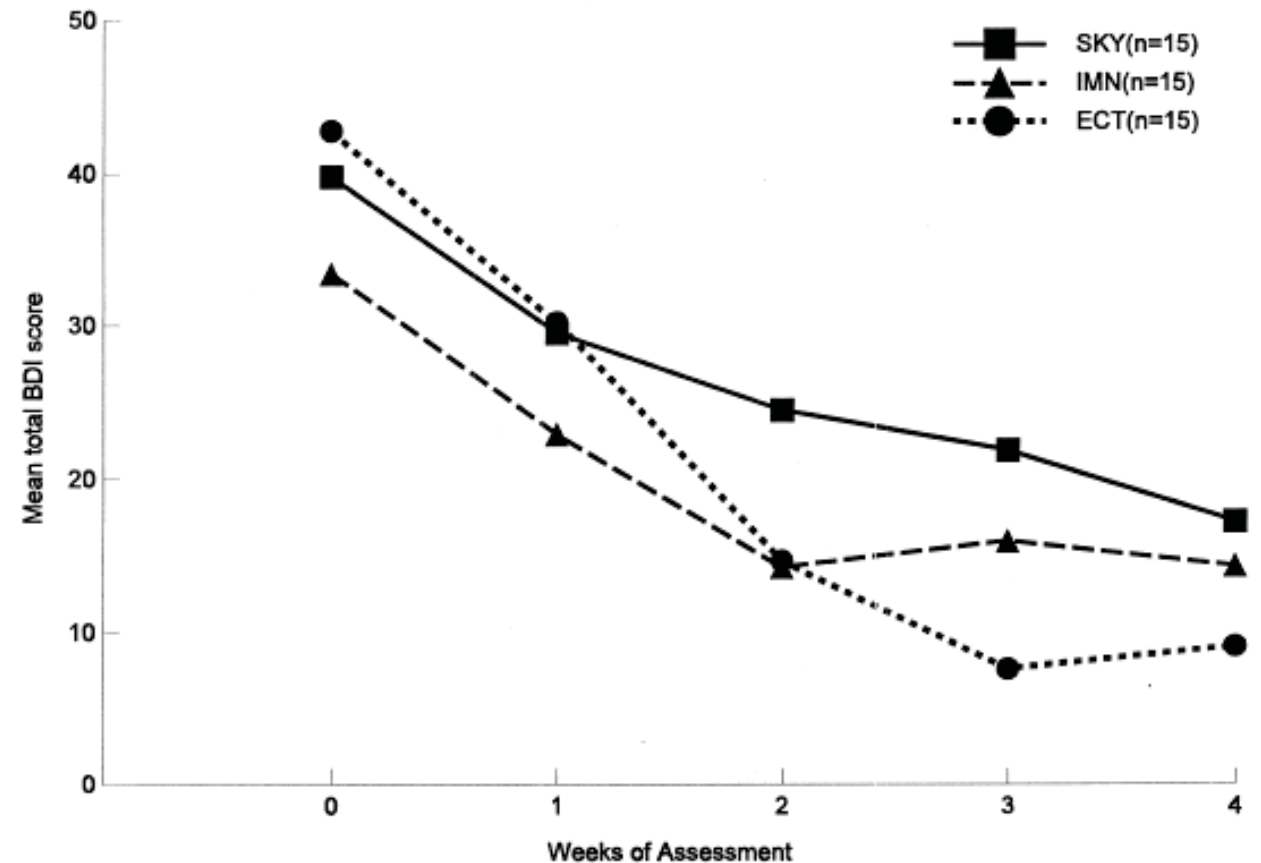


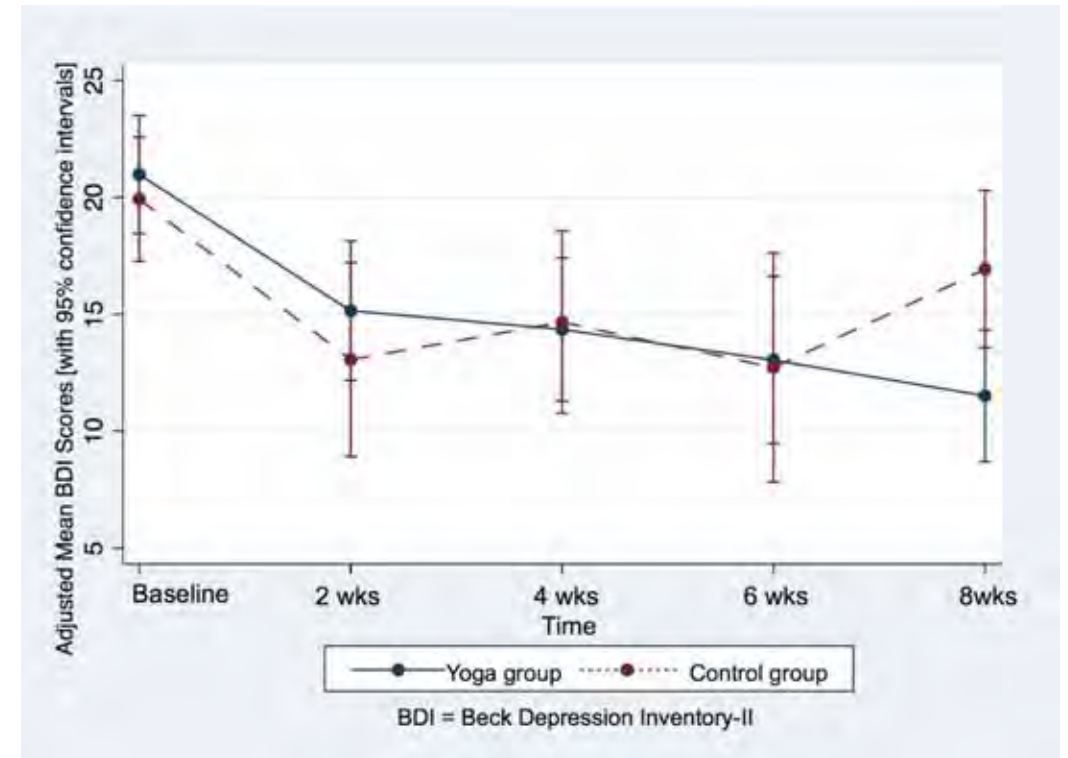
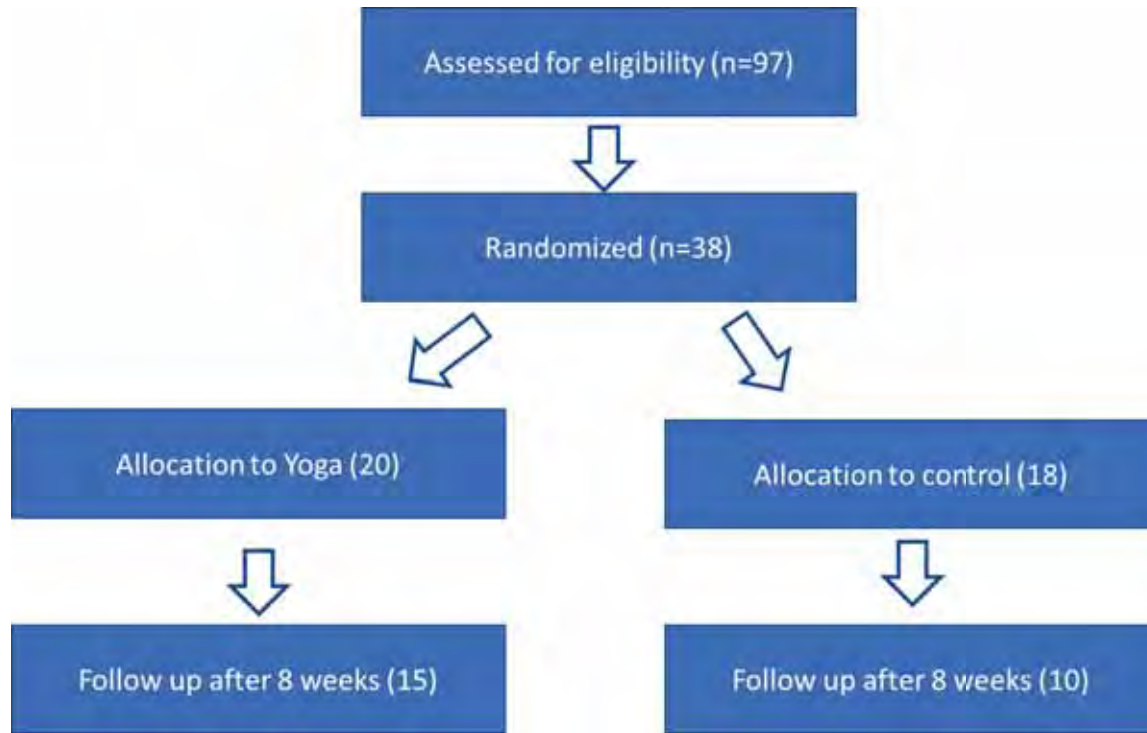
Global prevalence of depressive disorders, by age and sex (%)



Randomized trial of Sudarshan Kriya yoga vs Imipramine vs ECT

(Janakiramiah et al. Journal of
affective disorders 2000)





Treating major depression with yoga: A prospective, randomized, controlled pilot trial (Prathikanti et al. PLOS One 2017)

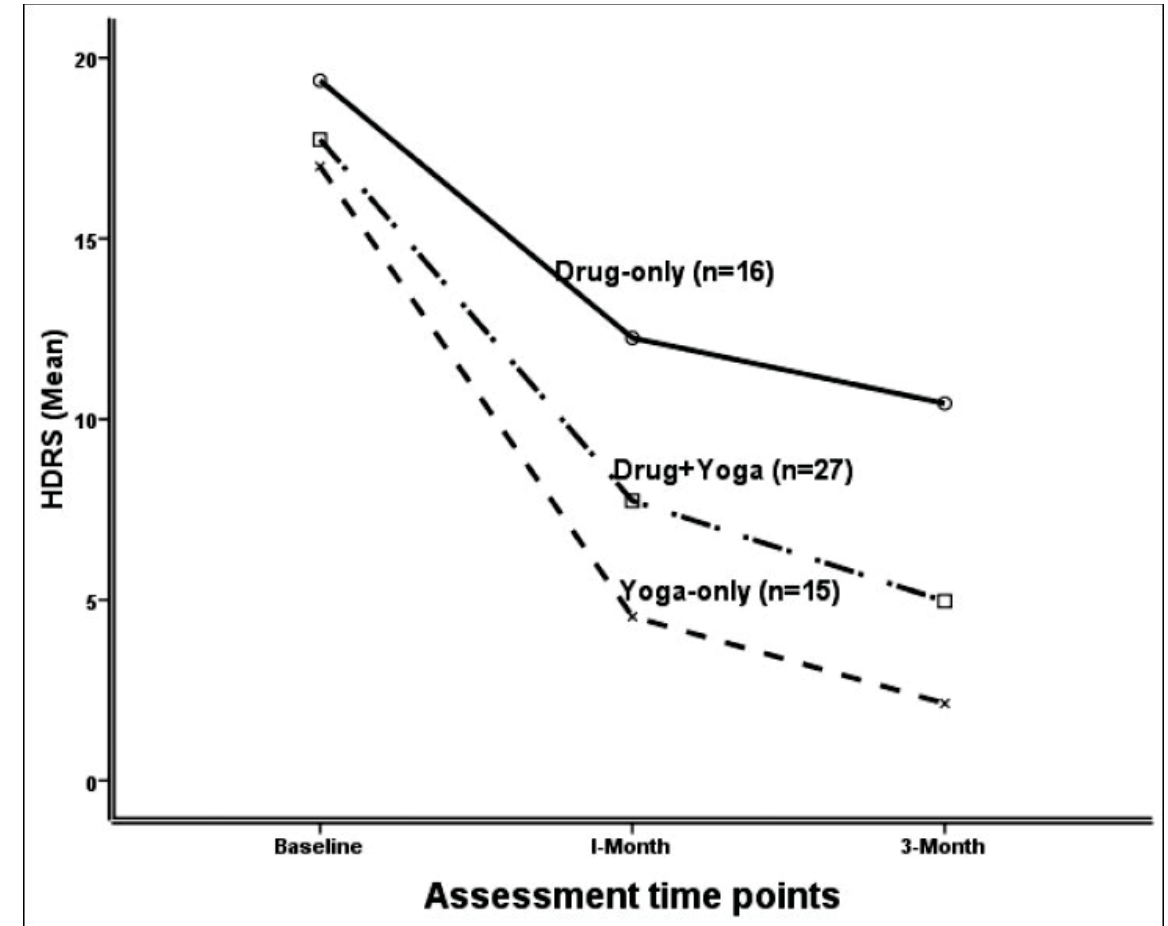
Development and feasibility of yoga therapy module for out-patients with depression in India.

