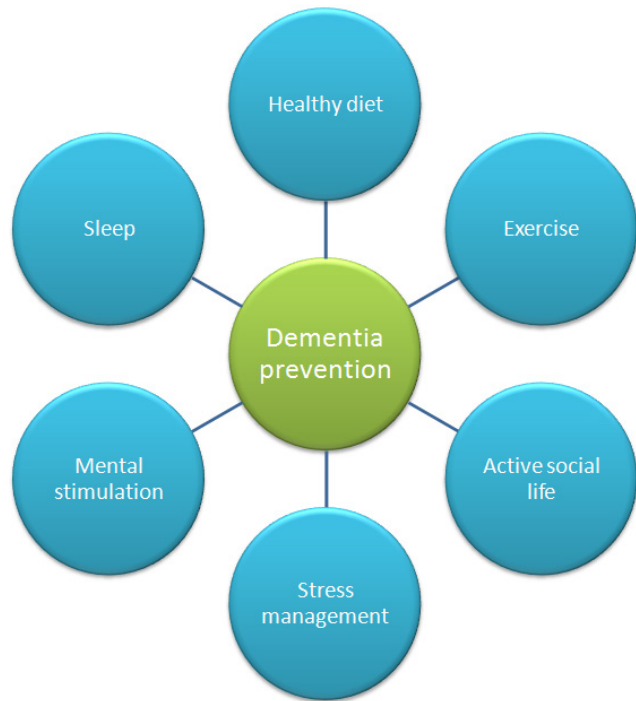


Stress:, Memory, Dementia, Burnout, Meditation and Mindfulness



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Objectives

- Distinguish between the effects of acute and chronic stress on health
- Briefly explain how stress affects memory loss, Alzheimer's risk, various dementias, and promotes burnout.
- Describe at least two symptoms of burnout.
- List at least two protective practices to lessen or mitigate stress effects on cognition and burnout.
- Explain the difference between mindfulness and meditation.
- Explore at least two stress reduction practices.

What is Stress?

- **Emotional**
- **Physiological**
- **Environmental**

- Stress is not what happens to you, but how you *react* to what happens
- “...demands exceed personal and social resources the individual is able to mobilize.” RS Lazarus
- Change can induce a stress response.

See: Life Events Rating Scale at:
http://www.changeforlife.com/holmes_rahe.html

Acute vs Chronic

Acute

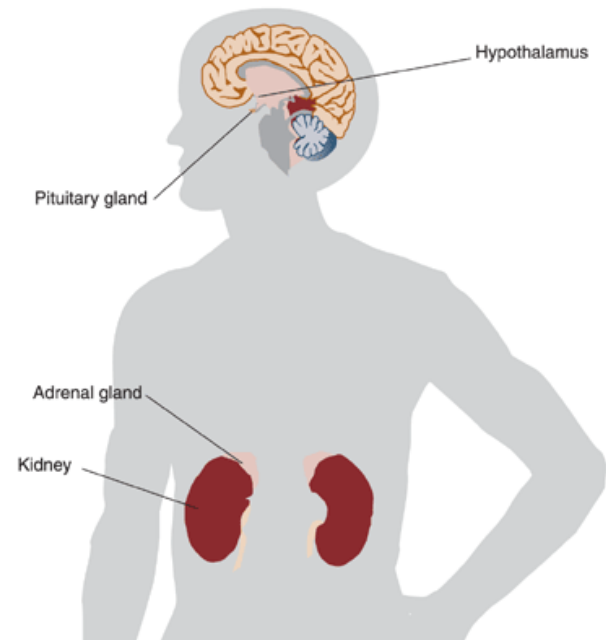
- “Fight or flight”
- Response to physical threat

