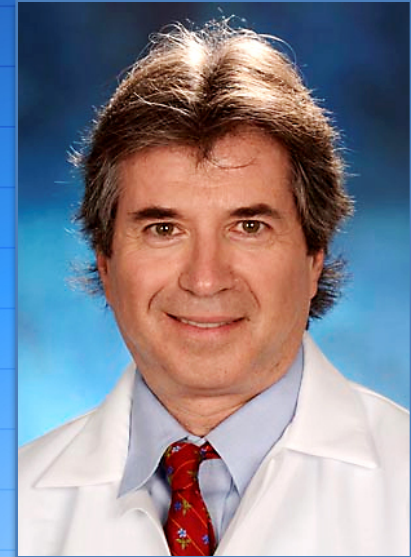


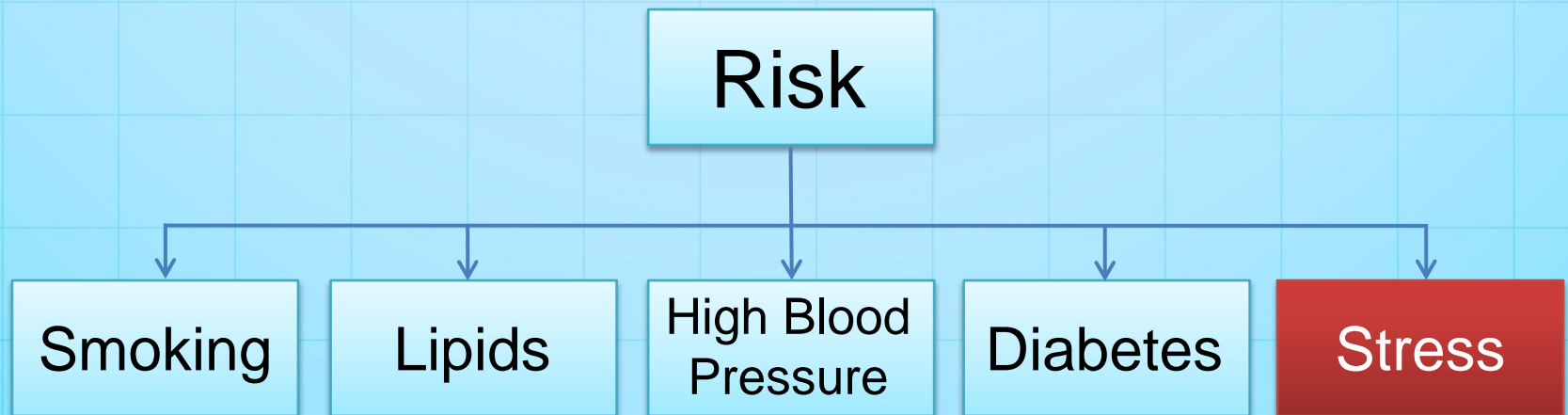
Can Laughter Yoga Heal Your **Heart?**



Michael Miller, MD, FACC, FAHA
Professor of Cardiovascular Medicine,
Epidemiology & Public Health
University of Maryland School of Medicine
www.drmmichaelmiller.org