Naveen GH¹, Rao MG, Vishal V, Thirthalli J, Varambally S, Gangadhar BN.



Positive antidepressant effects of generic yoga in depressive out-patients: A comparative study

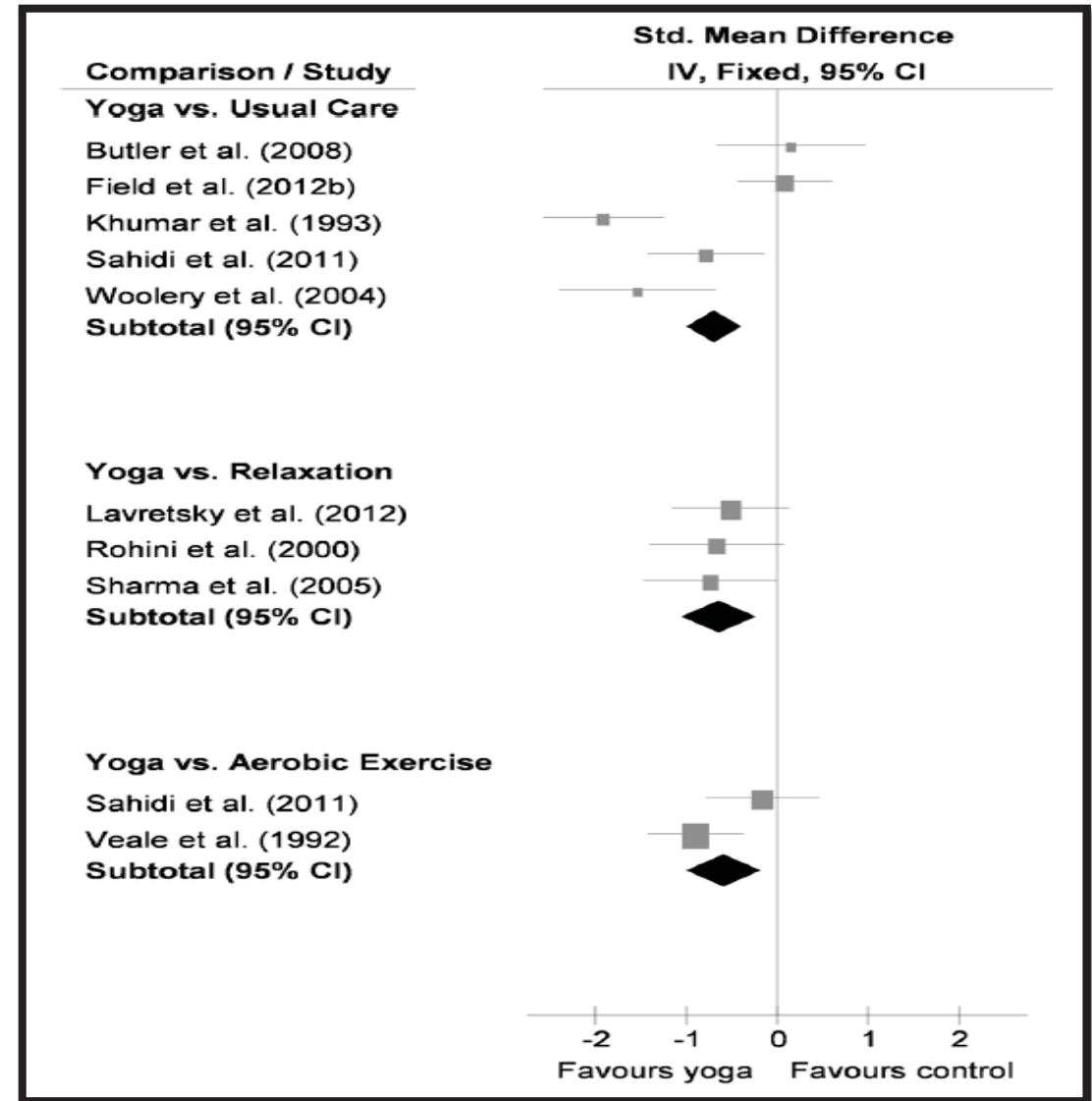
B. N. Gangadhar, G. H. Naveen, M. G. Rao, J. Thirthalli, and S. Varambally



YOGA FOR DEPRESSION: A SYSTEMATIC REVIEW AND META-ANALYSIS

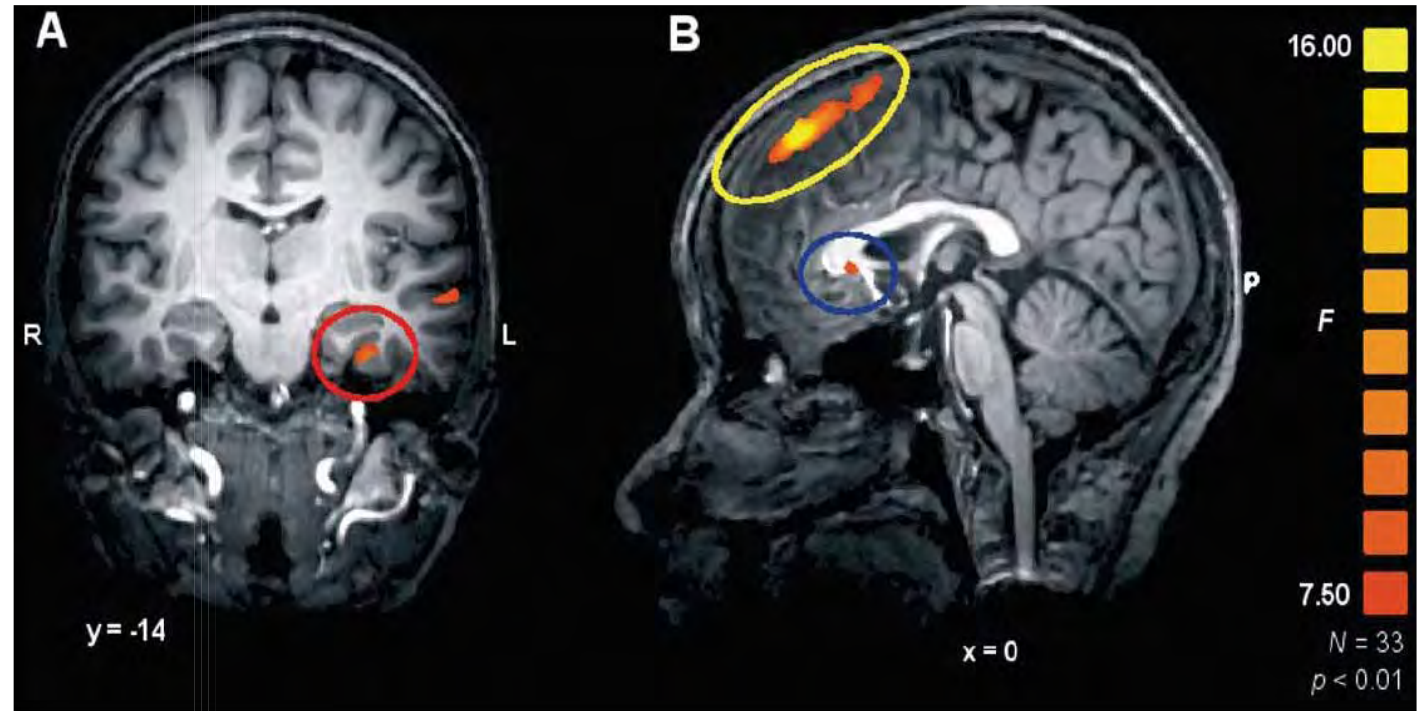
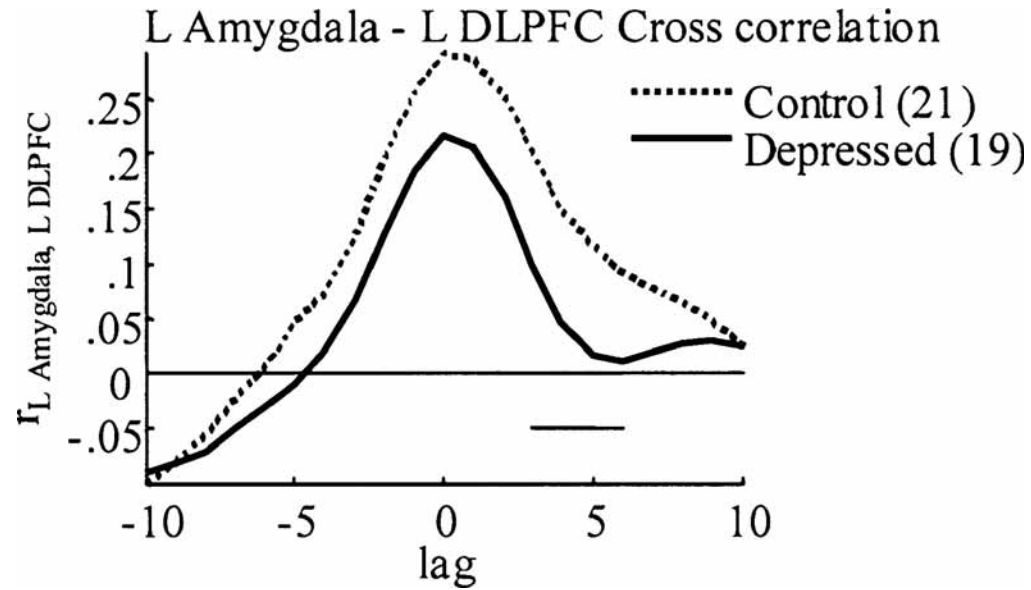
Holger Cramer, Ph.D.,* Romy Lauche, Ph.D., Jost Langhorst, M.D., and Gustav Dobos, M.D.