Stress Hormones

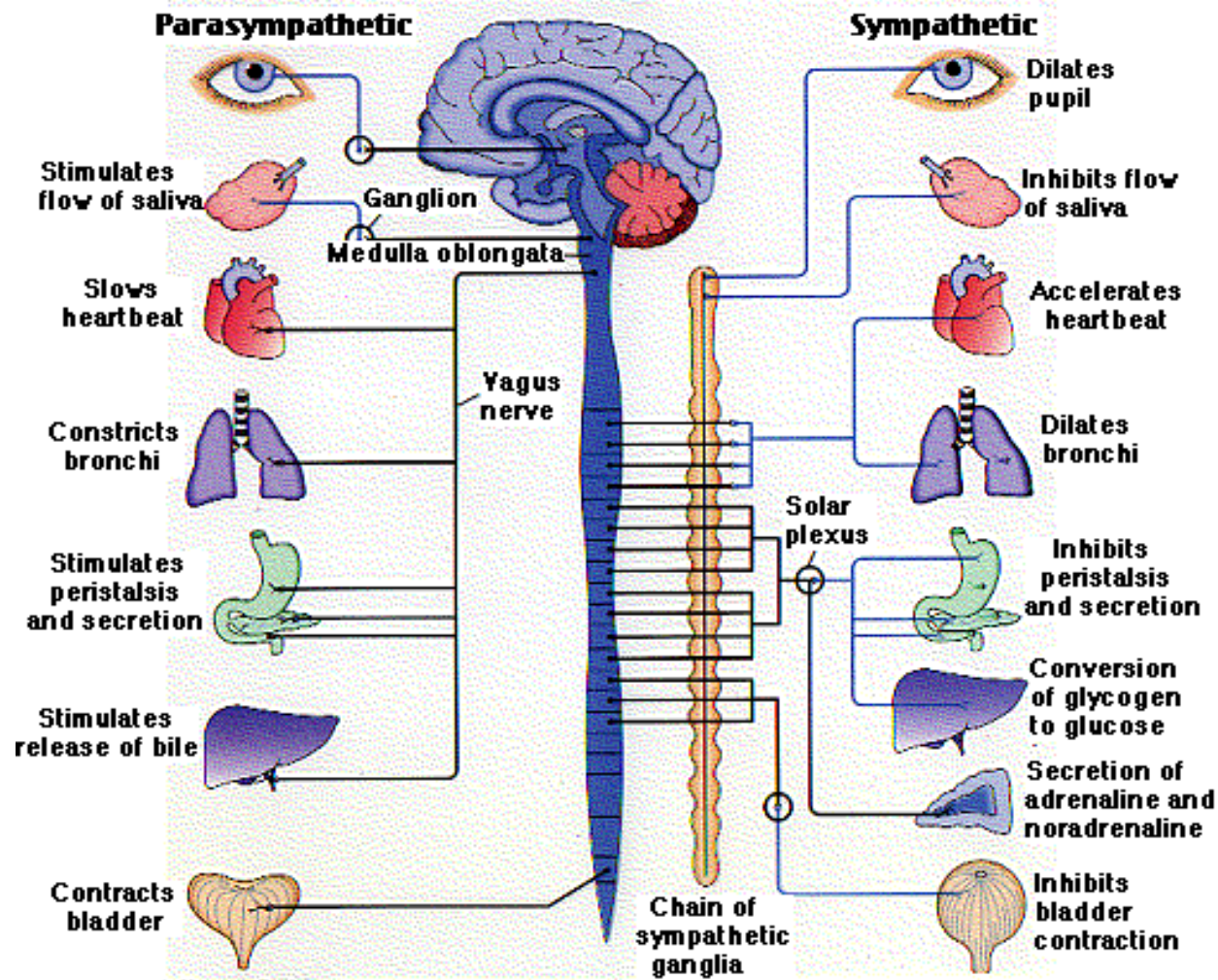
- Adrenalin
- Cortisol

Chronic

- Psychological
- Interpersonal



Organ Responses



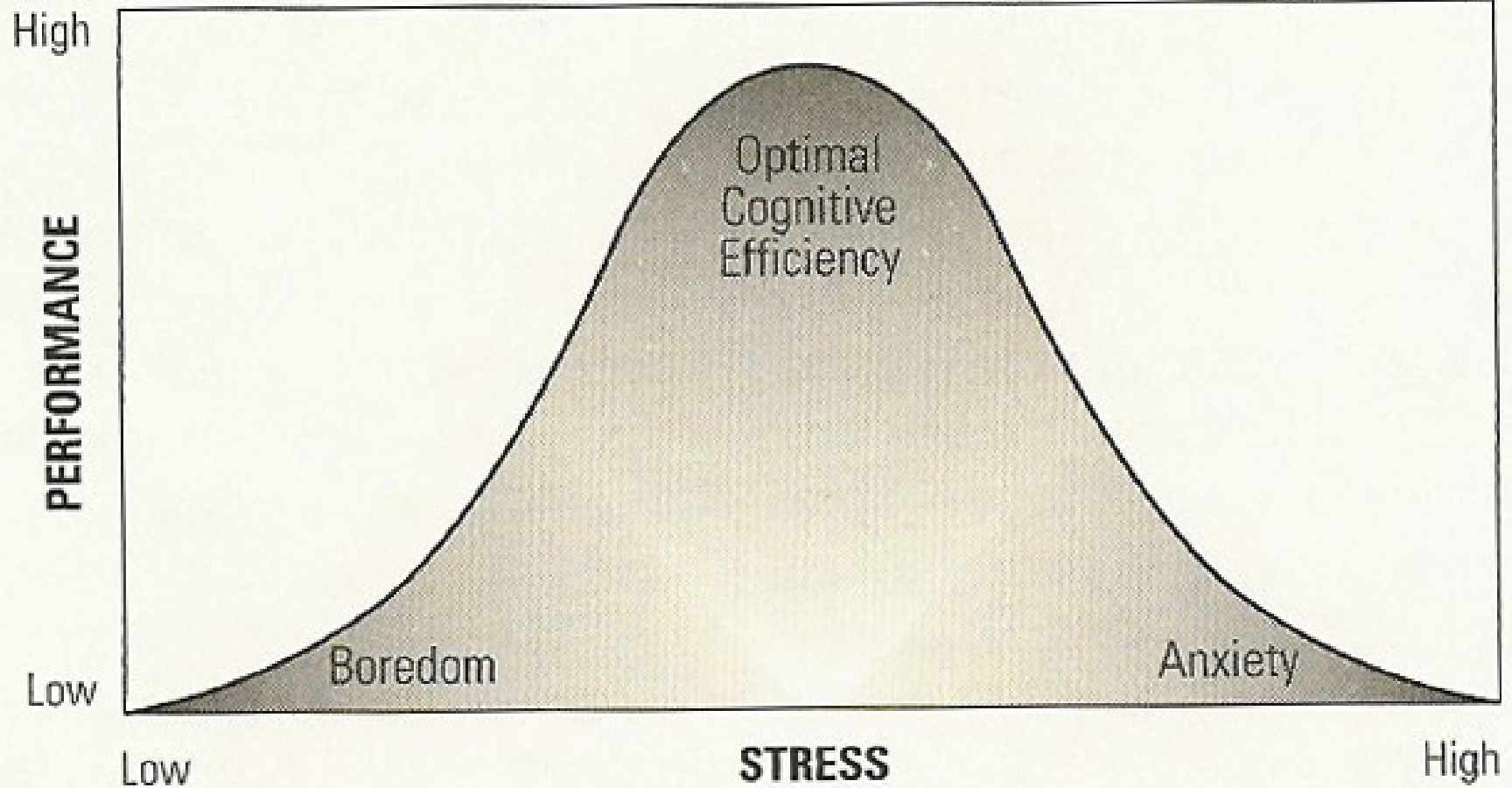
Effects – Chronic Stress

- **Nervous System**
 - Increased blood pressure, heart rate, platelet activity
- **Endocrine - Increased cortisol &**
 - Increased blood sugar
 - Increased insulin
 - Increased cholesterol
 - Impaired cognition
- **Immune**
 - Susceptibility to infection

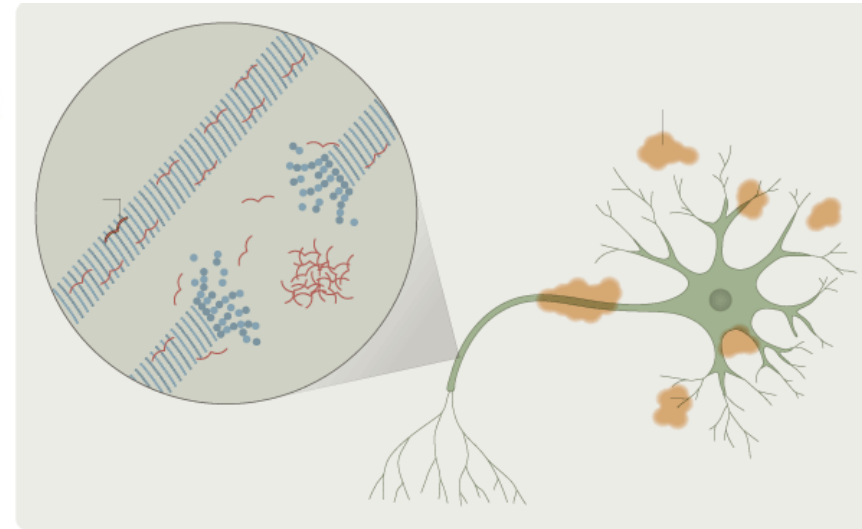
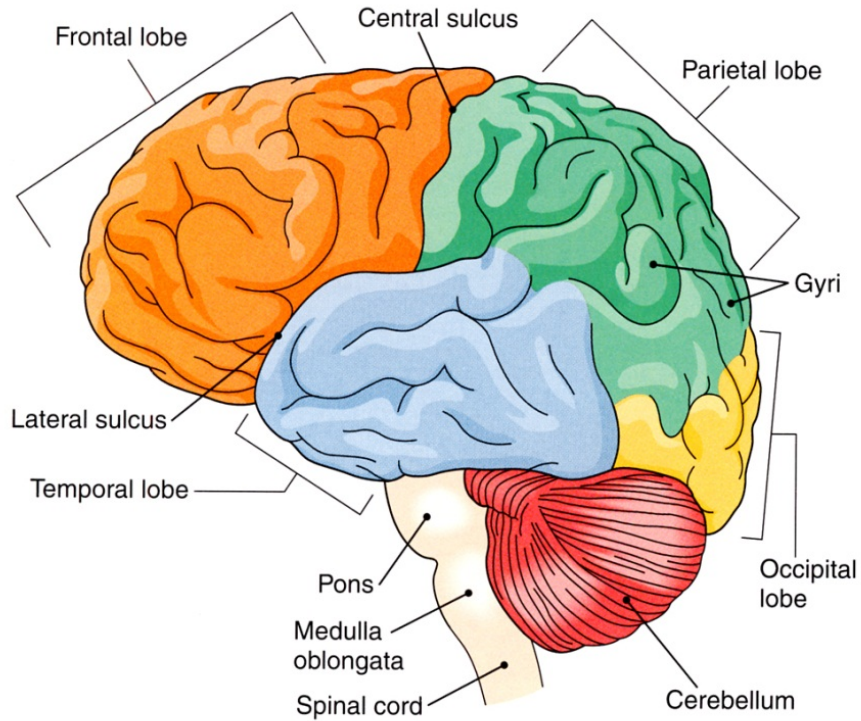
Conditions & Chronic Stress

- Depression
- CVD
- HIV/AIDS
- Upper respiratory tract infections
- Asthma
- Herpes viral infections
- Auto-immune diseases
- Wound healing
- Anorexia nervosa
- Panic disorder
- Obsessive-compulsive disorder
- Malnutrition
- Hyperthyroidism
- PMS
- Vulnerability to addiction