Cardiovascular Risk In The 21s Century-

STRESS: The Missing Link

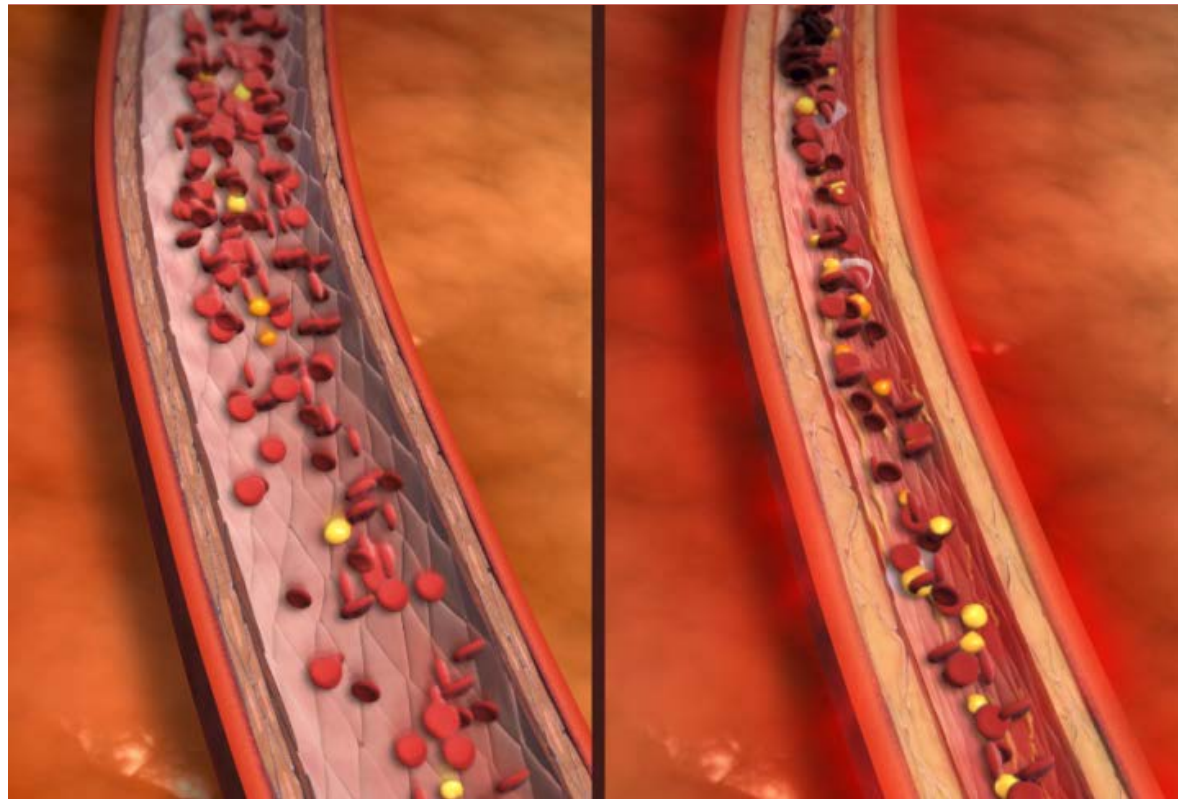


The Biology of Stress



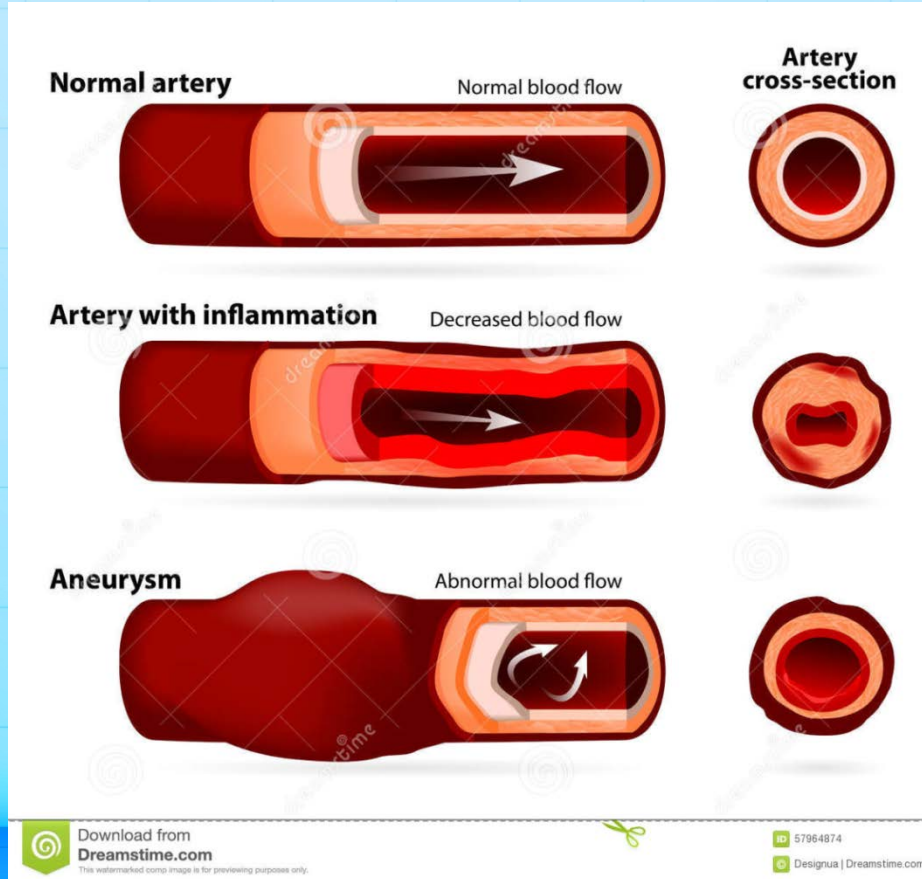
The Biology of Stress

Blood Vessels Constrict



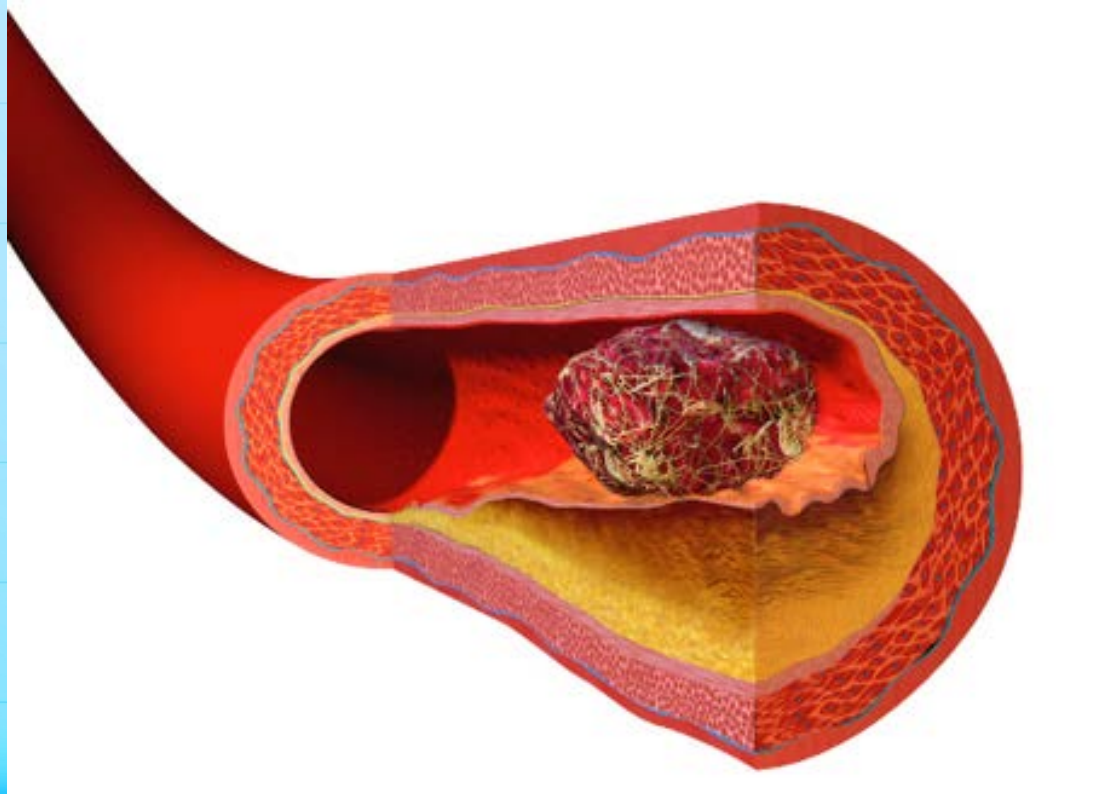