“Despite methodological drawbacks of the included studies, yoga could be considered an ancillary treatment option for patients with depressive disorders and individuals with elevated levels of depression”



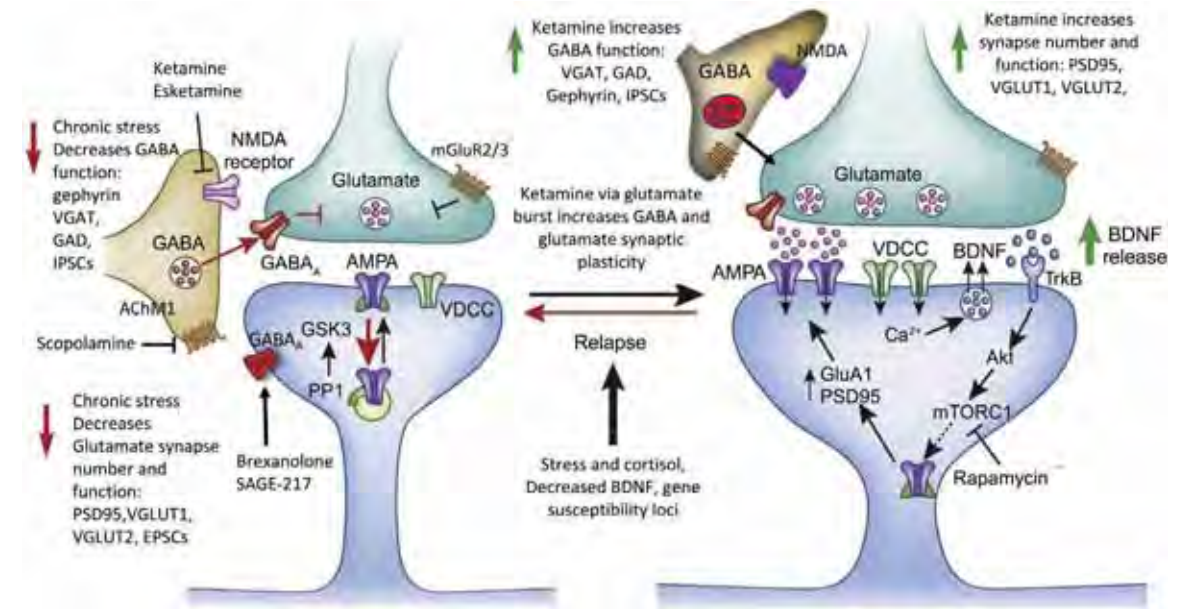
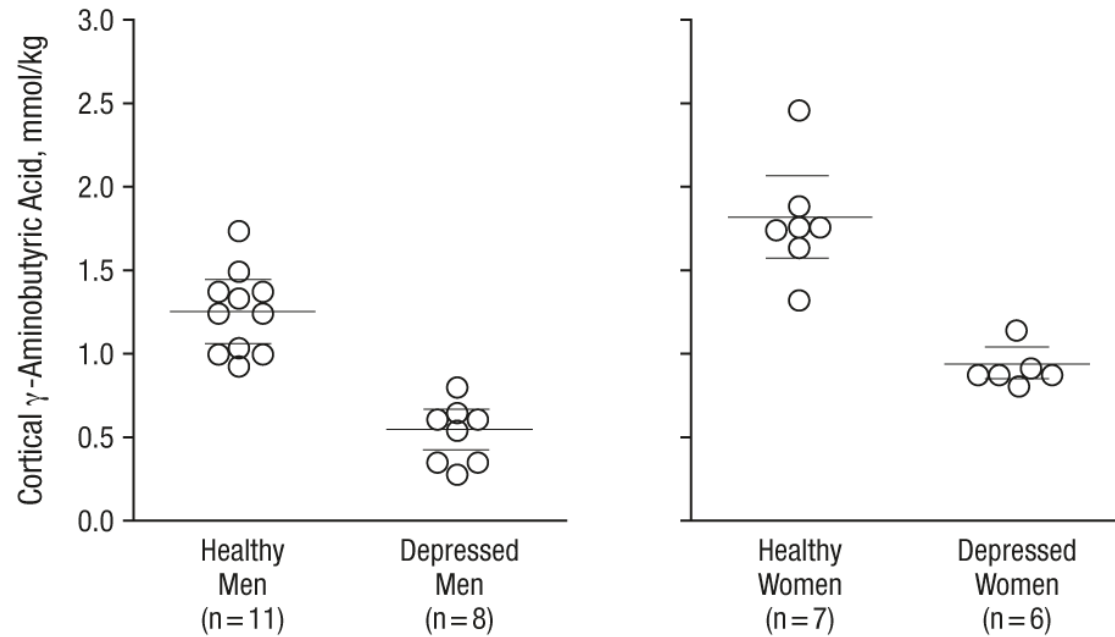
Does yoga work only on the symptoms
or
also on the pathophysiological processes...

thus bringing a 'cure' ?



Increased Amygdala – Anterior cingulate cortex and
Decreased Dorsolateral prefrontal cortex activity

(Murray et al. Biological Psychiatry 2011; Buchheim et al. PLOS one 2012)

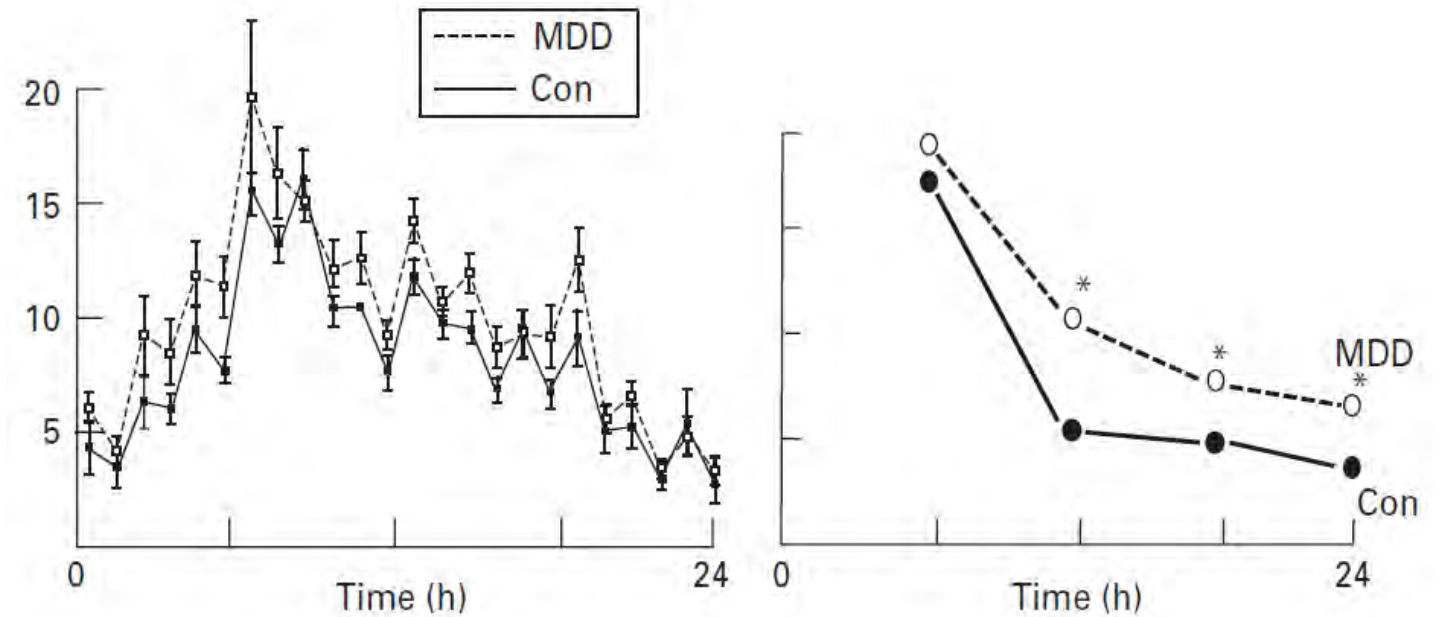


Depression - associated with decreased GABA

(Duman et al. Neuron 2019; Sanacora et al. Arch Gen Psy 1999)

Depression and elevated Cortisol

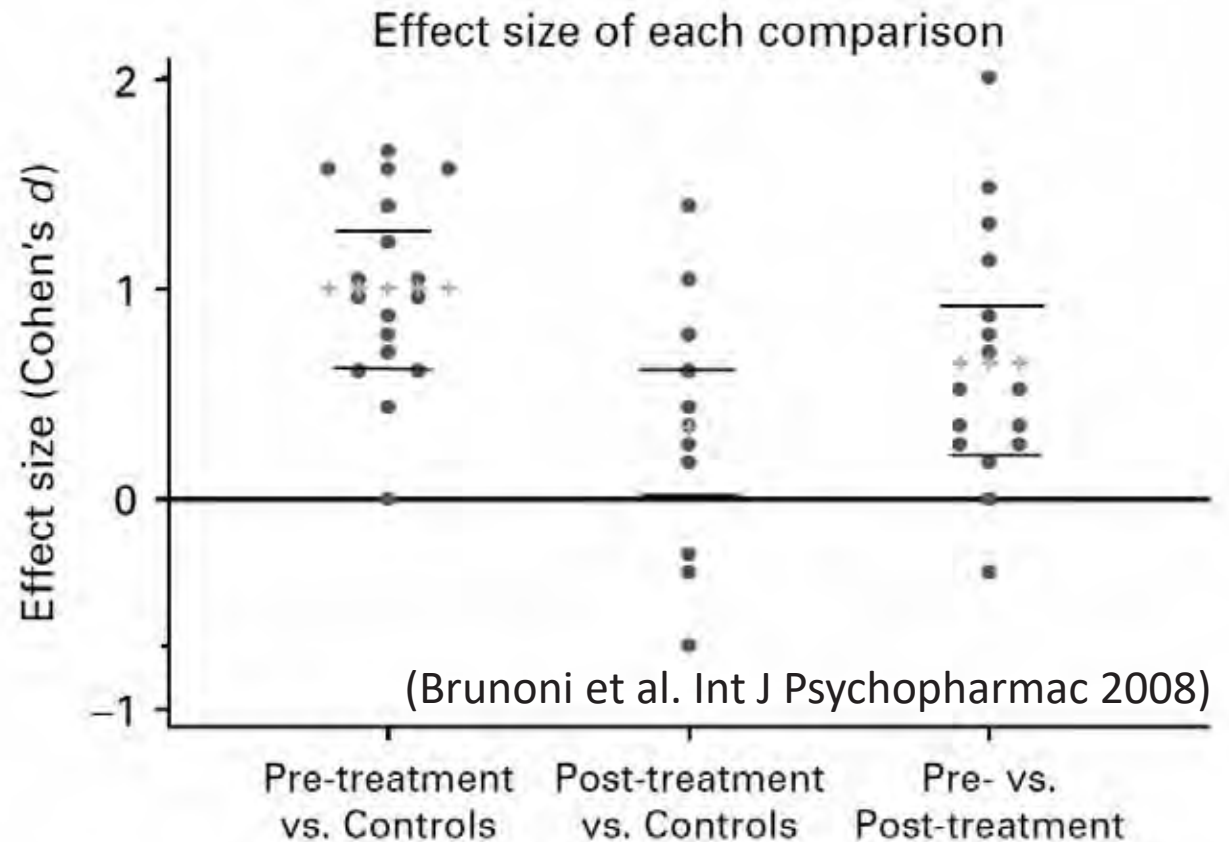
- Diurnal rhythms in cortisol are disturbed in Depression
- Increased resistance to feedback action of glucocorticoids
- Endogenous and exogenous cortisol is risk factor for depression