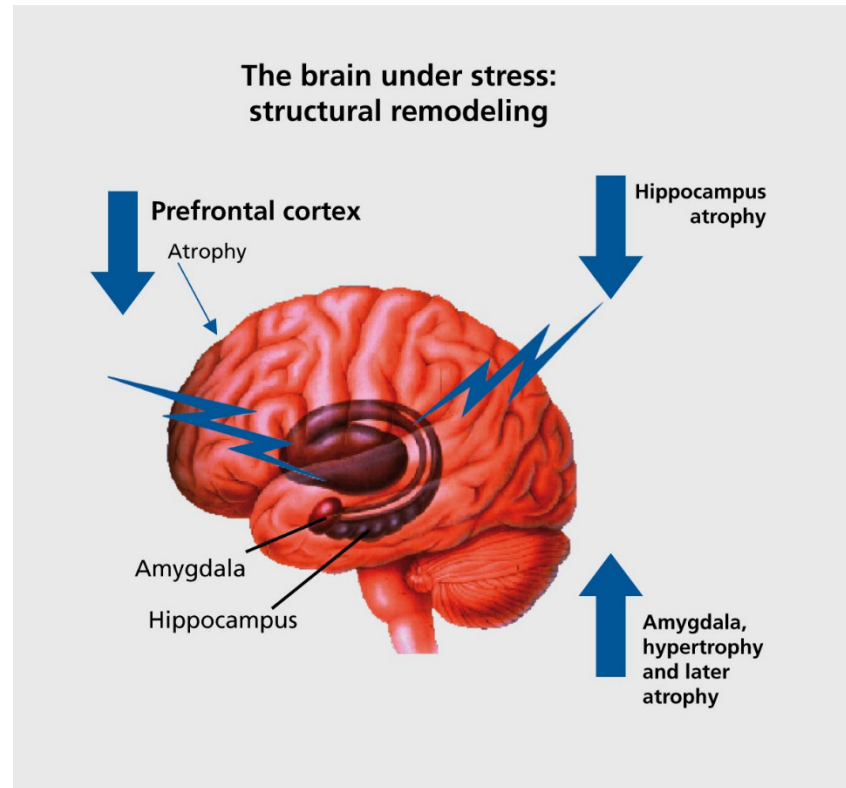
Stress and Cognitive Efficiency



Basic Neuroscience



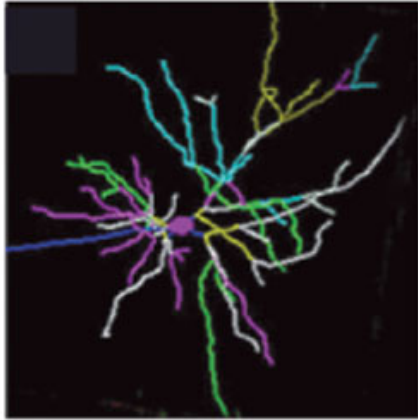
Stress and the Brain



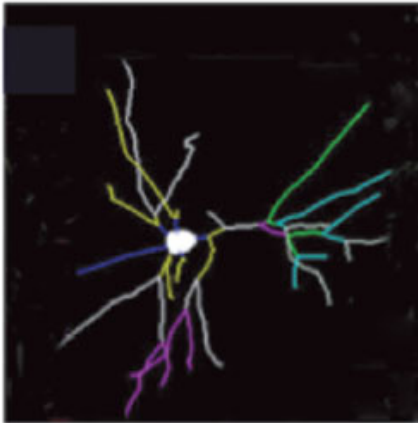
McEwen 2006

Stress and the Brain

Control



Chronic stress

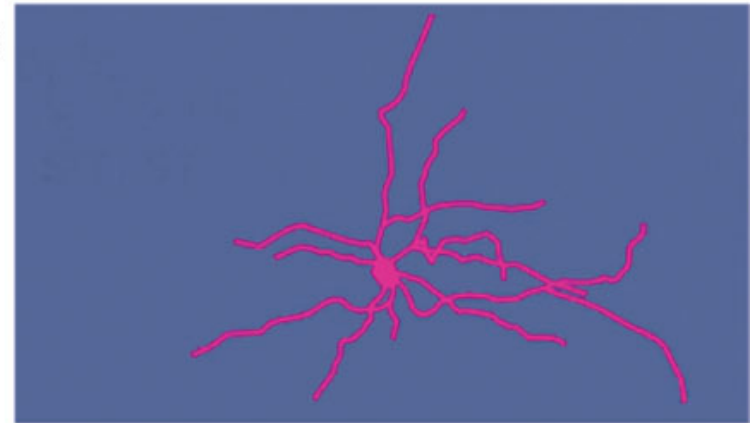


Prefrontal cortex
and hippocampus

Control



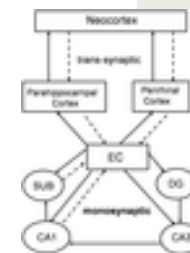
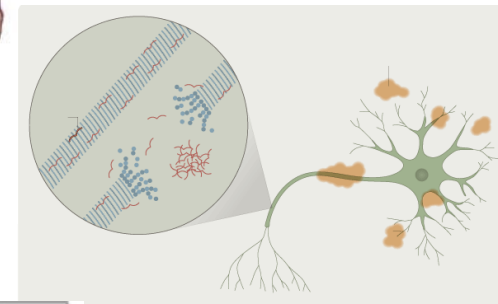
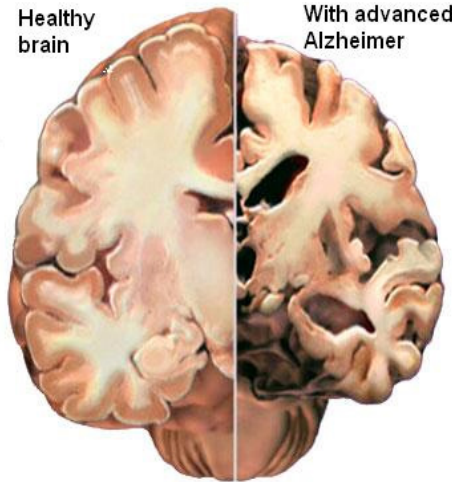
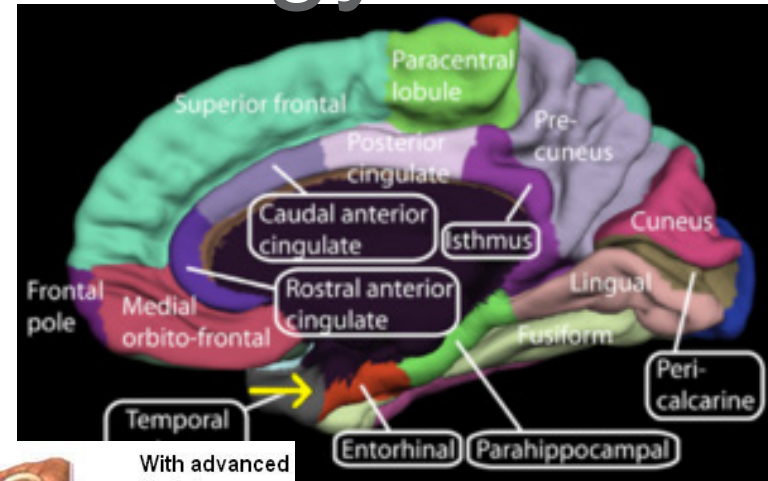
Chronic stress



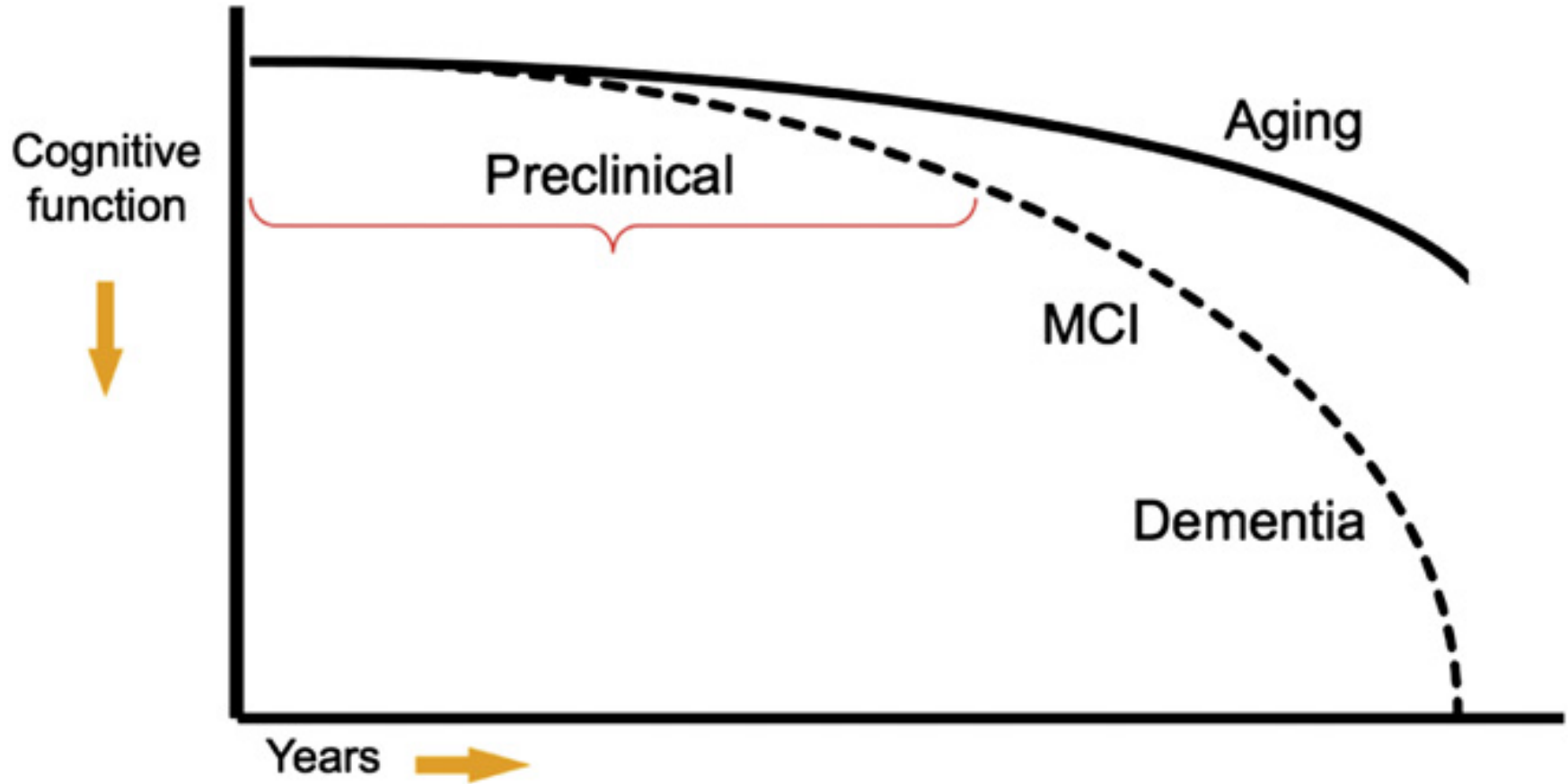
Amygdala and
orbitofrontal cortex

Alzheimer's : Pathology

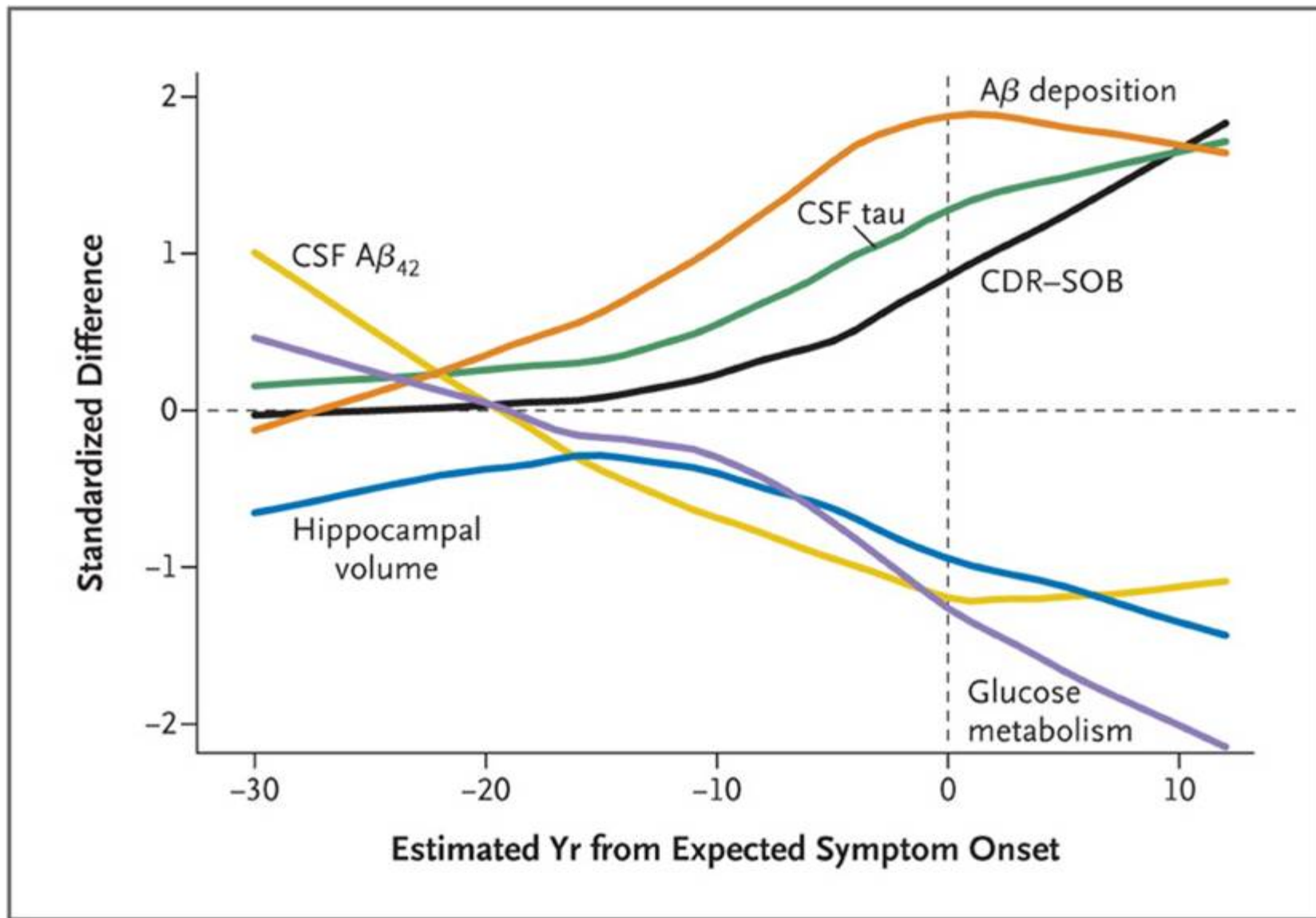
- Cortical atrophy
 - Amyloid accumulation
 - Synaptic dysfunction
 - Neuronal loss
- Sulcal widening
- Gyral atrophy
- Cortical ribbon thinning
- Ventricular enlargement
- Initial entorhinal cortex involvement
 - Trans-synaptic spread to hippocampus



