Mindfulness and the Brain

Presented by

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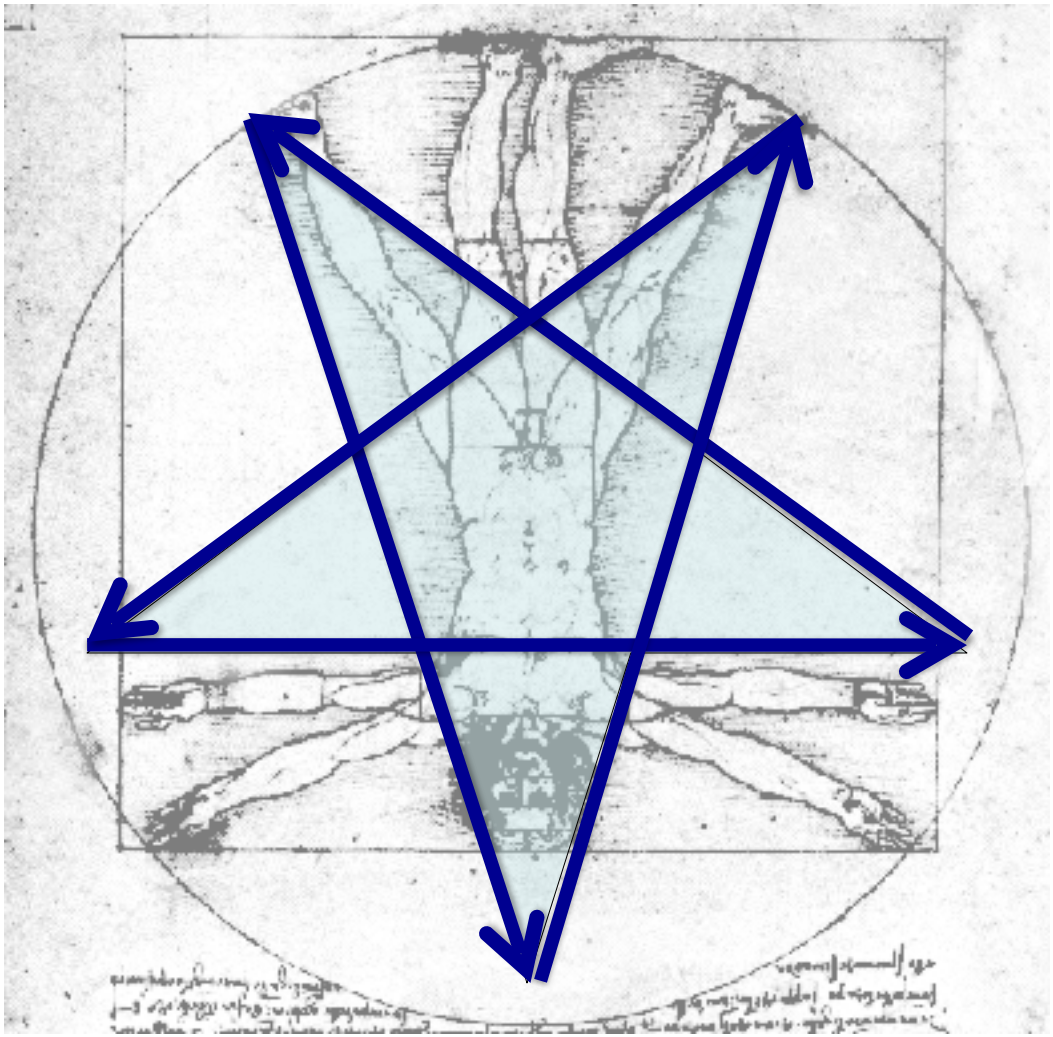
Star Walk



Mindfulness

Paying attention in a particular way:
on purpose, in the present moment,
and non-judgmentally.

Jon Kabat-Zinn, Ph.D.
Author and founder,
Mindfulness-Based Stress Reduction (MBSR) program
University of Massachusetts Medical School

Relaxation Response

1. Sit comfortably with your eyes closed.
2. Pay attention to your breathing, and repeat a word or phrase or prayer silently to yourself as you exhale.
3. When you notice your mind wandering (it will) just notice it and passively bring your attention back to your breathing.
4. Practice for approximately 20 minutes every day (or at least 3-4 times per week).