(Herbert et al. Psychological medicine 2012)

Depression and BDNF

- **Decreased BDNF in depression**
- **Normalized after treatment with antidepressants**
- **BDNF may be a target of antidepressants**



Structural brain

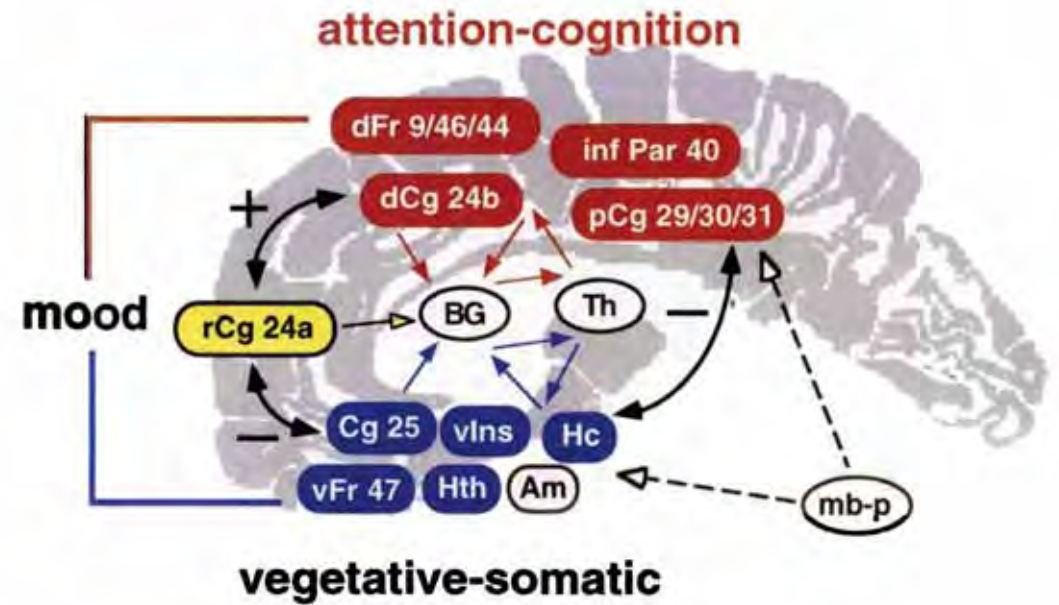
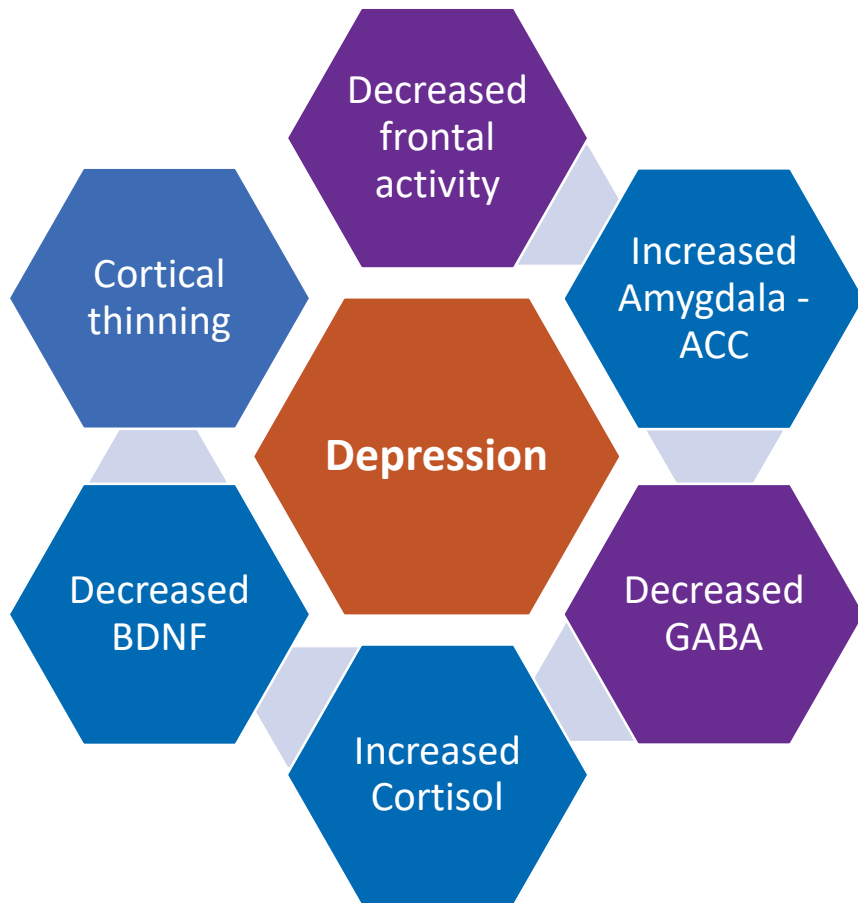
Decreased cortical thickness in depression than in healthy controls in the orbitofrontal cortex (OFC), anterior and posterior cingulate, insula and temporal lobes

(Schmaa et al. Mol Psychiatry 2017)