The continuum of Alzheimer's disease



Toward defining the preclinical stages of Alzheimer's disease: Recommendations from the National Institute on Aging and the Alzheimer's Association workgroup Alz & Dementia 2011





So, stress hurts the brain. Any antidotes?

Mindfulness

- Relationship with Eastern meditation practices
 - Not tethered to them
 - Unconstrained to ideologies/beliefs
- Resting of attention in the present moment
- “Here and now” vs “then and there”
- Core components of openness to whatever the present moment contains
 - Non-judgmental
 - Gentleness
 - Curiosity
 - Acceptance
- Engagement over avoidance

Mindfulness

- 'Doing' versus 'Being'
 - Habits versus intentions
 - Passive recipient versus active receiver
 - Avoiding versus approaching
 - Fusion of thoughts and reality versus thoughts being thoughts
 - Striving versus flowing

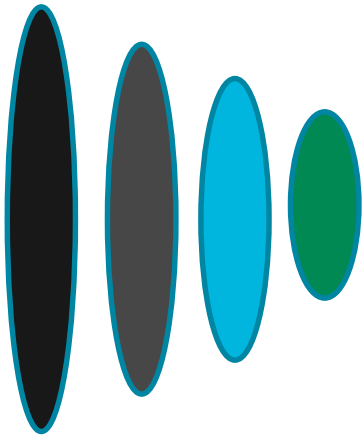
Mindfulness

- Is not:
 - Escape
 - A different form of avoidance
 - Emptying the mind of all thoughts
 - Competitive
 - A relaxation technique
 - Exclusive
 - Dogmatic

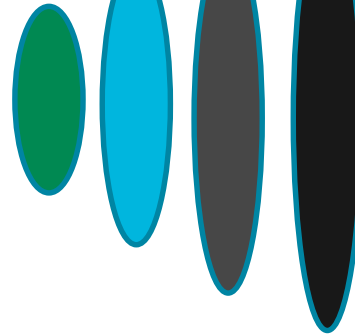
Mindfulness

- “Mindfulness means paying attention in a particular way: on purpose, in the present moment, and non-judgmentally.” (Kabat-Zinn, 1994)
- “Life can be found only in the present moment. The past is gone, the future is not yet here, and if we do not go back to ourselves in the present moment, we cannot be in touch with life.” – Thich Nhat Hanh

WHAT WAS
(then and there)



WHAT IS
(here and now)



WHAT IF
(where and when)

Mindfulness

- Core attitudes (Kabat-Zinn, 1990):
 - Non-judging
 - Patience
 - Beginners Mind
 - Trusting
 - Non-striving
 - Acceptance
 - Freedom from attachment

Mindfulness

- Practice, not Mastery
 - Meditation
 - Body Scan
 - Breath
 - Sounds
 - Movement
 - Enhanced awareness
 - Body
 - Mind
 - World

Mindfulness-Based Stress Reduction

- Stress Reduction Clinic at U. Mass Medical Center; Jon Kabat-Zinn, PhD - 1979
 - Stress — job, family or financial
 - Chronic pain and illness
 - Anxiety and panic
 - GI distress
 - Sleep disturbances / Fatigue
 - High blood pressure
 - Headaches
- Center for Mindfulness in Medicine, Health Care, and Society
- One application
 - Identify and disengage from negative thinking

Mindfulness Based Clinical Applications

- **Mindfulness-Based Stress Reduction (MBSR)**
- Bohlmeijer, E., Prenger, R., Taal, E., & Cuijpers, P. (2010). The effects of mindfulness-based stress reduction therapy on mental health of adults with a chronic medical disease: A meta-analysis. *Journal of Psychosomatic Research*, 68(6), 539. [link]
- Chiesa, A. & Serretti, A. (2009). Mindfulness-based stress reduction for stress management in healthy people: A review and meta-analysis. *Journal of Alternative and Complementary Medicine*, 15(5), 593. [link]
- de Vibe, M., Bjørndal, A., Tipton, E.,... Kowalski, K. (2012). Mindfulness based stress reduction (MBSR) for improving health, quality of life, and social functioning in adults. *The Campbell Collaboration*, 3. [link]
- Grossman, P., Niemann, L., Schmidt, S., & Walach, H. (2004). Mindfulness-based stress reduction and health benefits. A meta-analysis. *Journal of Psychosomatic Research*, 57(1), 35. [link]
- Ledesma, D. & Kumano, H. (2008). Mindfulness-based stress reduction and cancer: A meta-analysis. *Psycho-oncology*, 18(6), 571. [link]
- Winbush, N. Y., Gross, C. R., & Kreitzer, M. J. (2007). The effects of mindfulness-based stress reduction on sleep disturbance: A systematic review. *Explore*, 3(6), 585. [link]
- Khoury, B., Lecomte, T.,... Hofmann, S. G. (2013). Mindfulness-Based therapy: A comprehensive meta-analysis. *Clinical Psychology Review*, 33(6), 763-771. [link]

Mindfulness Based Clinical Applications

- Mindfulness-Based Cognitive Therapy (MBCT)

- Chiesa, A. & Serretti, A. (2011). Mindfulness based cognitive therapy for psychiatric disorders: A systematic review and meta-analysis. *Psychiatry Research*, 187(3), 441. [\[link\]](#)
- Fjorback, L. O., Arendt, M., Ornbøl, E.,... Walach, H. (2011). Mindfulness-based stress reduction and mindfulness-based cognitive therapy - a systematic review of randomized controlled trials. *Acta Psychiatrica Scandinavica*, 124(2):102. [\[link\]](#)
- Marchand, W. R. (2012). Mindfulness-based stress reduction, mindfulness-based cognitive therapy, and zen meditation for depression, anxiety, pain, and psychological distress. *Journal of Psychiatric Practice*, 18(4), 233. [\[link\]](#)
- Piet, J. & Hougaard, E. (2011). The effect of mindfulness-based cognitive therapy for prevention of relapse in recurrent major depressive disorder: A systematic review and meta-analysis. *Clinical Psychology Review*, 31(6):1032. [\[link\]](#)
- Scherer-Dickson, N. (2004). Current developments of metacognitive concepts and their clinical implications: Mindfulness-based cognitive therapy for depression. *Counselling Psychology Quarterly*, 17(2), 223. [\[link\]](#)
- Galante, J., Iribarren, S. J., & Pearce, P. F. (2012). Effects of mindfulness-based cognitive therapy on mental disorders: A systematic review and meta-analysis of randomised controlled trials. *Journal of Research in Nursing*. [\[link\]](#)

Mindfulness Based Clinical Applications

- **Mindfulness-Based Programs for Substance Use**
- Chiesa, A. & Serretti, A. (2013). Are mindfulness-based interventions effective for substance use disorders? A systematic review of the evidence. *Substance Use & Misuse*. [link]
- Garland, E. L., Schwarz, N. R., Kelly, A.,... Howard, M. O. (2012). Mindfulness-oriented recovery enhancement for alcohol dependence: Therapeutic mechanisms and intervention acceptability. *Journal of Social Work Practice in the Addictions*, 12(3), 242. [link]
- Katz, D. & Toner, B. (2012). A systematic review of gender differences in the effectiveness of mindfulness-based treatments for substance use disorders. *Mindfulness*. doi: 10.1007/s12671-012-0132-3 [link]
- Witkiewitz, K., Lustyk, M. K., & Bowen, S. (2013). Retraining the addicted brain: A review of hypothesized neurobiological mechanisms of mindfulness-based relapse prevention. *Psychology of Addictive Behaviors*, 27(2), 351-65. [link]
- Zgierska, A., Rabago, D., Chawla, N., Kushner, K., Koehler, R., & Marlatt, A. (2009). Mindfulness meditation for substance use disorders: A systematic review. *Substance Abuse*, 30(4), 266. [link]

How the Mind Processes Pain

ANTERIOR CINGULATE CORTEX

Registers unpleasant feelings when things go wrong, either physically or emotionally. **People who are highly sensitive to pain have greater activity here.**

SOMATOSENSORY CORTEX

Registers which body part is in pain and the intensity of that pain. **Less activity here when patients focus their attention away from their pain.**

INSULAR CORTEX

Integrates sensory, emotional and cognitive states; **feels empathy for others' pain.**

THALAMUS

Receives **pain signals** from spinal cord and relays them to higher brain regions.