The Biology of Stress

Blood Vessels become Inflamed



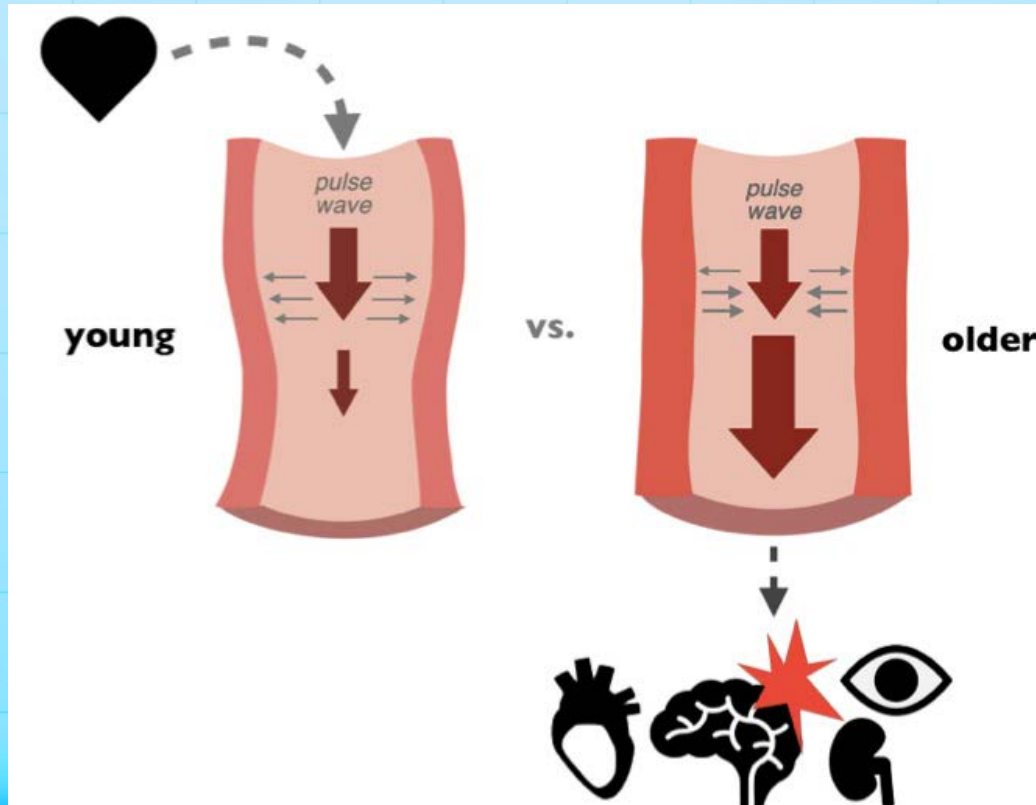
The Biology of Stress

“The Clot Thickens”



The Biology of Stress

Blood Vessels Age



How Laughter Yoga Heals Hearts