Tuesday, July 16, 2019

Chita Dahati Nirjeevam Chinta Dahati Jeevanam



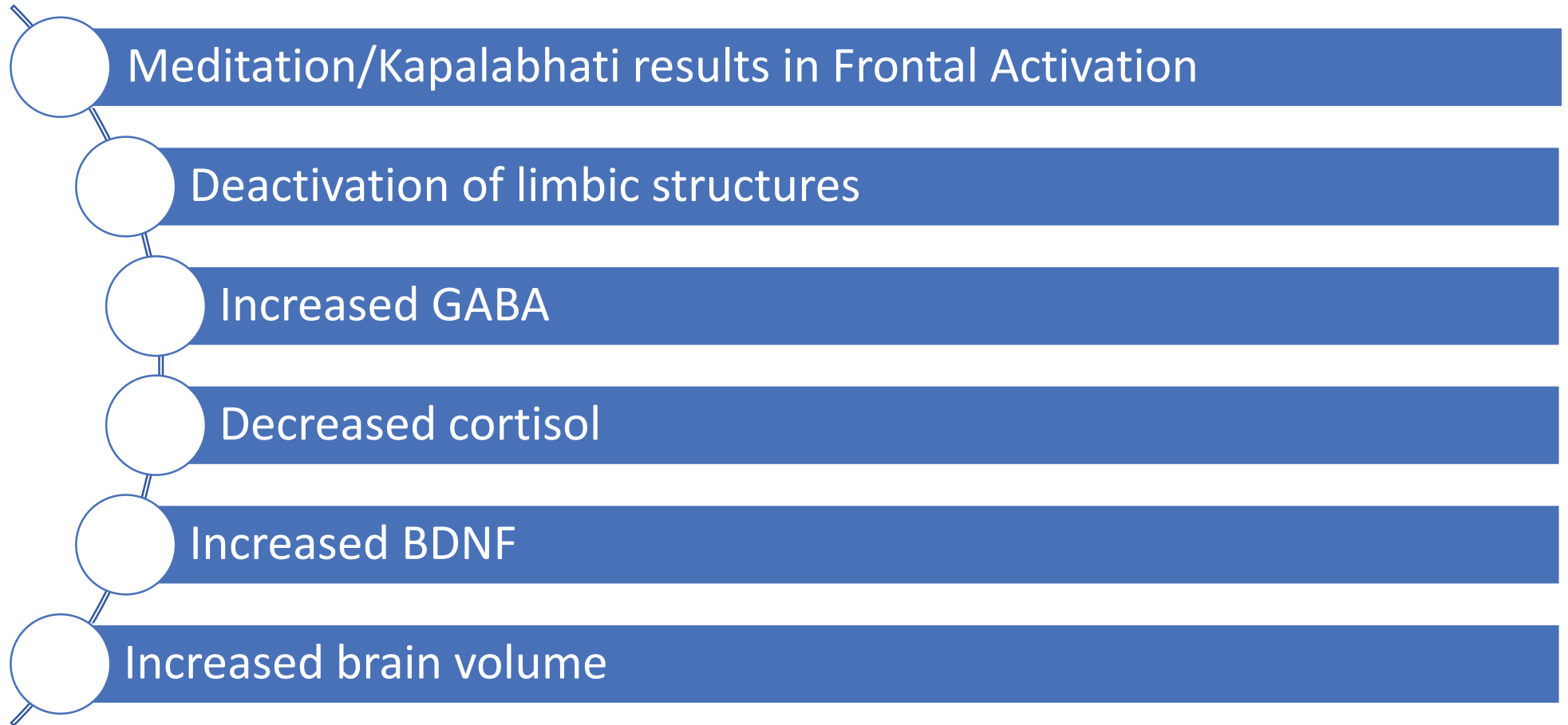


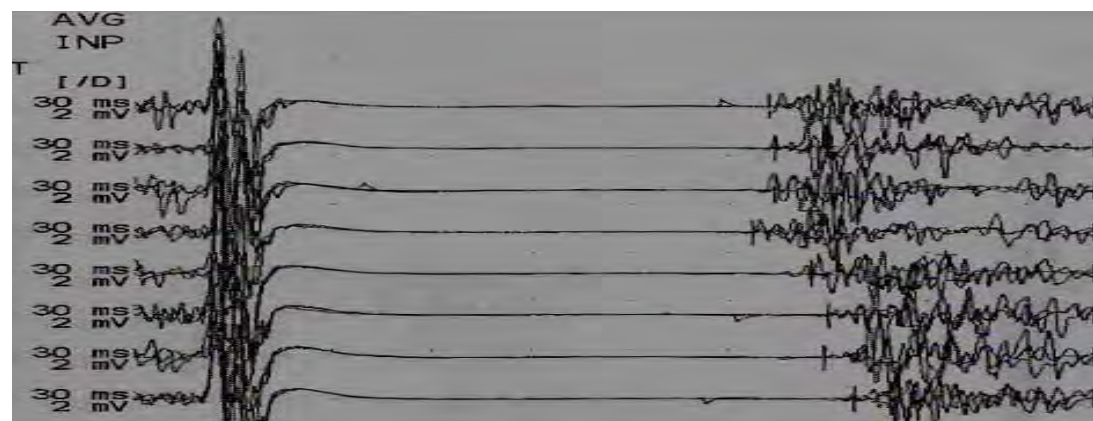
Cortico-limbic dyscontrol

Depression model

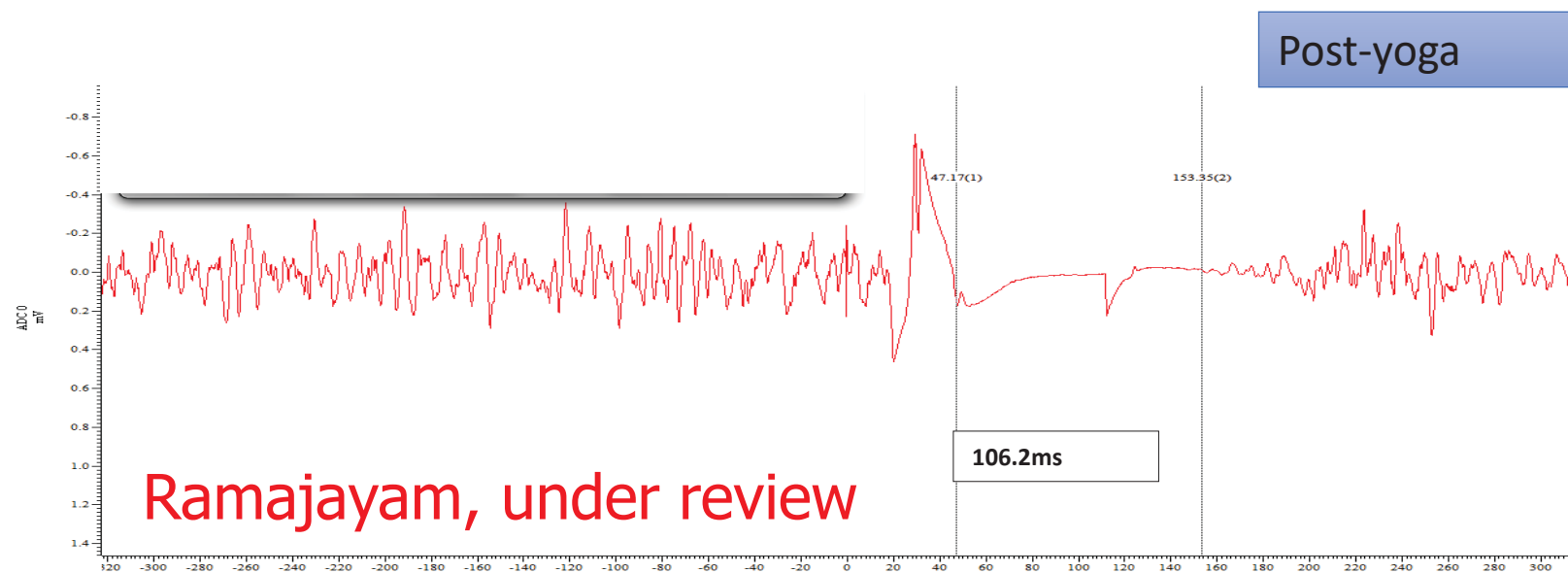
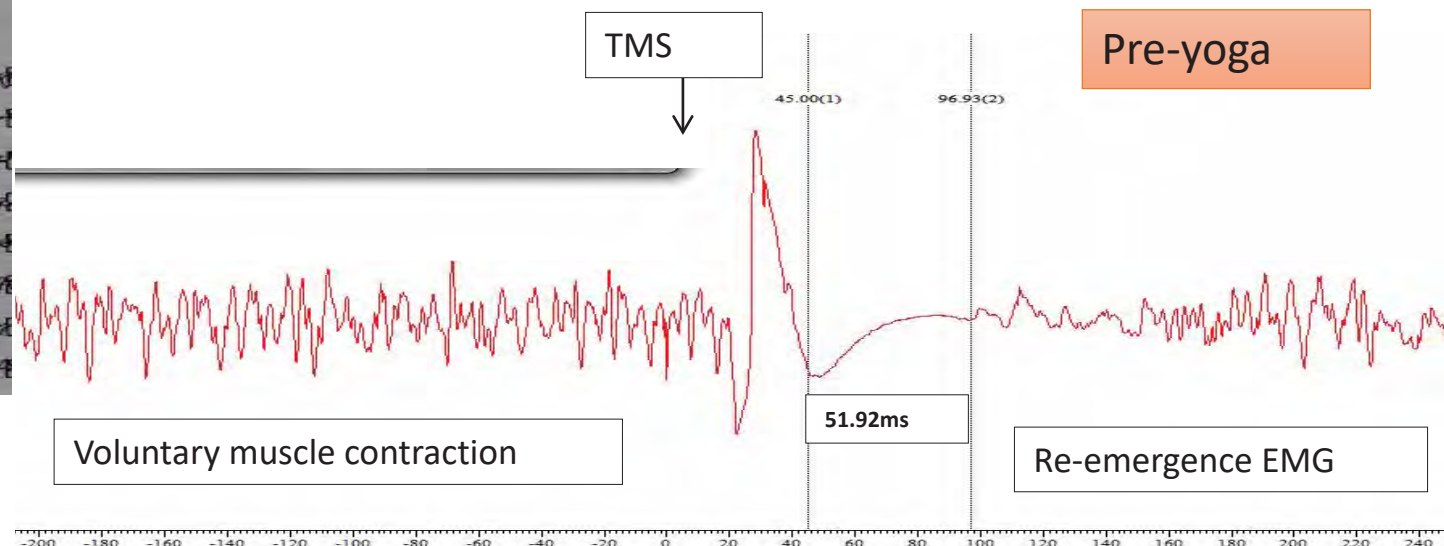
(Mayberg et al. J Neuropsych Clin Neurosci 1997)

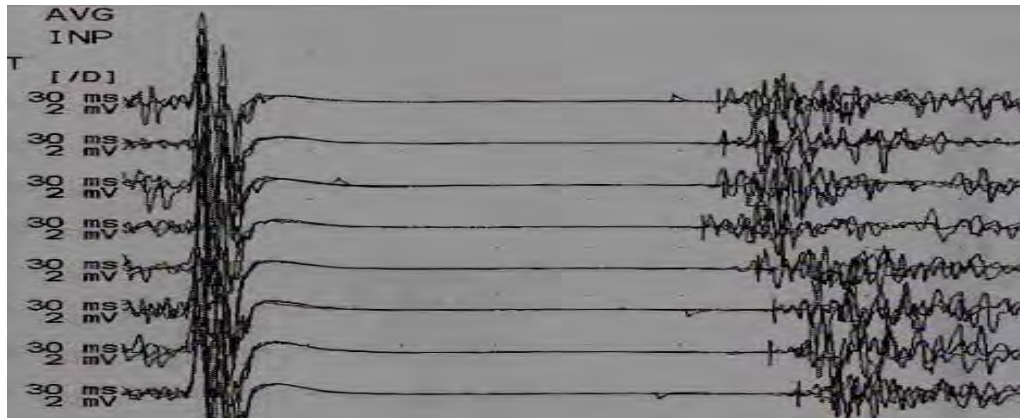
Yoga – Neurobiological effects





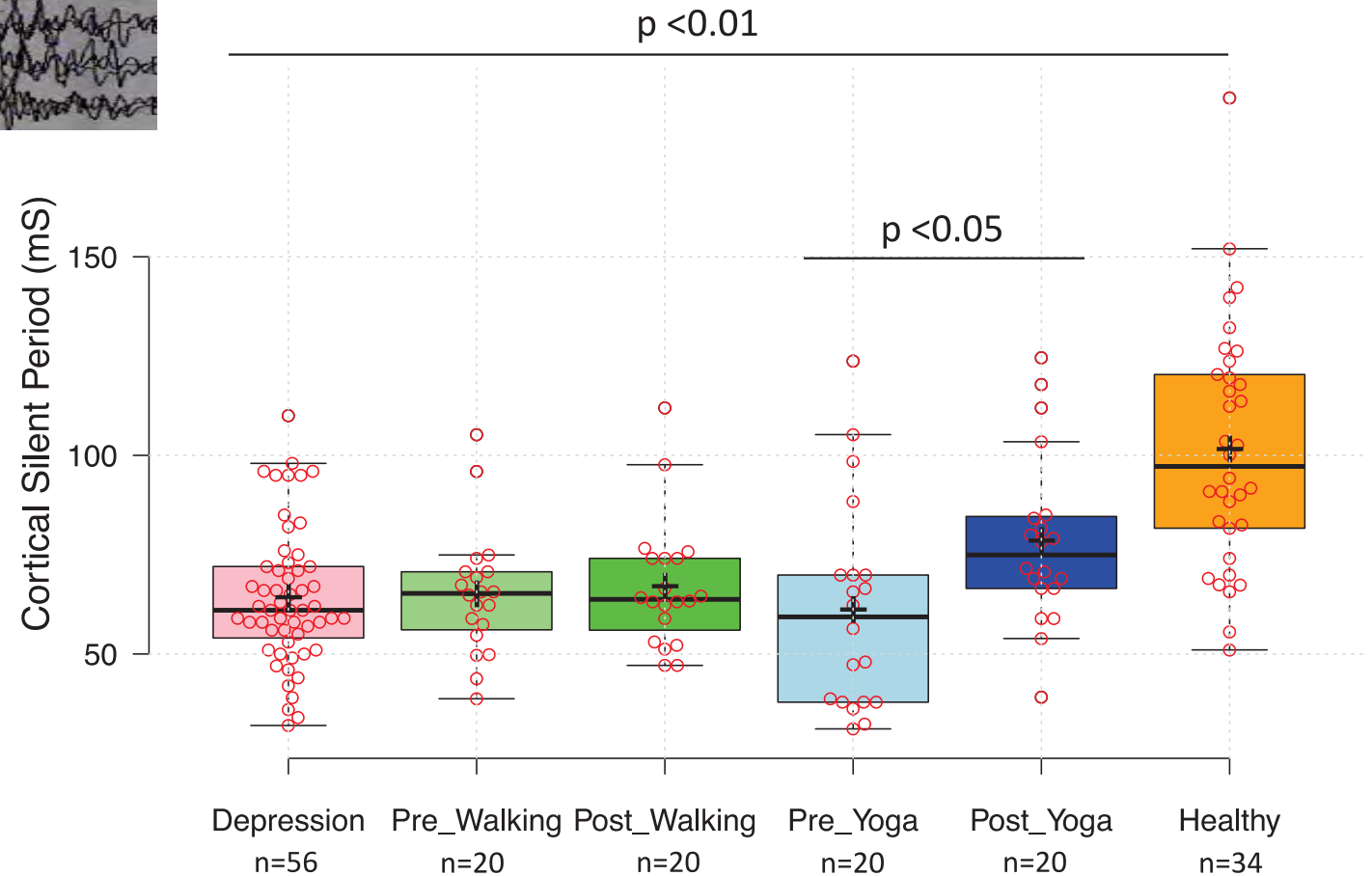
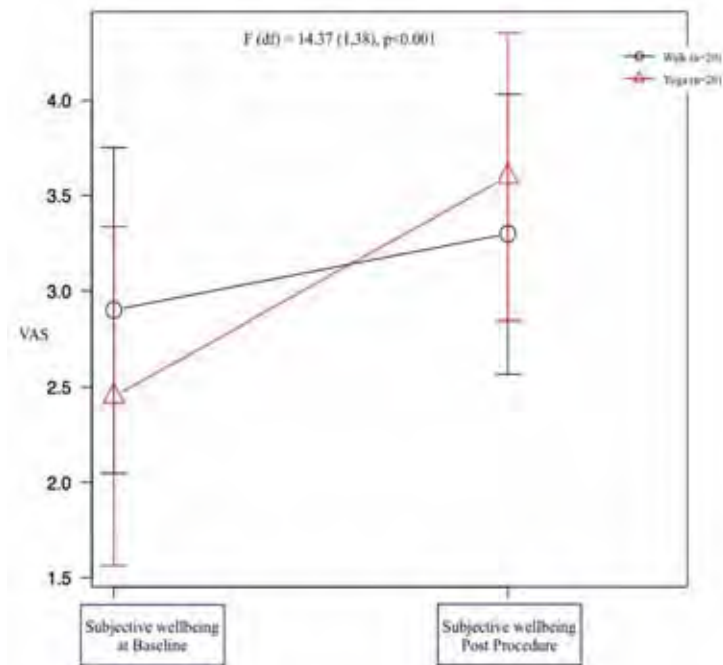
- An illustration of enhanced cortical silent period in a healthy subject after 1-month of yoga practice
- The average CSP in 10 recordings increased from 51.95 to 106.2mss in this person