PERIAQUEDUCTAL GRAY

An area rich in natural opioids that act as a **pain reliever.**

AMYGDALA

Anticipates pain and reacts to perceived threats.

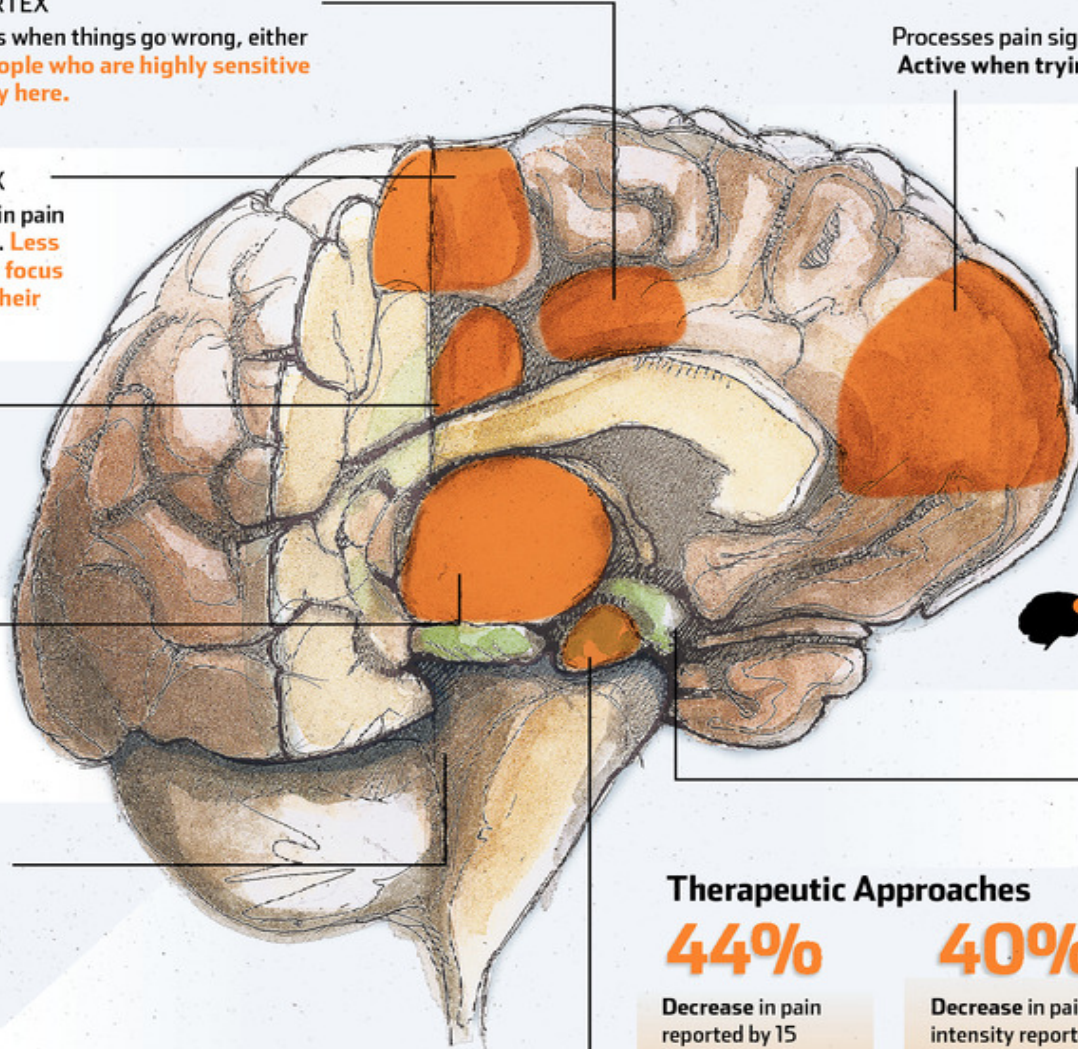
PREFRONTAL CORTEX
Processes pain signals rationally and plans action. **Active when trying to consciously reduce pain.**

MEDIAL PREFRONTAL GYRUS
Focuses on negative personal implications of pain. **Heightened activity seen in anxious people.**

RIGHT LATERAL ORBITOFRONTAL CORTEX

Evaluates sensory stimuli and **decides on response**, particularly if fear is involved. Mindfulness meditation calms down this response.

NUCLEUS ACCUMBENS
Releases **dopamine and serotonin** during pleasure or pain.



Therapeutic Approaches

44%

Decrease in pain reported by 15 undergraduates when they focused on a loved one's photo while exposed to a heated probe.

40%

Decrease in pain intensity reported by 15 people who learned mindfulness meditation and used it while exposed to a heated probe.

30%

Percentage of people in a study of 422 fibromyalgia patients who reported less pain after receiving cognitive behavioral therapy.

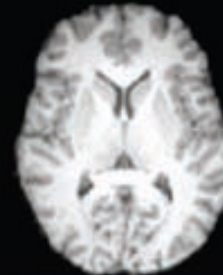
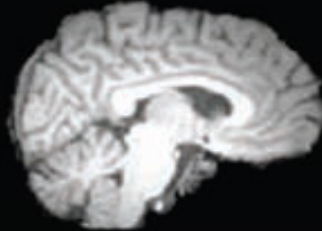
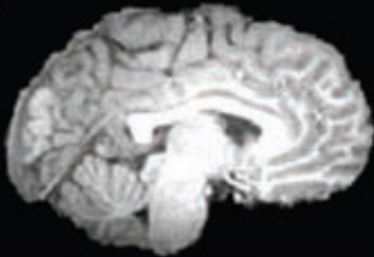
© Cartoonbank.com



“Could we up the dosage? I still have feelings.”

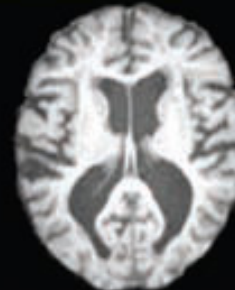
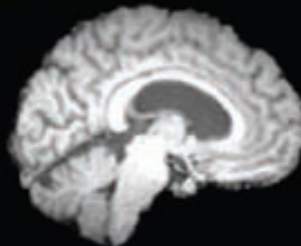
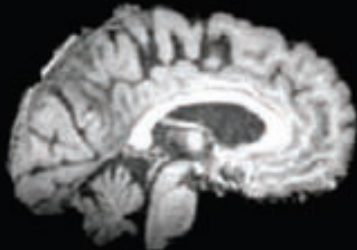
Variation in Cortical Volume

A



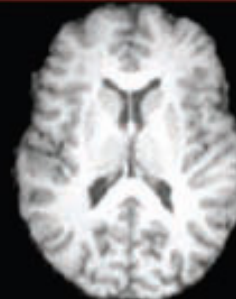
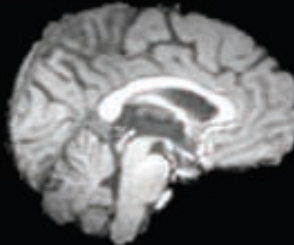
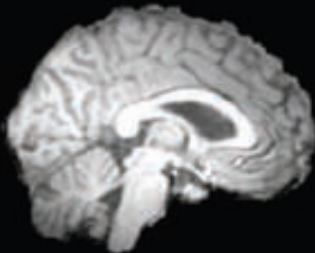
Young