Source: Benson (1975, 1987, 2004)

Proven Benefits of the Relaxation Response

- Increases awareness of whether you are tense or relaxed
- Reduces the resting level of your autonomic nervous system
- Improves concentration
- Increases hemispheric communication
- Transforms brain cells and establishes new neural pathways

Source: Benson, 1975, 1987, 2003.

Mindfulness and Aging

Kirtan Kriya Yoga

Chant out loud for 2 minutes

Chant in a whisper for 2 minutes

Chant in silence for 3 minutes

Chant in a whisper for 2 more minutes

Chant out loud for 2 more minutes

Mindfulness-Based Stress Reduction

30-years of MBSR research:

Improved brain function

Enhanced immune function

Improved affect (reduced depression, anxiety)

Reduction in pain levels

Enhanced ability to cope with pain that may not go away

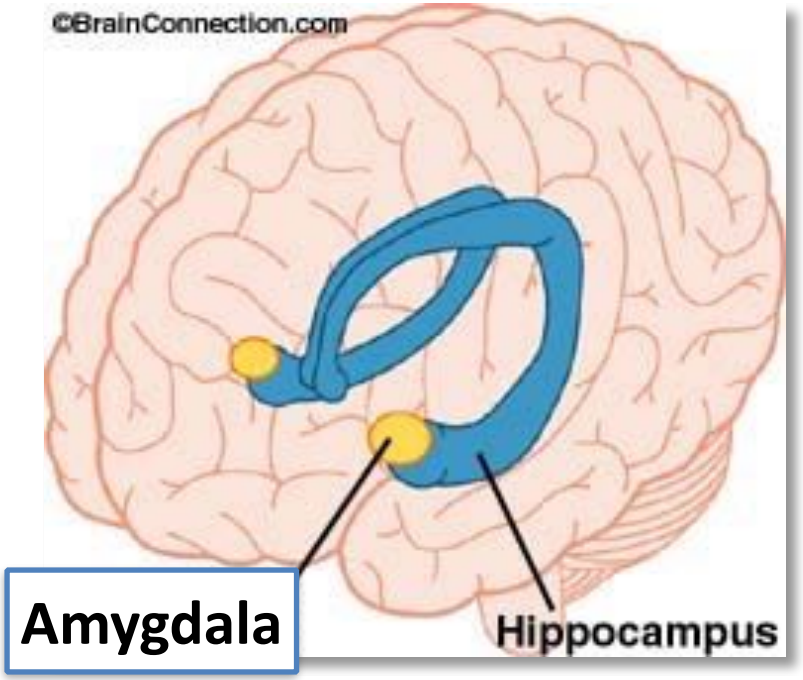
Greater energy and enthusiasm for life

An ability to cope more effectively with both short and long-term stressful situations.

http://www.umassmed.edu/cfm/stress/index.aspx

Positively Altered Brain Structure

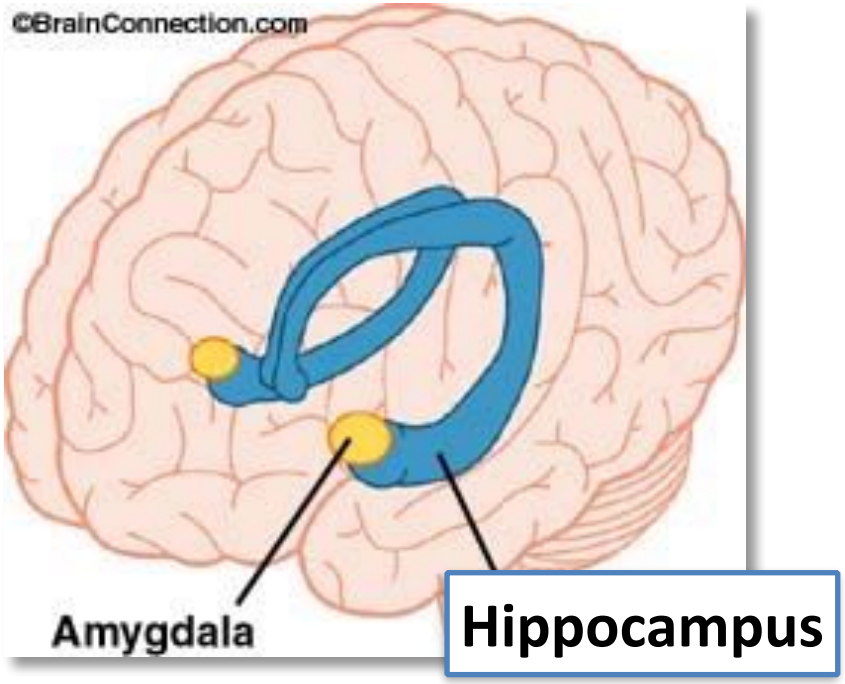
"Decreased grey-matter density in the **amygdala**, known to play an important role in anxiety and stress. "