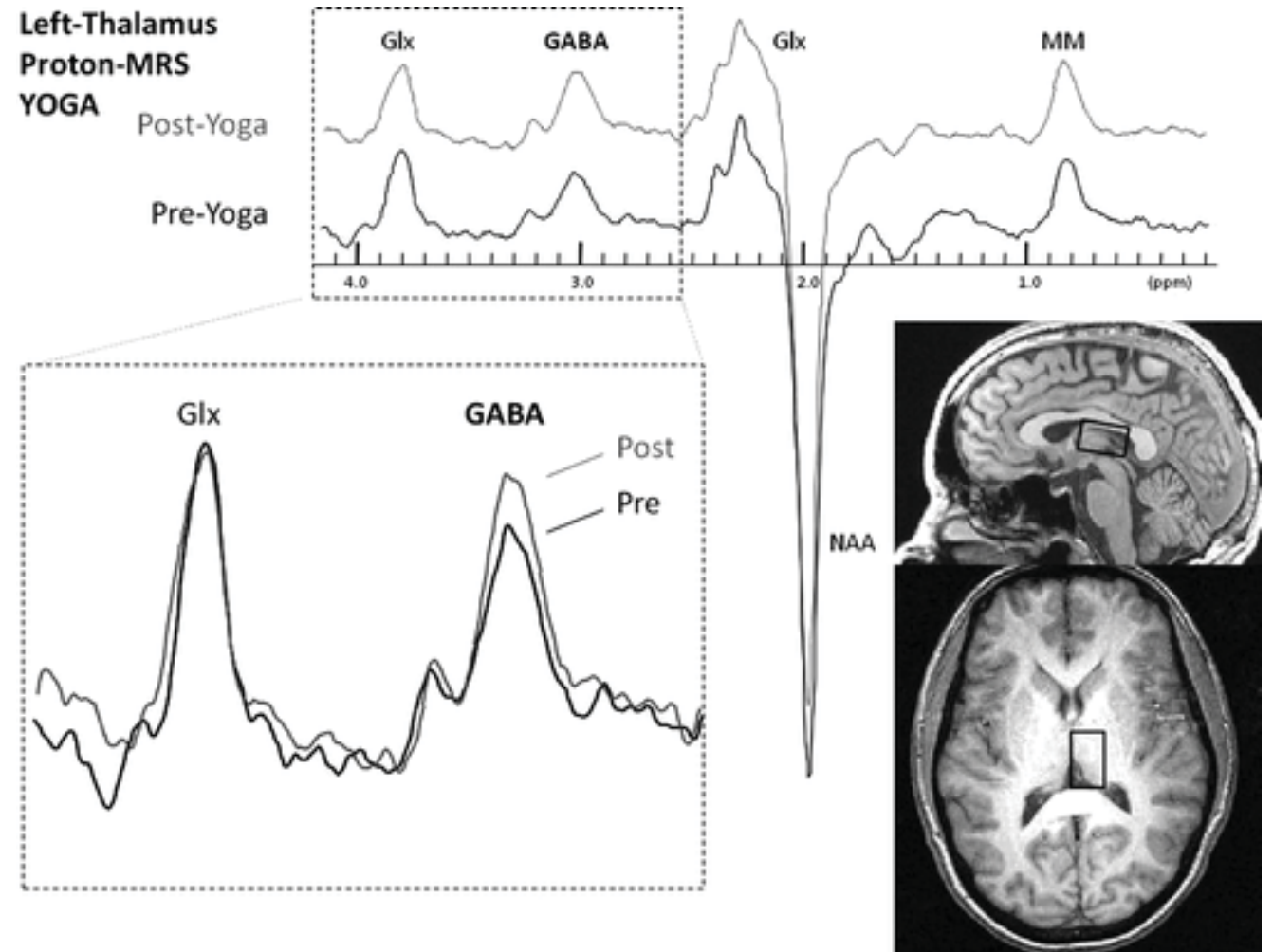
Role of GABA in Yoga

(Jakar et al. Under review)



Yoga – increases GABA levels

12 weeks of Yoga, compared
to exercise, increased GABA in
thalamus measured using
Magnetic resonance
spectroscopy

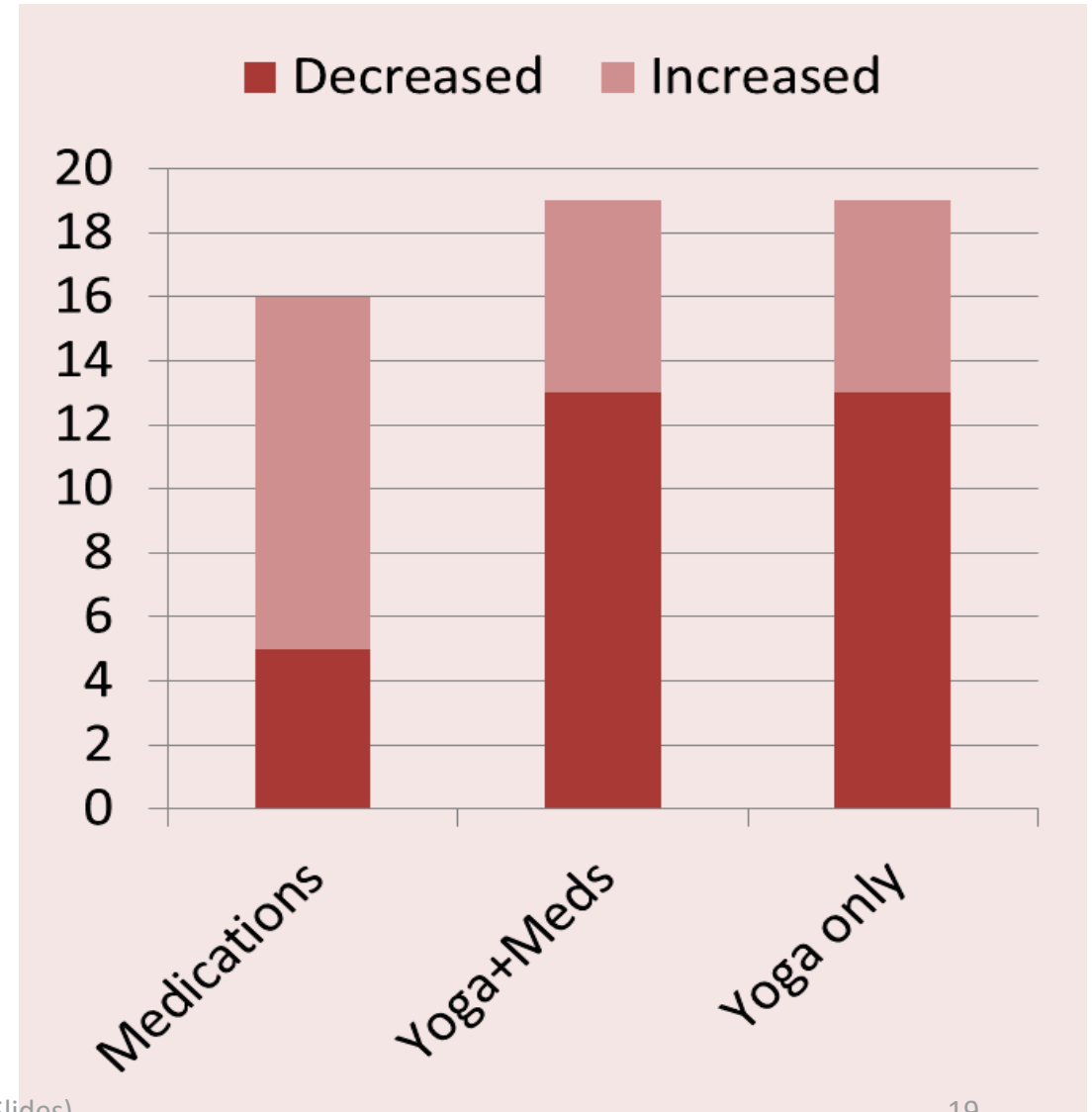


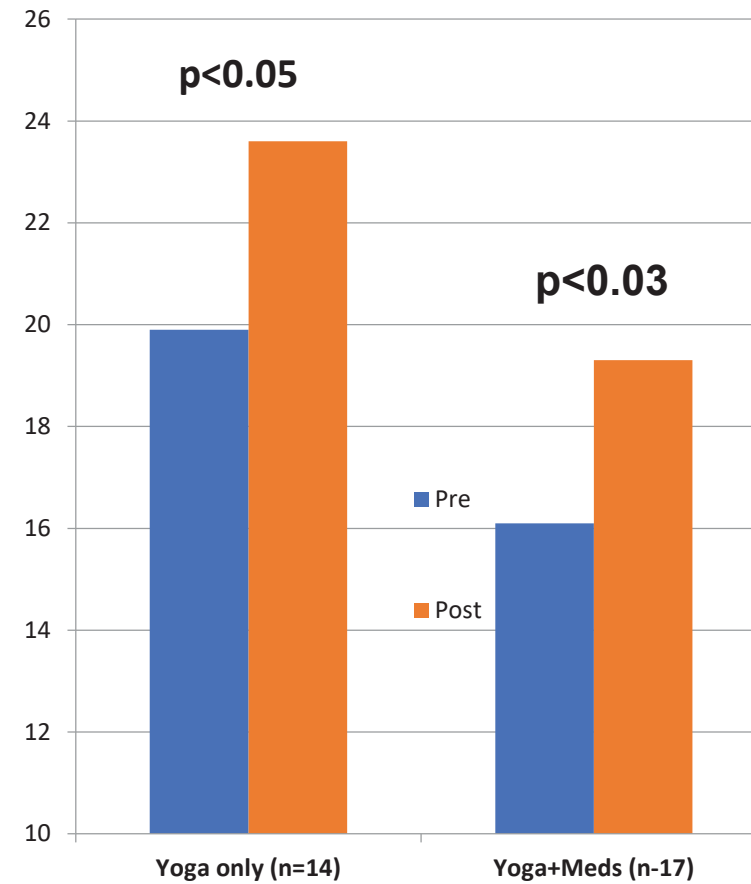
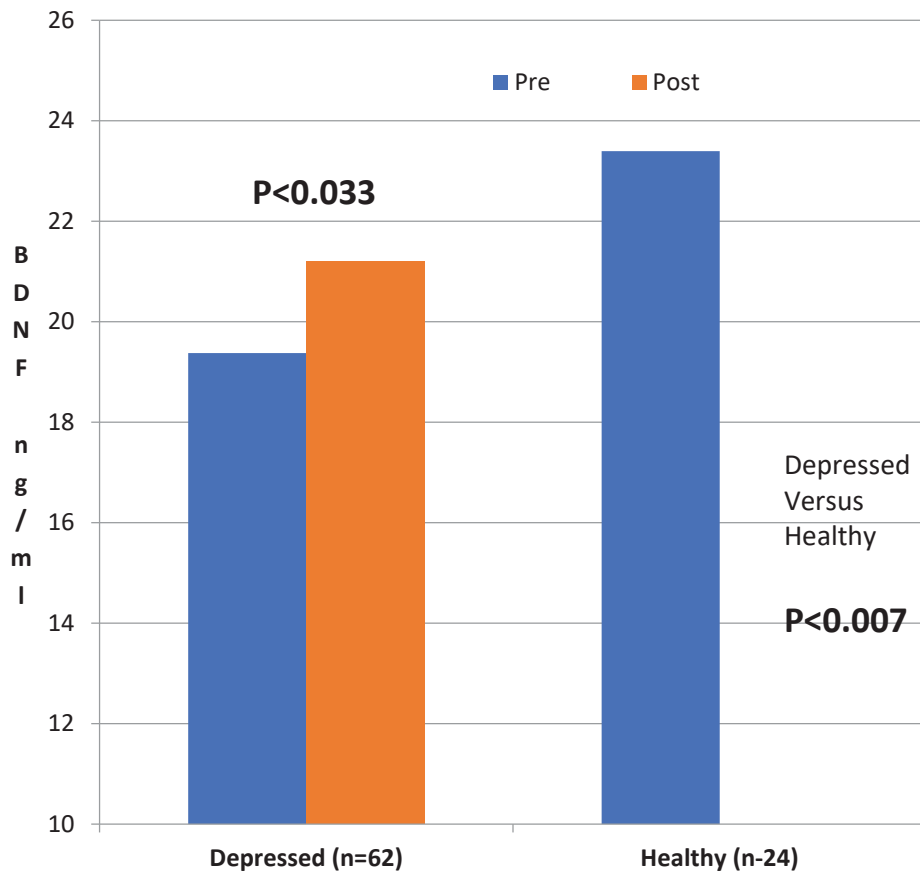
(Streeter et al. J Alt Com Med 2010)