B



Old

C



Old

Meditation and Cognition

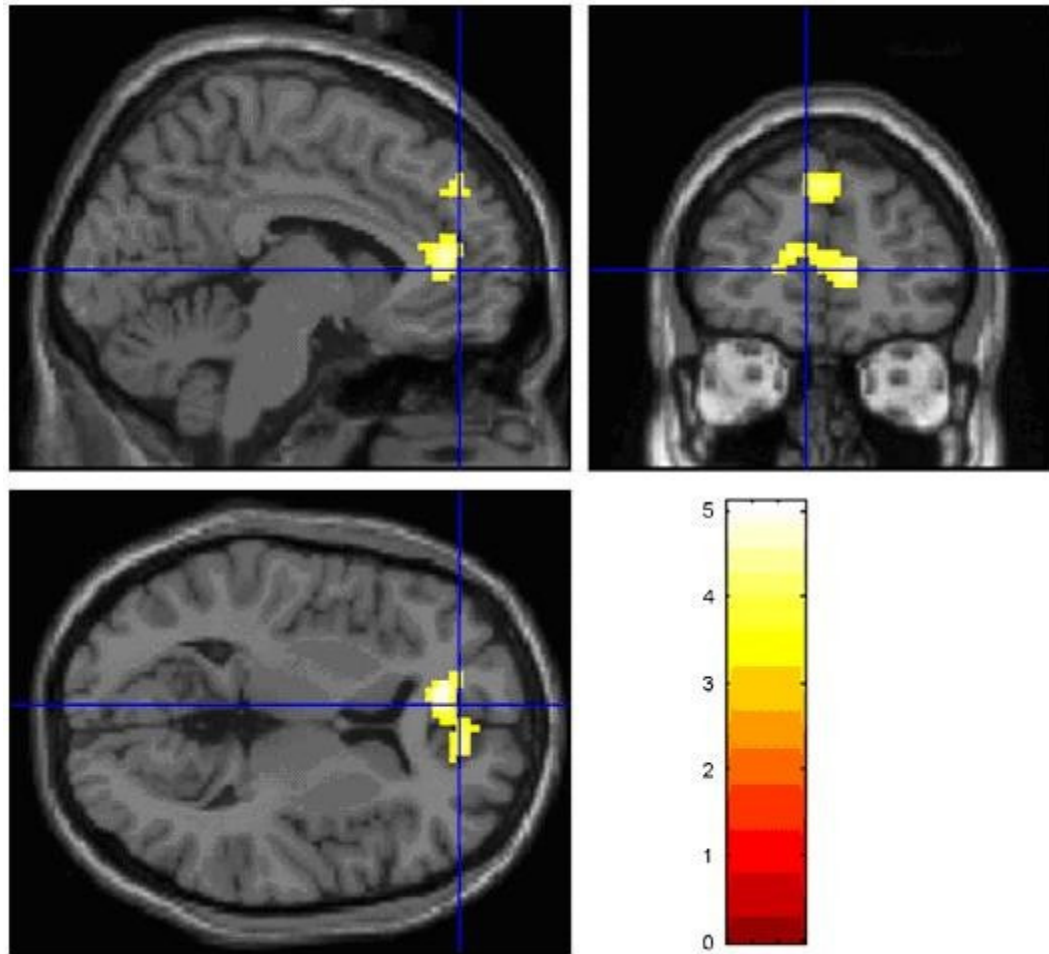
- **Changes in cortical structures** (Marciniak et al., 2014)
 - White matter
 - Brain stem
 - Putamen
 - Frontal lobes
 - Function
 - Frontal
 - Parietal
 - Default mode network
- **Changes in cognitive skills** (Chiesa et al., 2011)
 - Processing speed
 - Attention
 - Selective vs. divided
 - Working memory
 - Executive function
 - Mental flexibility

Meditation and the Brain

Study	Intervention	<i>n</i>	Mean age \pm SD	Experience with meditation	Loci with increased cortical thickness	Interpretation
Lazar et al. (2005)	Various	20	38.2	9.1 \pm 7.1 years, 6.2 \pm 4 h per week	Anterior insula, parts of frontal lobe, auditory cortex in temporal lobe	Somato-sensory, auditory, and interceptive processes
Pagnoni and Cekic (2007)	Zen	13	37.2 \pm 6.9	>3 years per day	Putamen	Attention
Holzel et al. (2008)	Vipassana	20	34.1 \pm 4.7	8.6 years, 2 h daily	Anterior insula, right hippocampus, left inferior temporal gyrus	Anterior insula – awareness of internal experience
Vestergaard-Poulsen et al. (2009)	Tibetan buddhism	10	55 \pm 6.2	16.5 \pm 5.1 years	Medulla oblongata, anterior cerebellum, superior, and inferior frontal gyrus	Breath control, resistance to stress, attention, calmness
Luders et al. (2009)	Various	22	53 \pm 11.5	24 \pm 12 years	Orbito-frontal cortex, right thalamus, left inferior temporal gyrus	Regulation of emotions and sensory functions
Grant et al. (2010)	Zen	17	37.6 \pm 10.9	>1000 h	Anterior cingulate cortex, secondary somato-sensory cortex	Anterior cingulate cortex – adaptive control of behavior
Holzel et al. (2011)	MBSR	16	39 \pm 4	0	Left hippocampus, posterior cingulate cortex, temporo-parietal junction, cerebellum	Learning, memory, regulation of emotions, empathy
Luders et al. (2013b)	Various	50	51.4 \pm 12.8	20 years	Hippocampus, especially subiculum	Subiculum – regulation of stress
Grant et al. (2013)	Zen	18	37.1 \pm 10.9	>1000 h	Cingulo-fronto-parietal network	Attention

n, number of subjects, *SD*, standard deviation, *MBSR*, mindfulness-based stress reduction, *IBMT*, integrative body mind training.

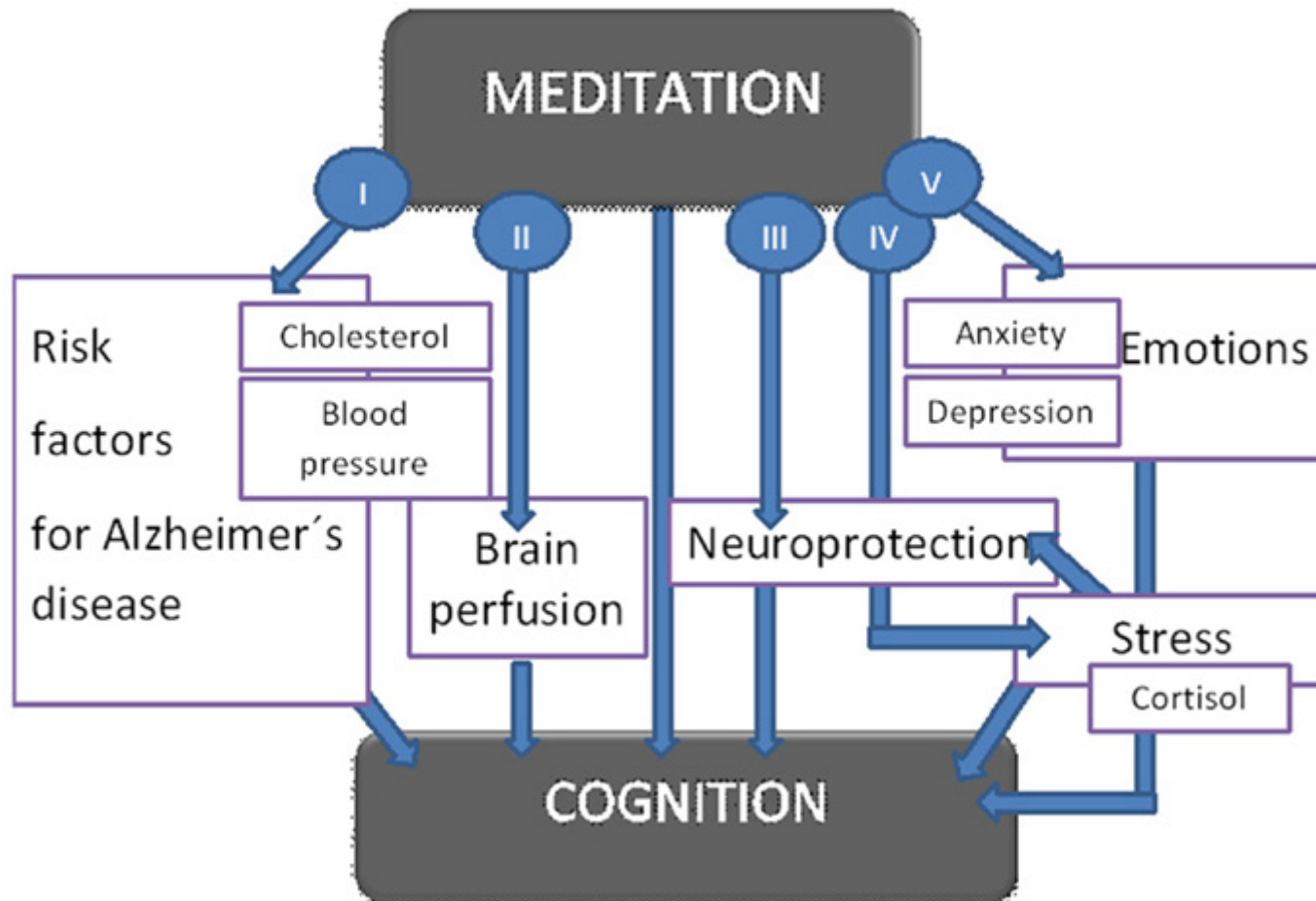
Meditation and the Brain



Meditation and Alzheimer's

- **Reduction of risk factors**
 - Hypertension (Anderson et al., 2008)
 - Cholesterol (Walton et al., 2004)
 - Depression (Beadreau, 2008)
 - Anxiety (Beadreau, 2008)
- **Improved perfusion** (Newberg et al, 2001)
- **Protected white matter networks** (Pagoni, 2007)
- **Inflammatory modulation** (Luders et al., 2013)
- **Decreased stress hormones** (Jacobs, 2013)
- **Downstream effects**
 - Alcohol?