Massachusetts General Hospital (2011, January 21). "Mindfulness meditation training changes brain structure in eight weeks." *ScienceDaily* *http://www.sciencedaily.com /releases/2011/01/110121144007.htm*

Positively Altered Brain Structure

"Increased grey-matter density in the **hippocampus**, known to be important for learning and memory, ….



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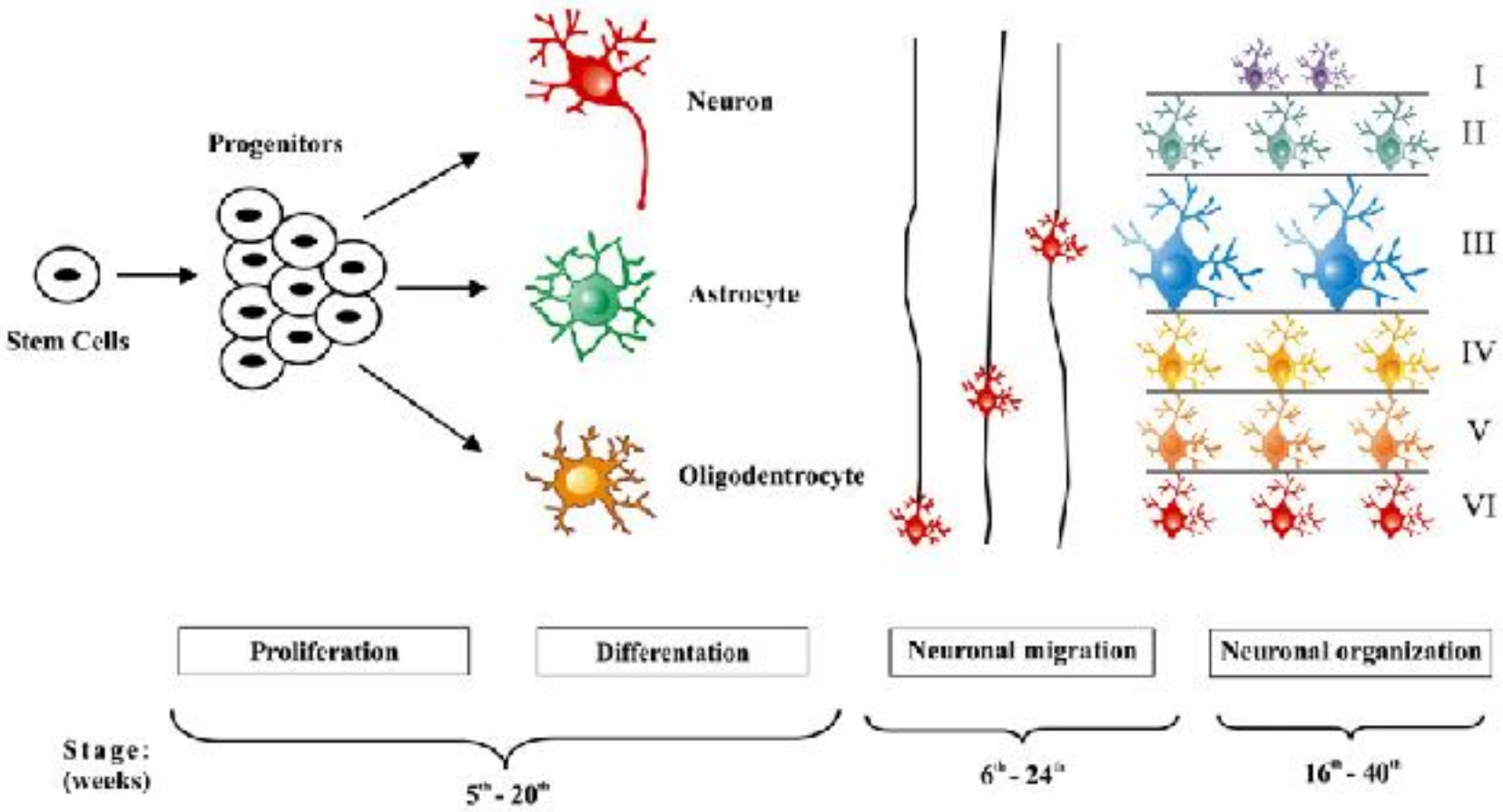
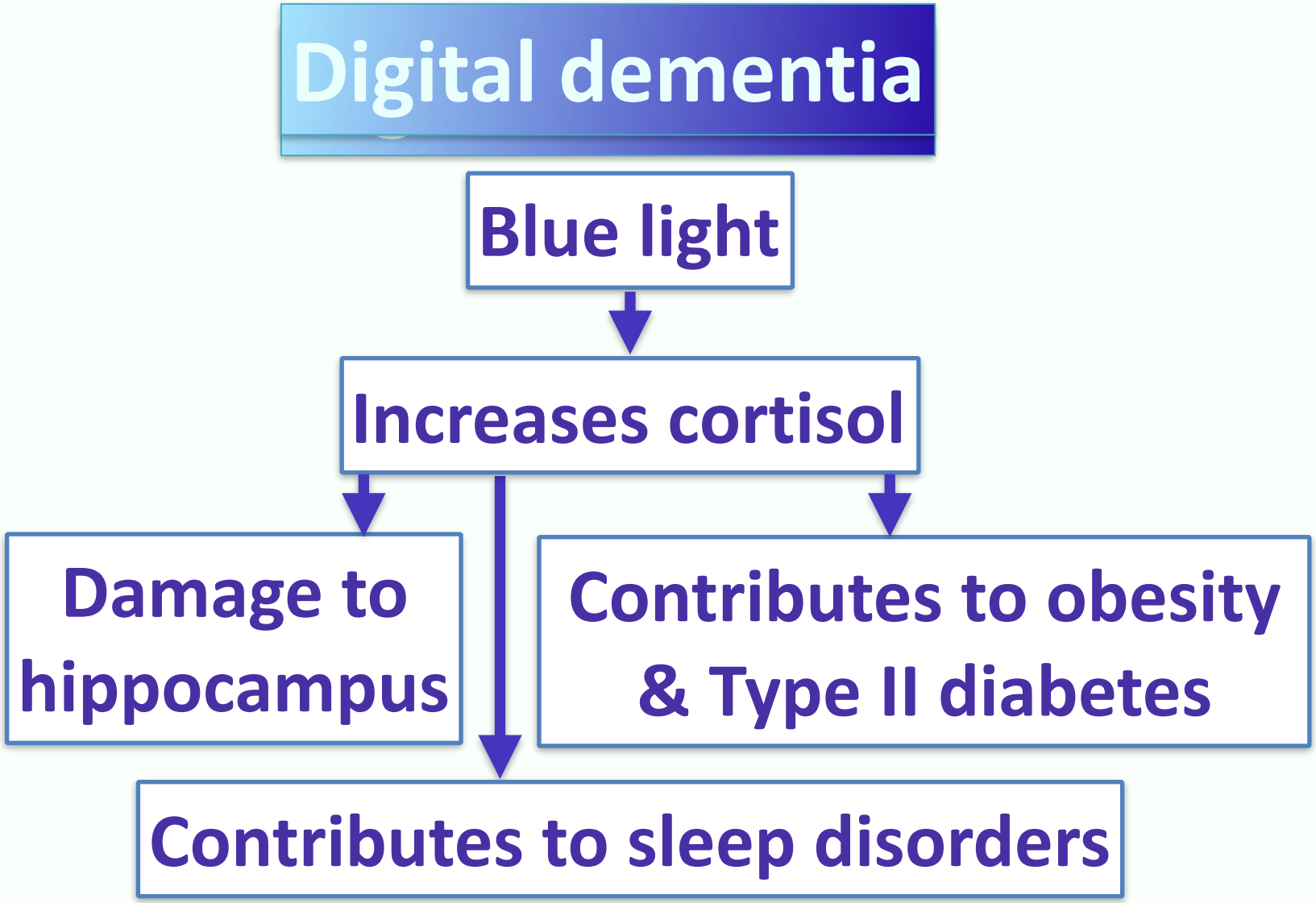
Positively Altered Brain Structure