More patients have decreases in cortisol after Yoga

- **Significant drop in cortisol occurred with yoga (3 months)**
- **More patients obtained a drop in cortisol with yoga than with medication only ($p < 0.04$)**
- **The reduction in cortisol was related to reduction in depression**

(Thirthalli et al. Ind J Psy 2013)

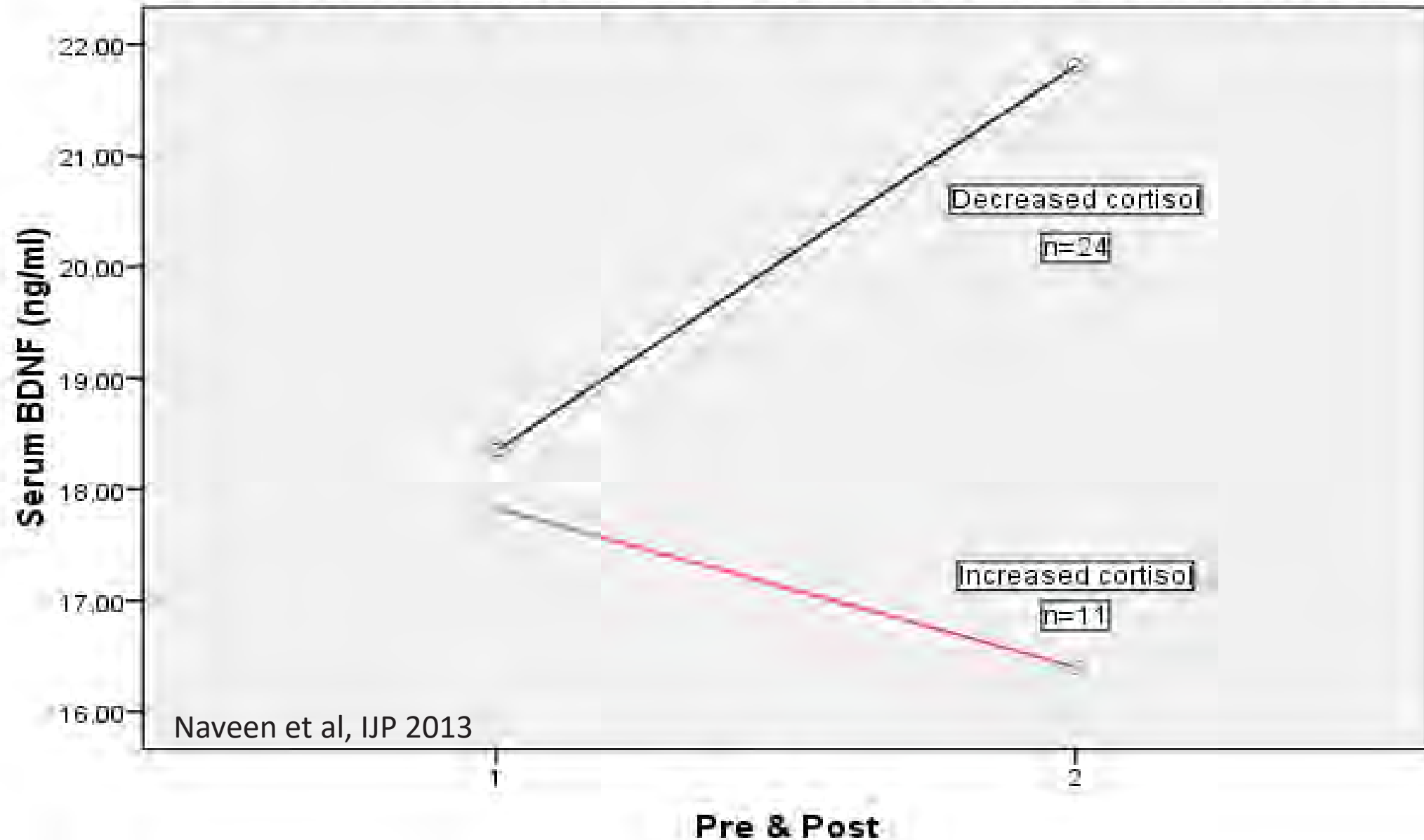


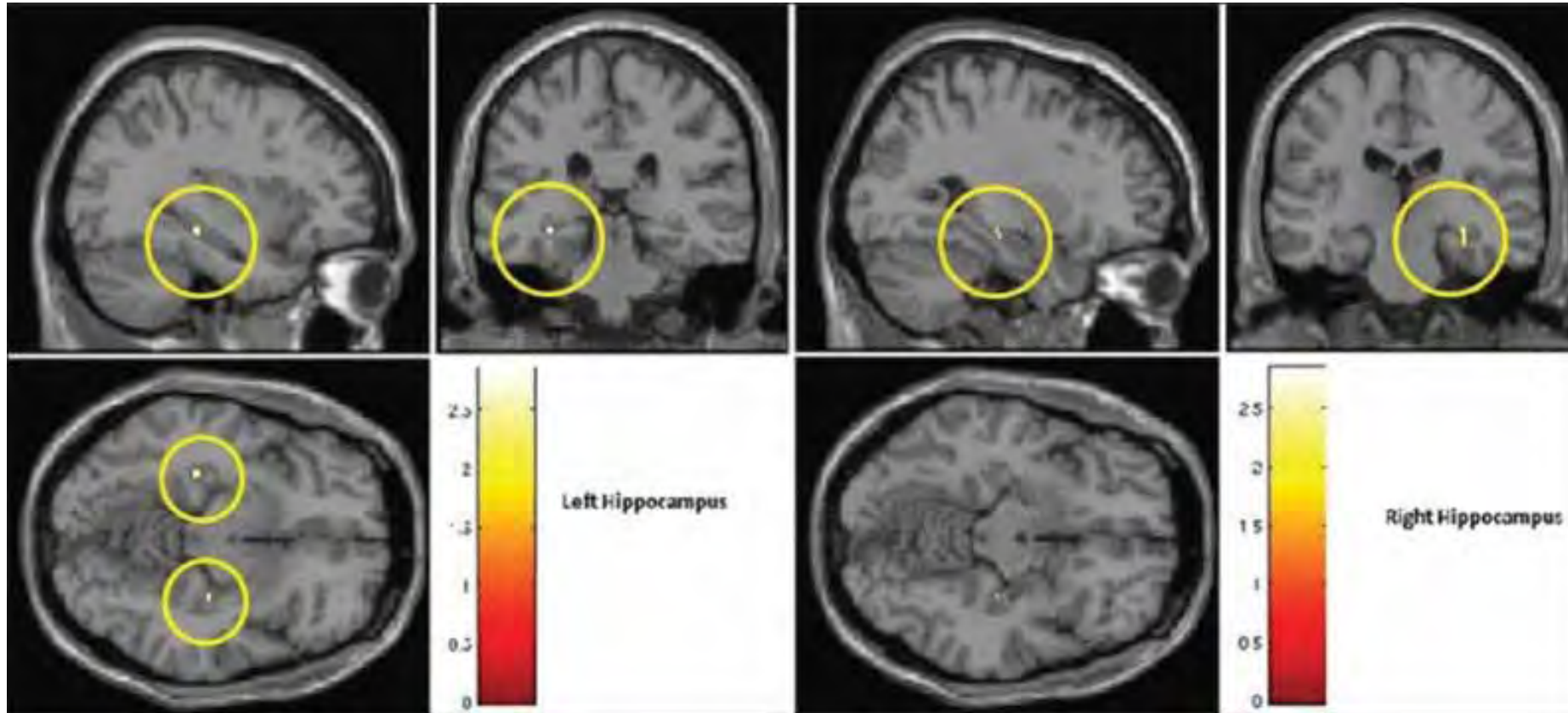


Yoga – increased BDNF in depression

(Naveen et al. Ind J Psy 2013)