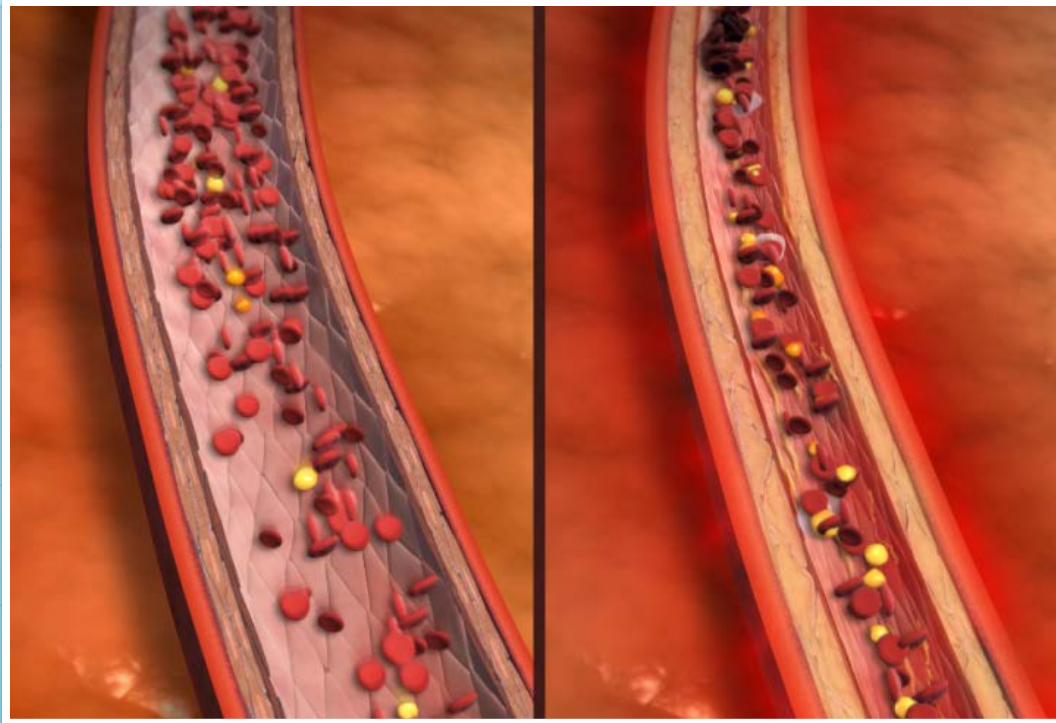
Biological Effects of Laughter



Your Artery after...

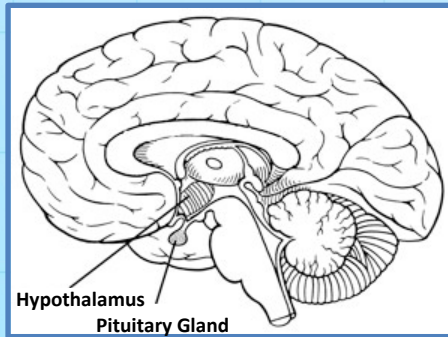
Laughter

Stress



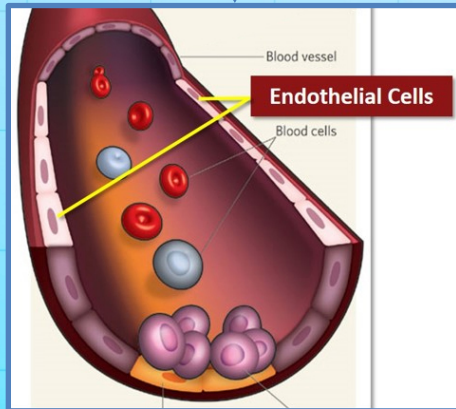
Heart 2006; Psychosomatic Medicine 2010; Am J Cardiol 2011