Meditation and the Brain

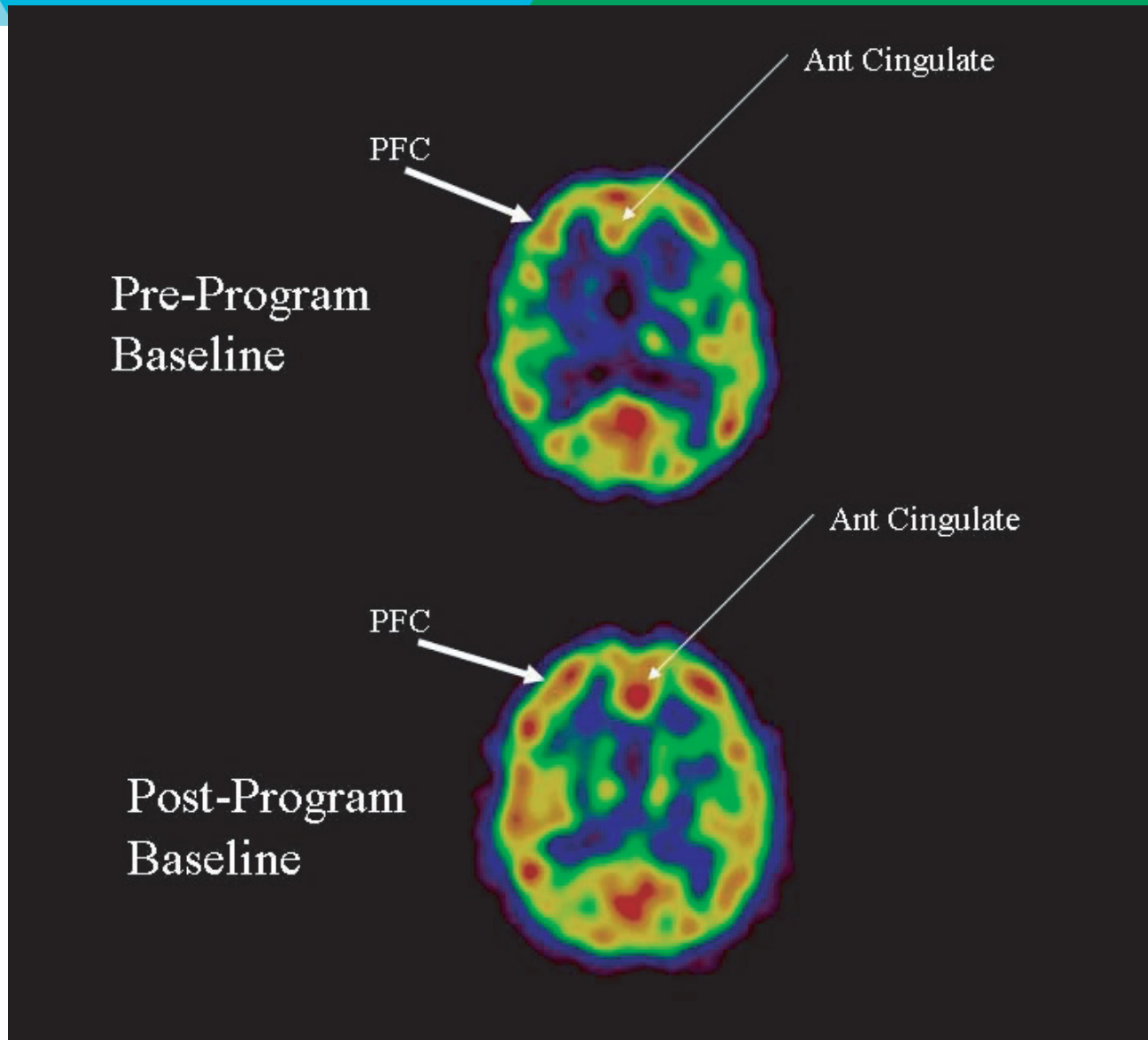


Meditation and Alzheimer's

Newberg et al., (2010). Meditation effects on cognitive function and cerebral blood flow in subjects with memory loss: a preliminary study. J. Alzheimers Dis. 2010, 20, 517–526

- 8 week meditation program
 - Relaxation (music) control
- N = 15
 - Normal control (n=7)
 - MCI (n=5)
 - AD (n=3)
- Improved perfusion
 - Prefrontal and auditory cortex
- Reduced perfusion (parietal)
- Improved cognition
 - Verbal fluency, divided/working attention, declarative memory

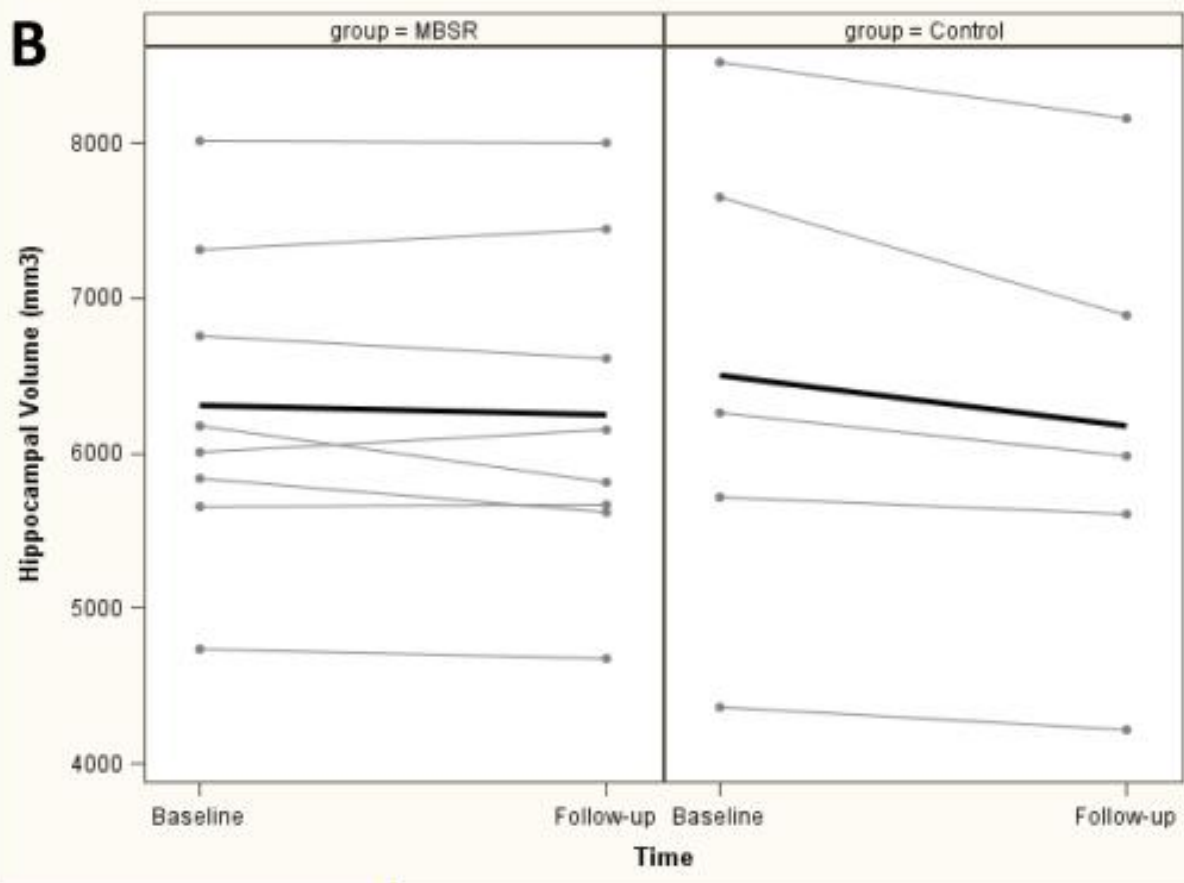
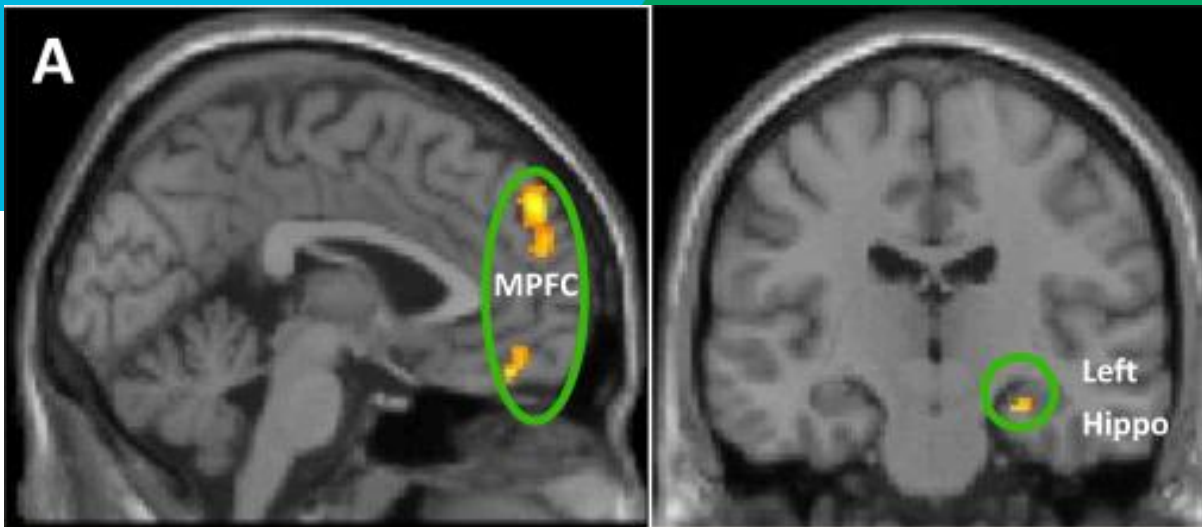
Meditation and AD



Meditation and AD

Wells et al., Meditation's impact on default mode network and hippocampus in mild cognitive impairment: a pilot study. Neurosci Lett. 2013 Nov 27;556:15-9.

- 8 week MBSR program
- Sample = 14 MCI
 - Randomized to MBSR or UC
- Increased functional connectivity
 - Posterior cingulate cortex and bilateral medial prefrontal cortex
 - PCC and left hippocampus
- Decreased bilateral hippocampal volume atrophy (trend)



(Wells et al. 2013)

Stress, Care-givers, Burnout

- Burnout defined
- Relation to stress and outcomes
- Overview of practices



Occupational Burnout

“a state of physical, emotional or mental exhaustion combined with doubts about your competence and the value of your work”

See Mayo Clinic

- <http://www.mayoclinic.org/healthy-lifestyle/adult-health/in-depth/burnout/art-20046642>

Whose at risk?