BDNF levels rose ($p < 0.02$) in yoga patients with reductions in cortisol



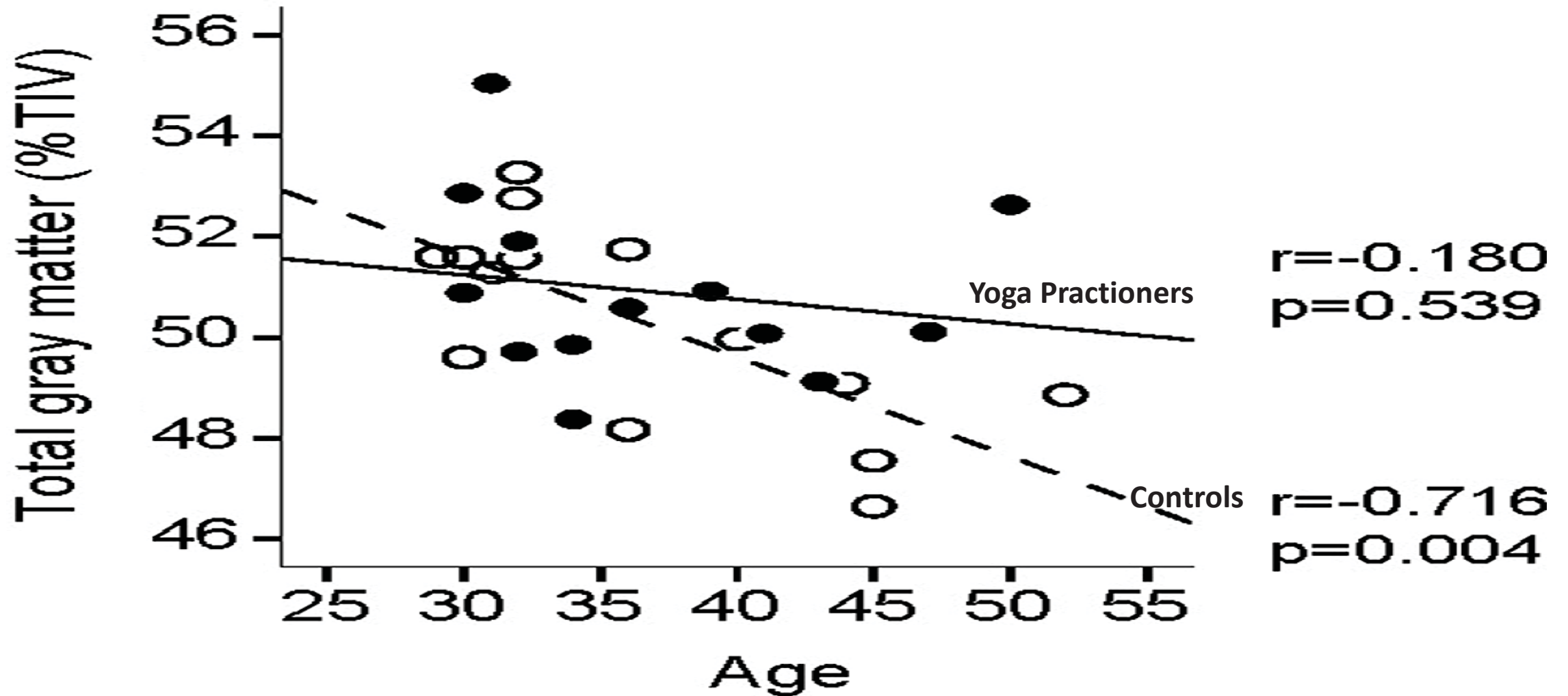


Yoga- Effect on brain structure

6 months of yoga increased the volume of hippocampus (Hariprasad et al. Ind J Psy 2013)

Neuroprotection from Yoga

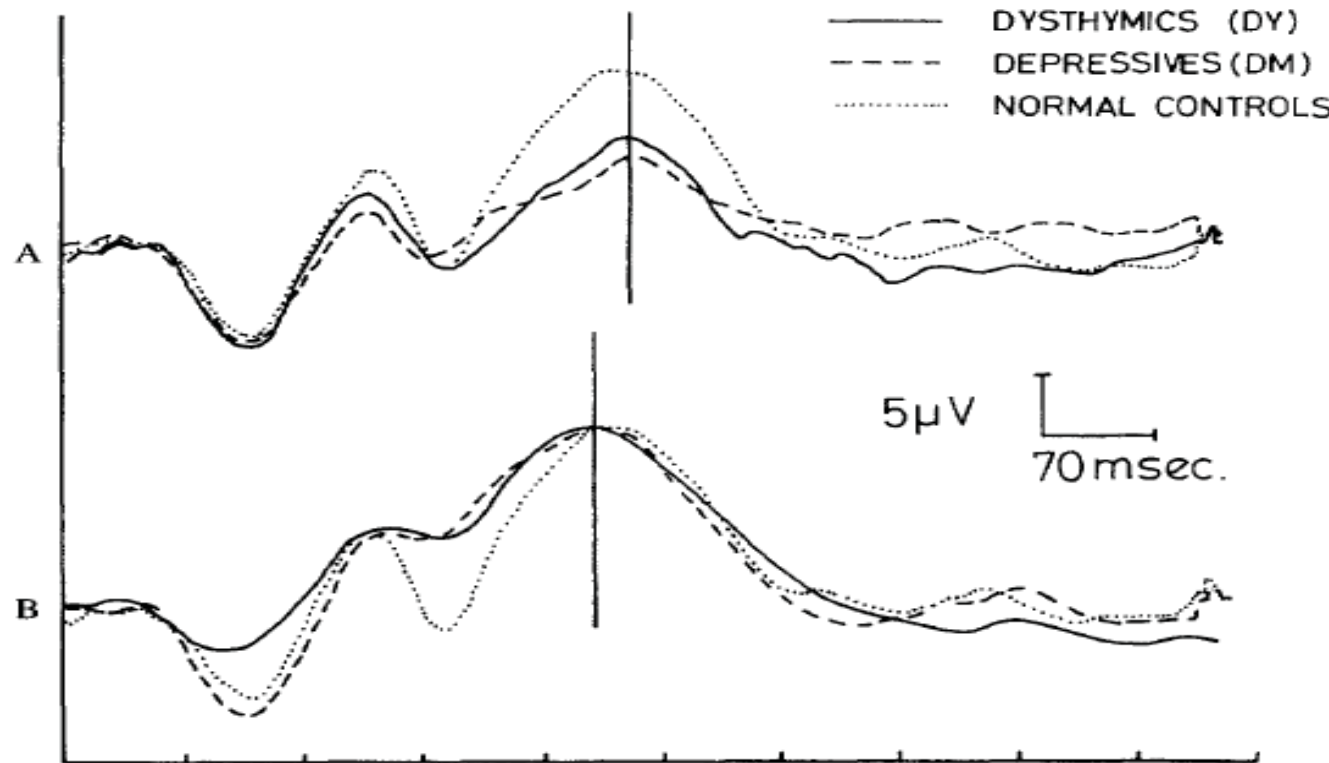
Frontiers in Human Neuroscience, May 2015



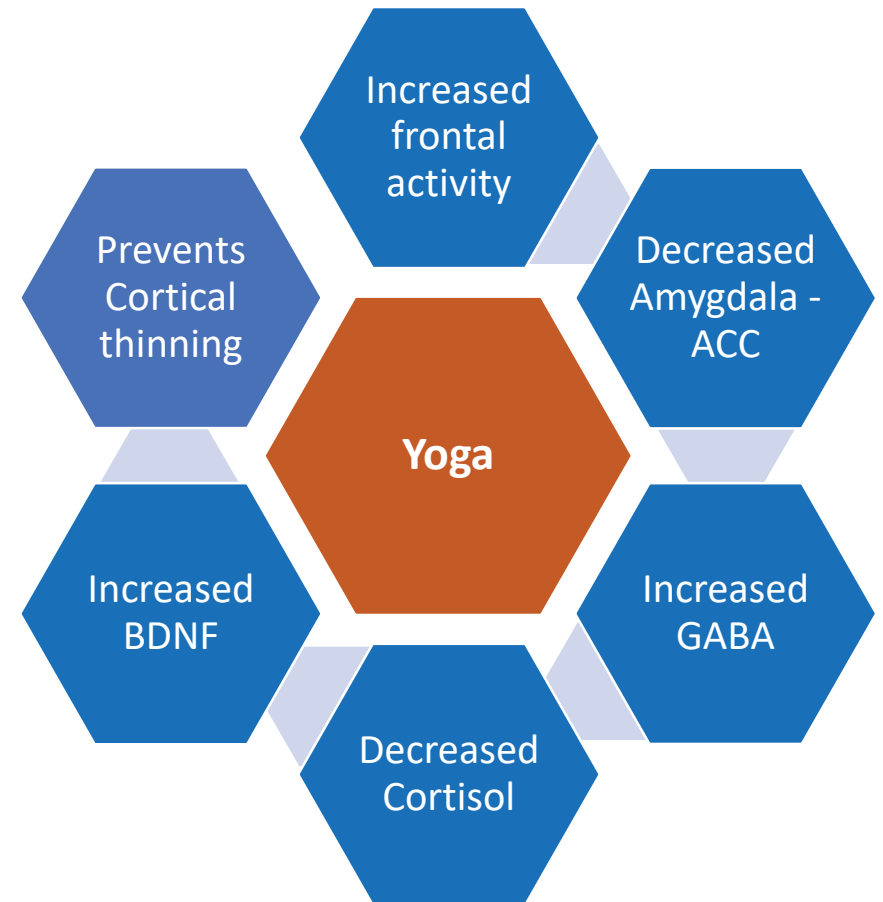
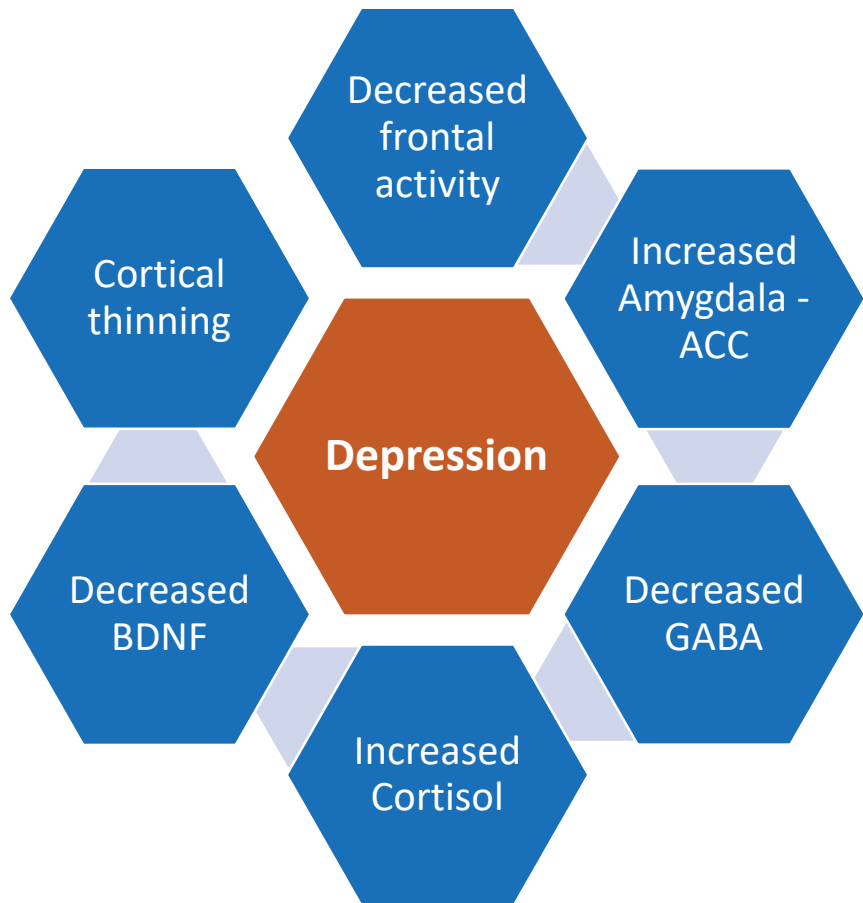
Yoga (SKY) improved amplitude of a cognitive event related potential

BIOL PSYCHIATRY
1997;42:740-743

Brief Reports



1. Grand average P300 ERP records pretreatment (A) and at 3rd month (B) (normals had one recording, the same is given in



Yoga - mechanisms in Depression: Summary

Thank You