ONE TO SIX MONTHS TO MATURE

"New Neurons Take Six Months or More to Mature in Non-Human Primate Brain, Study Finds"
ScienceDaily (June 6, 2011)
S. J. Kohler, G. B. Stanton, University of Illinois; and N. I. Williams, Sc.D., Pennsylvania State University.

Mindful Activity in a Digitally Distracted World



Autonomic Nervous System

Sympathetic Nervous System (SNS)

Increases:

Blood pressure

Fuel availability

Activity

Blood clotting

Adrenal hormones

Parasympathetic Nervous System (PNS)

Increases:

Digestion

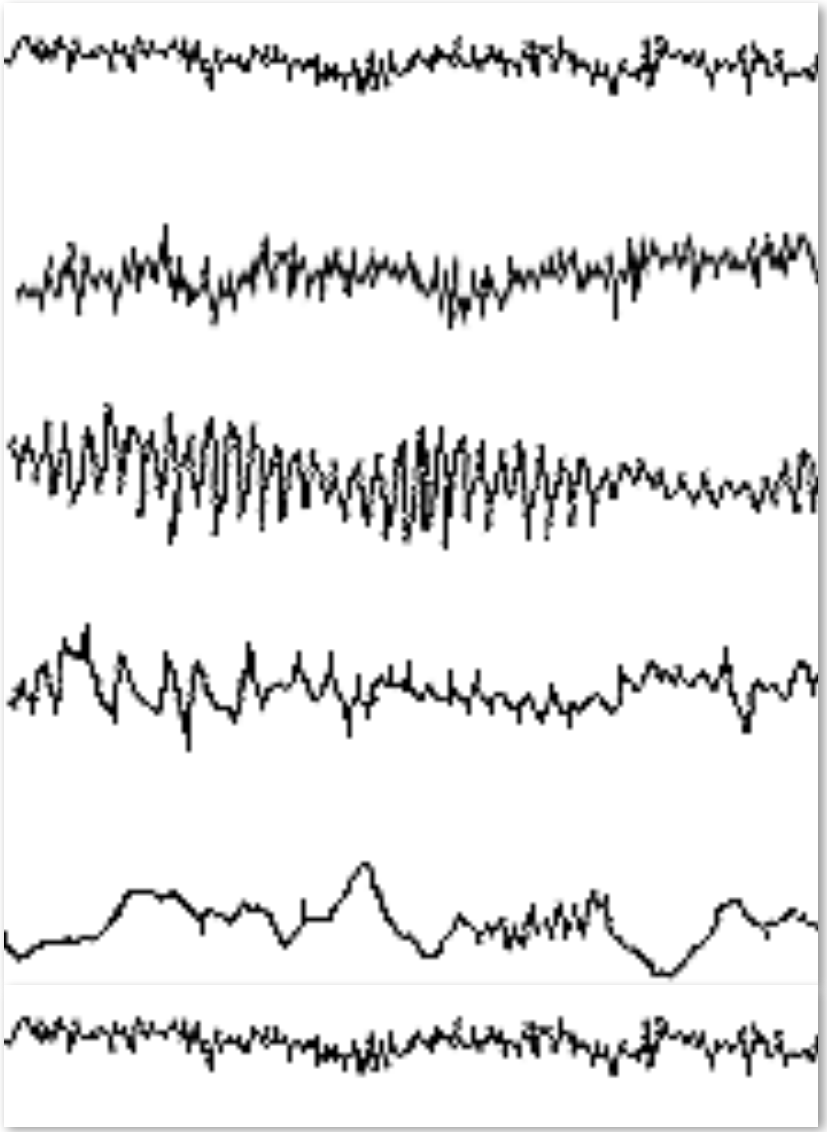
Fuel shortage

Rest and recovery

Resistance to infection

Endorphins

BRAIN-BODY-MIND STATES



Gamma - 25-100 Hz (40hz typical).