Effect of Laughter Yoga on Blood Vessels



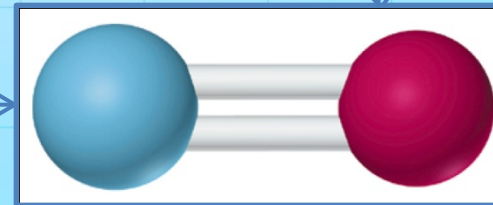
Pituitary Hypothalamus

Beta Endorphins (Other opioids)

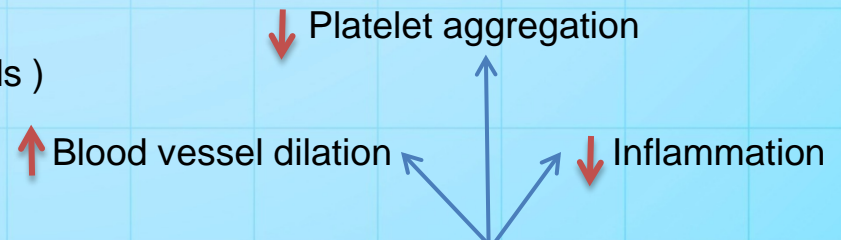


Endothelium

Receptor Activation



Nitric Oxide



Changes in blood pressure from baseline after three weeks of laughter yoga

Measurement	Laughter yoga group (n=200)	Control group (n=100)
Pretreatment systolic blood pressure (mm Hg)	128.24	125.89
Posttreatment systolic blood pressure (mm Hg)	120.78a	125.96b
Change (%)	-6.18	0.06
Pretreatment diastolic blood pressure (mm Hg)	82.37	82.34
pressure (mm Hg)	79.34a	81.8 b
Change (%)	-3.82	-0.65

a. $p < 0.001$ paired t test pretreatment compared with posttreatment; $p < 0.05$ independent t test comparison between laughter yoga and control group

b. $p = \text{NS}$ difference between pretreatment and posttreatment



Chaya MS et al American Society of Hypertension 2008. Annual Meeting; May 14, 2008; New Orleans, LA.

Laughter Yoga: Heart Disease & Stroke



Japanese Cross Sectional Study (n=20, 934; 65+ years)

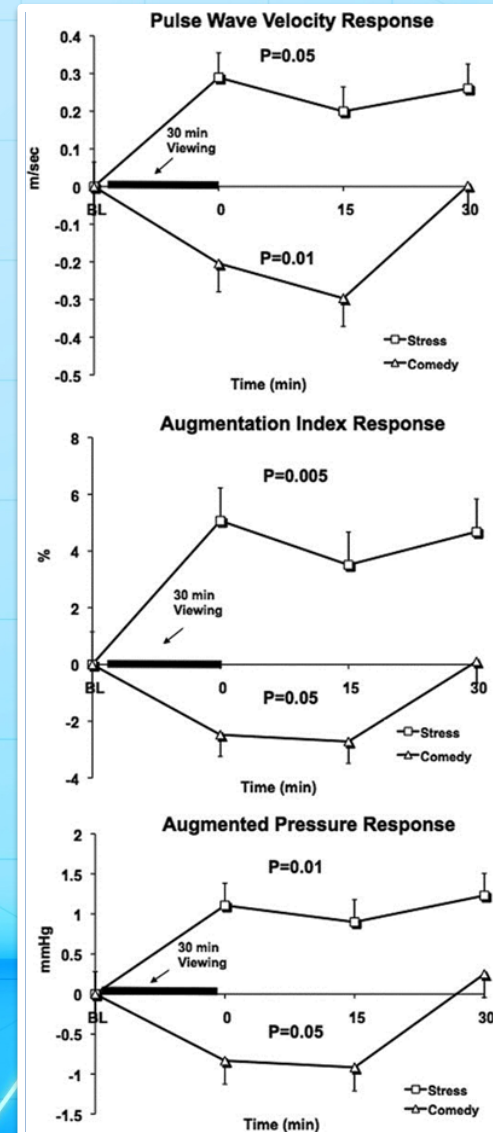
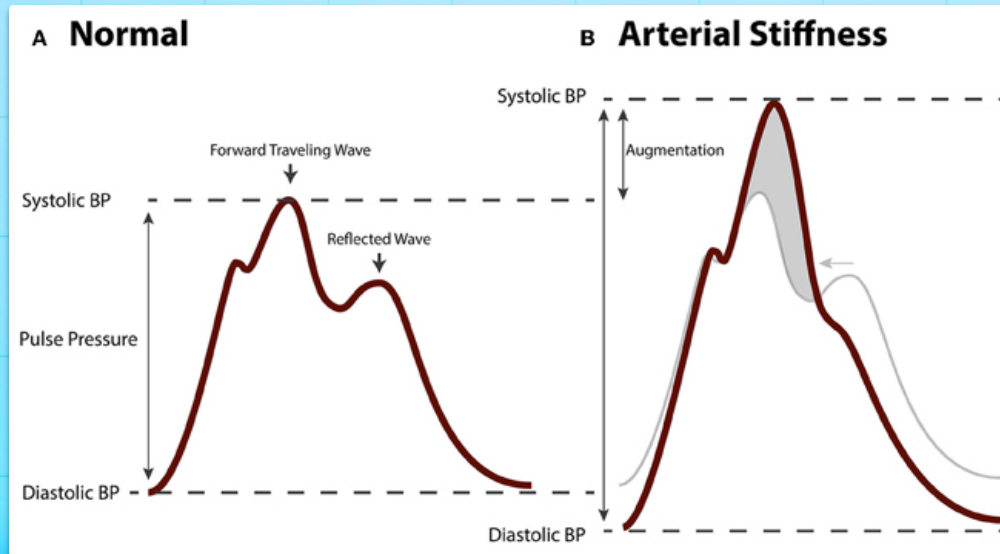
Never/Rarely laugh vs daily laughter