People who

- lack a reasonable balance between work and personal life
- try to be everything to everyone
- work in a helping profession (e.g., health care, counseling, teaching)
- have little or no control over their work
- have monotonous jobs

Symptoms

- Cynicism, criticality
- Irritable, impatient
- Lack energy to be consistently productive
- Difficulty getting to work and starting tasks
- Dissatisfaction
- Disillusioned about job
- Using food, drugs or alcohol to feel better or not feel
- Changed sleep habits or appetite
- Unexplained headaches, backaches or other physical complaints

Consequences

- Excessive stress
- Fatigue
- Insomnia
- A negative spillover into personal relationships or home life
- Depression
- Anxiety
- Alcohol or substance abuse
- Heart disease
- High cholesterol
- Type 2 diabetes, especially in women
- Stroke
- Obesity
- Vulnerability to illnesses

Manage and Prevent*

- **Manage the stressors that contribute to job burnout.** Once you've identified what's fueling your feelings of job burnout, you can make a plan to address the issues.
- **Evaluate your options.** Discuss specific concerns with your supervisor. Perhaps you can work together to change expectations or reach compromises or solutions. Is job sharing an option? What about telecommuting or flexing your time? Would it help to establish a mentoring relationship? What are the options for continuing education or professional development?
- **Adjust your attitude.** If you've become cynical at work, consider ways to improve your outlook. Rediscover enjoyable aspects of your work. Recognize co-workers for valuable contributions or a job well-done. Take short breaks throughout the day. Spend time away from work doing things you enjoy.
- **Seek support.** Whether you reach out to co-workers, friends or loved ones, support and collaboration might help you cope with job stress and feelings of burnout. If you have access to an employee assistance program (EAP), take advantage of the available services.
- **Assess your interests, skills and passions.** An honest assessment can help you decide whether you should consider an alternative job, such as one that's less demanding or one that better matches your interests or core values.
- **Get some exercise.** Regular physical activity can help you to better deal with stress. It can also help you get your mind off work and focus on something else.
- **Get some sleep.** Sleep restores well-being and helps protect your health. Aim for at least 7-8 hours each night

*<http://www.mayoclinic.org/healthy-lifestyle/adult-health/in-depth/burnout/art-20046642?pg=2>.

Stress, Care-givers, Burnout



Practices

Physical

Yoga, tai chi, running, etc

Spiritual

TM, Qigong, prayer,

Meditation

- Concentrative – Mantra, prayers, visualization, qigong, yoga
- Receptive/awareness – Vipassana, mindfulness
- Reflective/analytical – disciplined thinking for insight
- Expressive – dancing, chanting, whirling, fast breathing, drumming, calligraphy

Other

- Nature, silence, gratitude, forgiveness

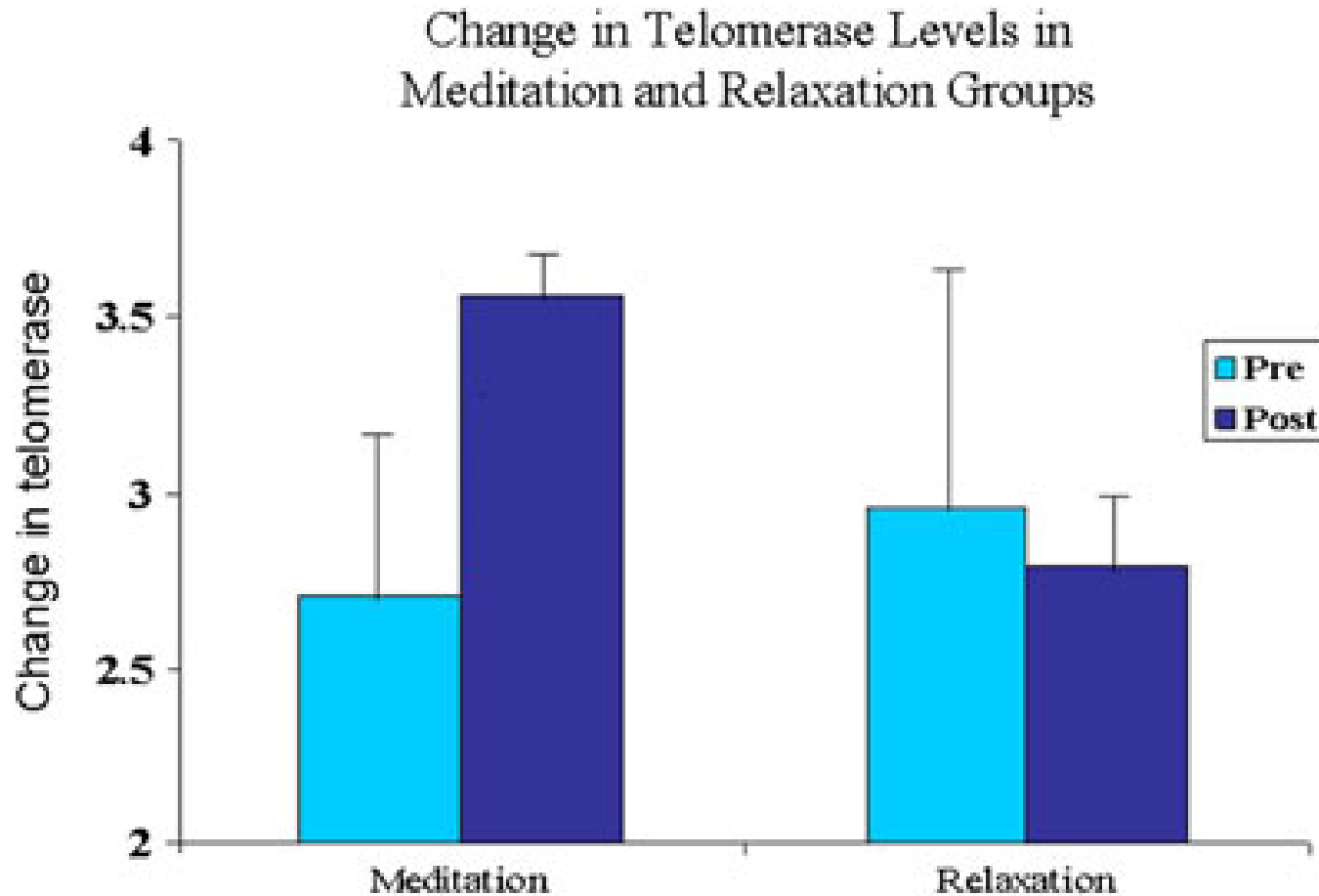


Meditation and Caregivers

Lavretsky, H., Epel, E. S., Siddarth, P., Nazarian, N., Cyr, N. S., Khalsa, D. S., et al. (2013). A pilot study of yogic meditation for family dementia caregivers with depressive symptoms: effects on mental health, cognition, and telomerase activity. *Int. J. Geriatr. Psychiatry* 28, 57–65.

- 12 minutes a day for 8 weeks
 - Relaxation = control group
- Significant improvements in
 - Depression
 - Overall mental health/distress
 - Cognitive function
- Decreased stress-induced cellular aging

Meditation and Caregivers



Summary

- Validated, longstanding practice
- Non-denominational / trans-theoretical adjunct
- Likely multifactorial direct and indirect impact
 - Risk factors
 - Direct cortical effects
 - Direct functional effects
- Not a cure-all
- Requires effort
- Addresses multiple domains
 - Including quality of life

Future Directions

- Program Export/Validation
 - ADWG/DAC State Plan Implementation
 - PSHVN/Bree Collaborative
- Enhanced partnerships with area resources
 - Frye here:now Program
 - Area Agencies on Aging/DSHS
 - Alzheimer's Association
 - Intergenerational Program



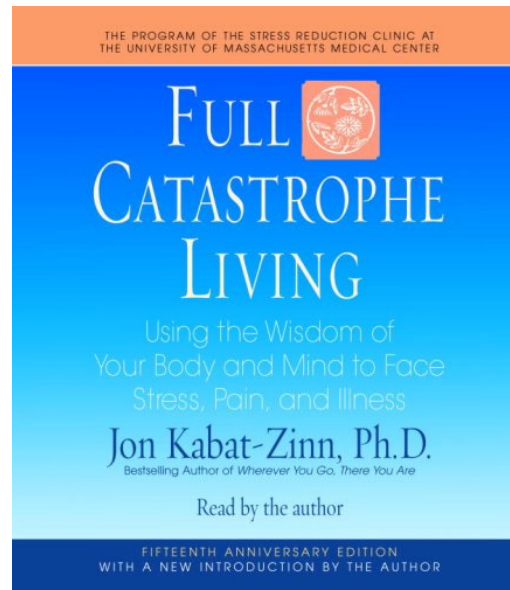
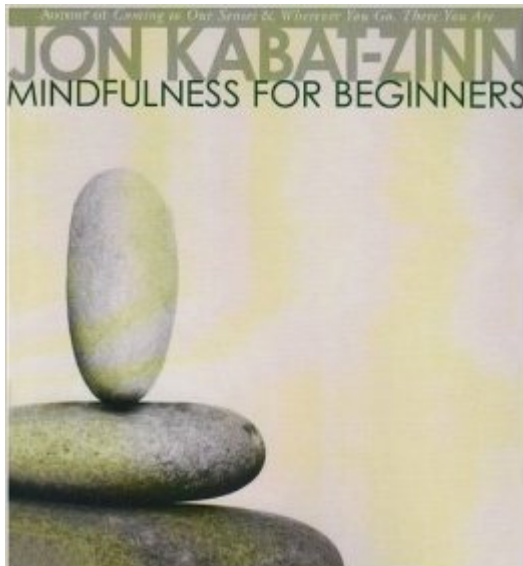
Thank you for your attention!



Questions?

Resources

- Mindfulness Northwest
- <http://www.mindfulnessnorthwest.com/>
- Seattle Mindfulness Center
- <http://seattlemindfulnesscenter.com/>
- Mindfulness for Beginners/Full Catastrophe Living (Kabat-Zinn)



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