Binds conscious perception

Beta – 13-30 Hz. Active, alert, concentration

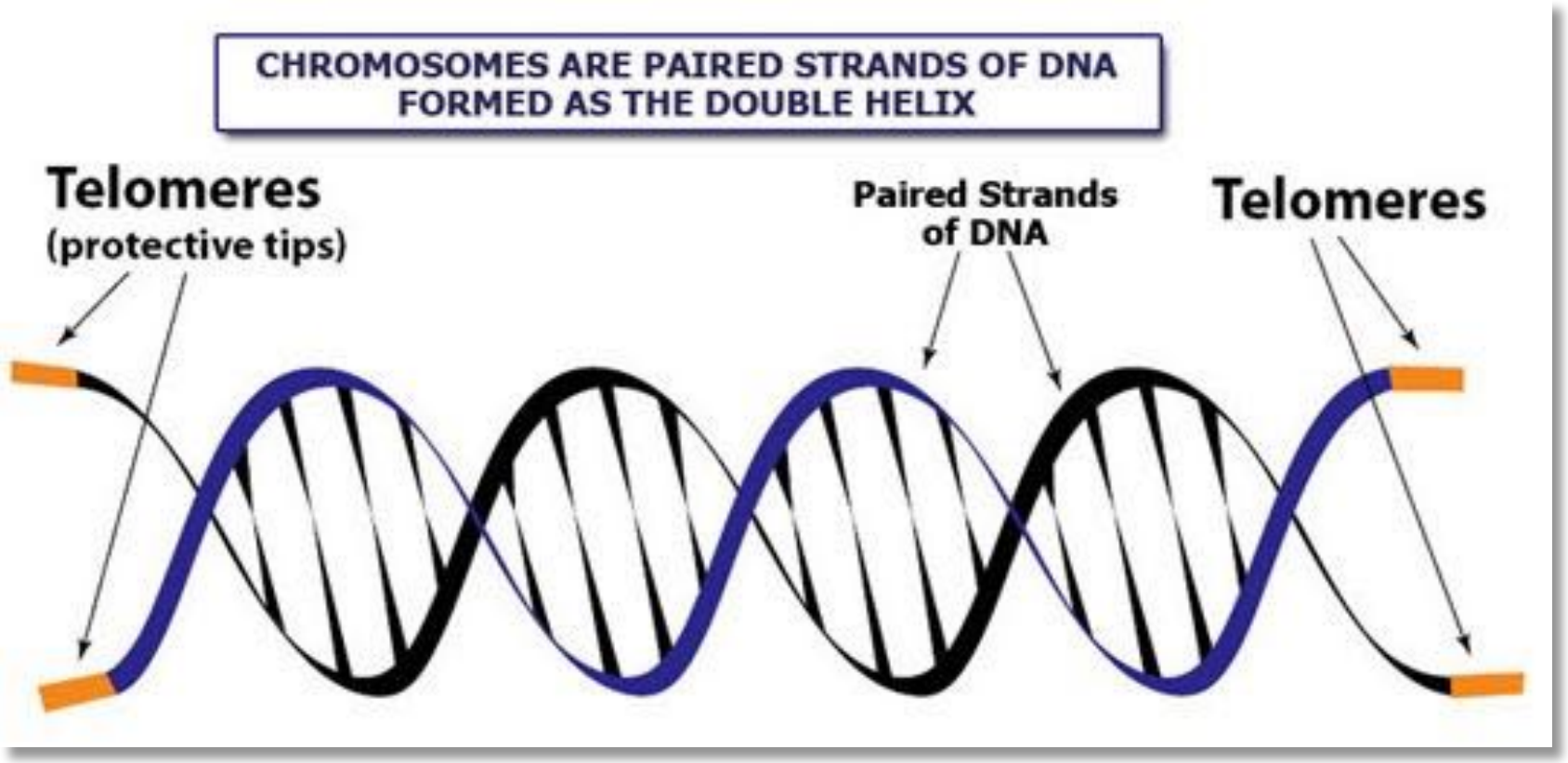
Alpha – 9-13 Hz. Relaxed focus, light trance, enhanced serotonin production