20% Increase in Heart Disease:

60% Increase in Stroke

Hayashi K, et al. J Epidemiol 2016 doi:10.2188

Laughter Reduces Aging of Blood Vessels



Biological Effects of Stress

Bottom Line

- ☐ Blood Vessels Constrict
- ☐ Blood Vessels become Inflamed
- ☐ The Clot thickens
- ☐ Blood vessels age with rigidity

Biological Effects of Laughter/LY

Bottom Line

- ☐ Blood Vessels Dilate
- ☐ Blood Vessels Chill
- ☐ The Clot does NOT thicken
- ☐ Blood vessels remain elastic and youthful



How Laughter Yoga Heals Hearts

Biological Effects of Laughter

Physical Effects of Laughter Yoga

Laughter & Calories Burned

- ❑ 10 min of laughter ~10-20 calories
(Buchowski MS, Int J Obes 2007)
- ❑ 30-40 min Laughter Yoga session~100-200 calories

How Laughter Yoga Heals Hearts

Biological Effects of Laughter

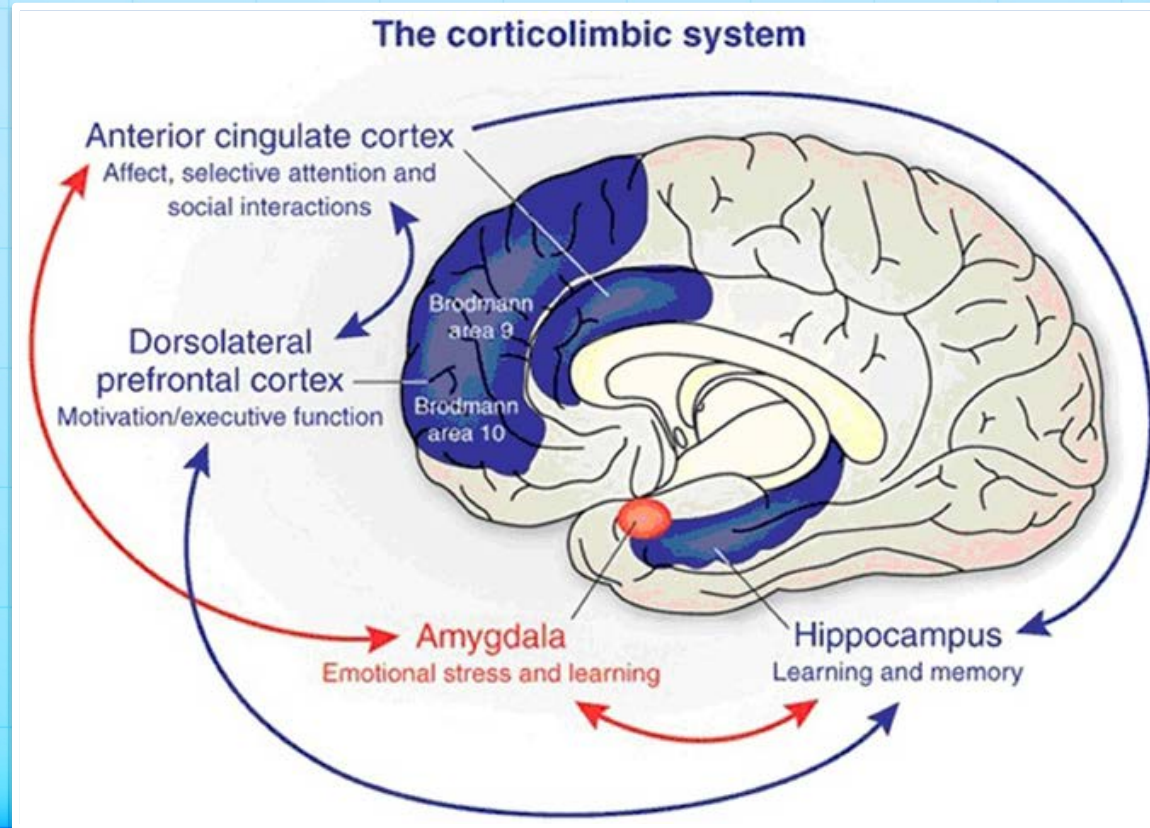
Physical Effects of Laughter Yoga

Social Effects of Laughter Yoga

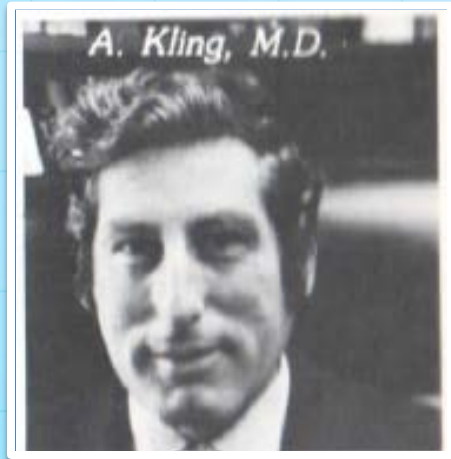


Amygdala:

The Brain's Emotional Coding Region



Pioneers of Emotional Health:



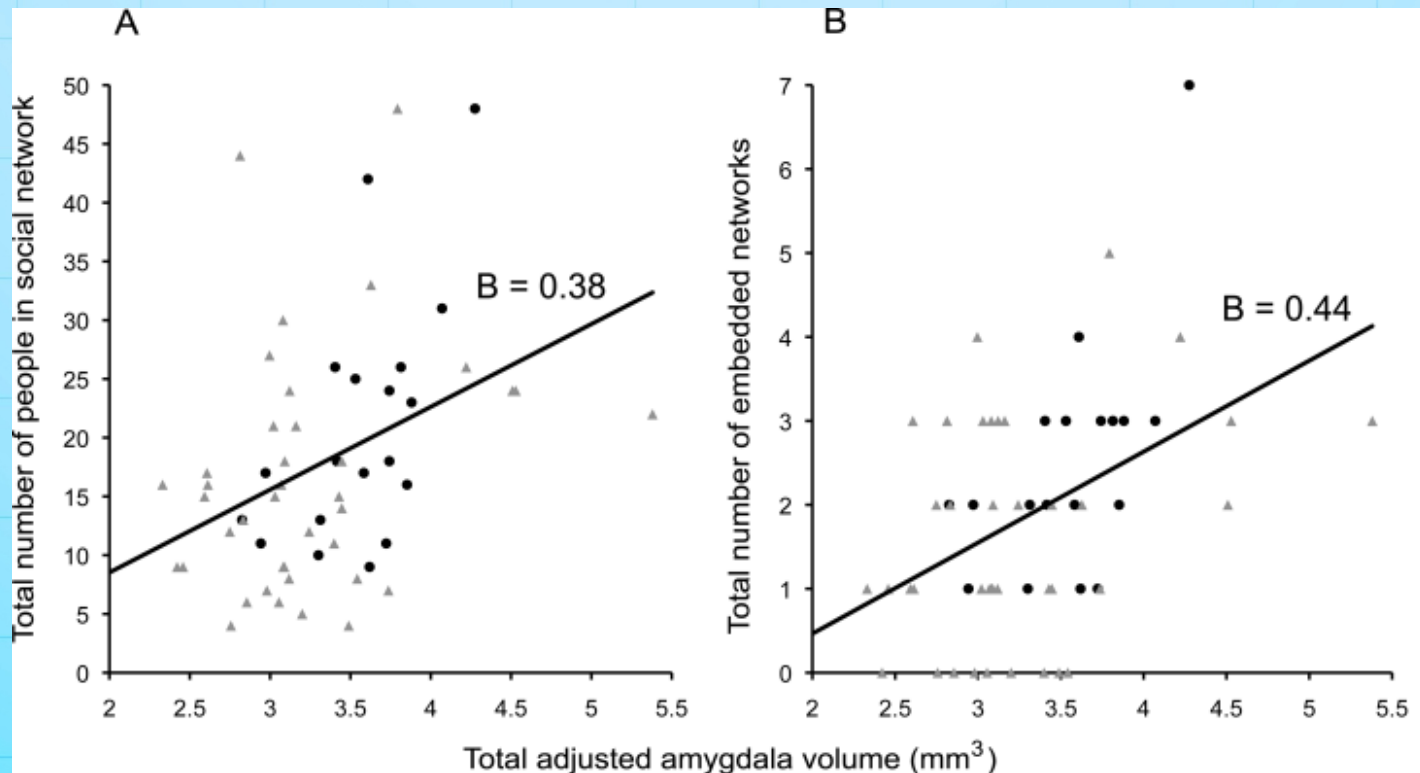
Arthur Kling, MD
Psychiatrist



Robert Deutsch, PhD
Cognitive Anthropologist

Amygdala & Social Connections:

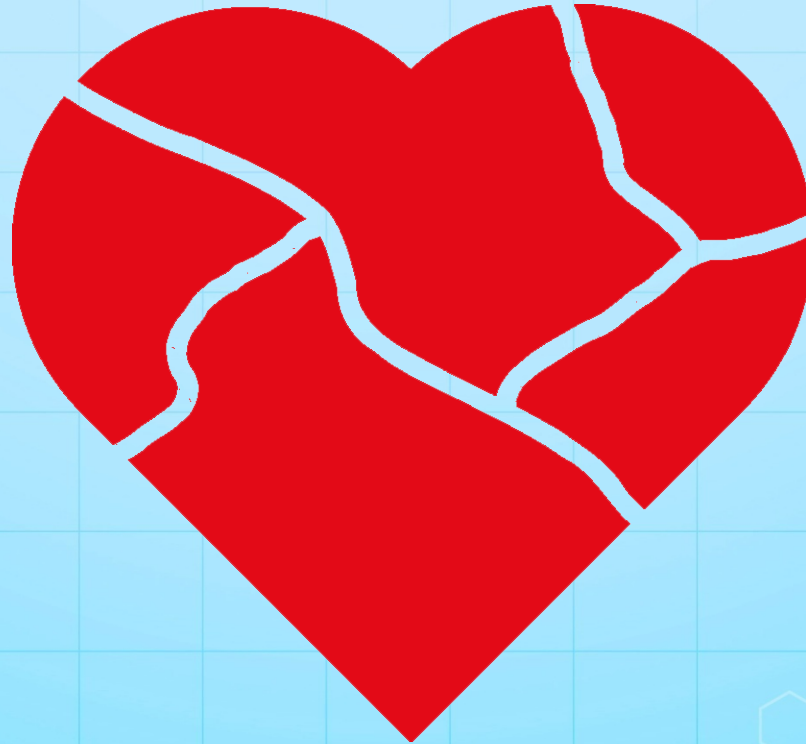
Amygdala Volume Correlates with Social Connections



Bickart KC, Nat Neurosci. 2011;14d:1oi6:130-140

“Broken Heart Syndrome”

Severence of a **Critical Social Connection**



Esler, M., Mental stress and human cardiovascular disease. *Neurosci. Biobehav. Rev.* (2016), <http://dx.doi.org/10.1016/j.neubiorev.2016.10.011>



Okinawan Centenarians (Japan)

High Level Social Connections



Laughter Yoga: High Level Social Connections



Laughter Yoga:

High Level Social Interactions



**Improves Heart Rate and Artery Flexibility
(HRV) for Transplant Patients**

(Dolgoff-Kaspar R, Altern Ther Health Med 2012)

**Improves Mood with Parkinson's Disease
(DeCaro DS, Explore 2016)**

**Improves Mood with Kidney Disease (dialysis)
(Bennett PN, Sem Dialysis 2014)**

Laughter Yoga: Guinness Book of World Records



Most Consecutive Years Teaching (78 years)



Sage Advice from a 101 year old

“Never too old to start Laughter Yoga”



THE POSITIVE EMOTIONS PRESCRIPTION
TO PREVENT AND REVERSE HEART DISEASE

HEAL YOUR HEART



MICHAEL MILLER, MD,
with CATHERINE KNEPPER