Theta – 4-8 Hz. Trance-like state; enhanced catecholamine aids retention of learning

Delta – 1-3 Hz. Dreamless sleep; HGH produced

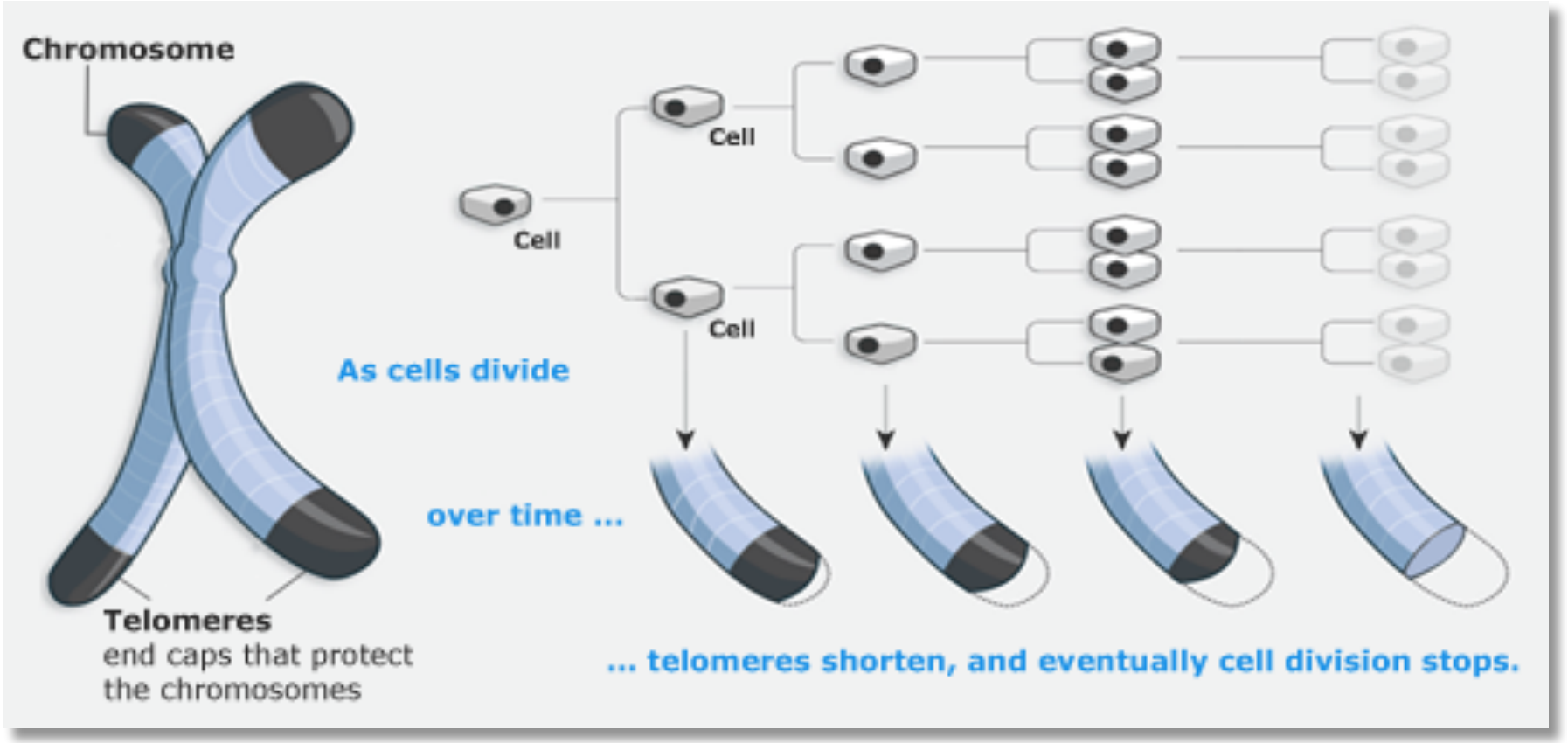
REM – Rapid Eye Movement; dreaming

Mindfulness and Aging



Telomeres

Mindfulness and Aging



General Adaptation Syndrome

Autonomic Nervous System

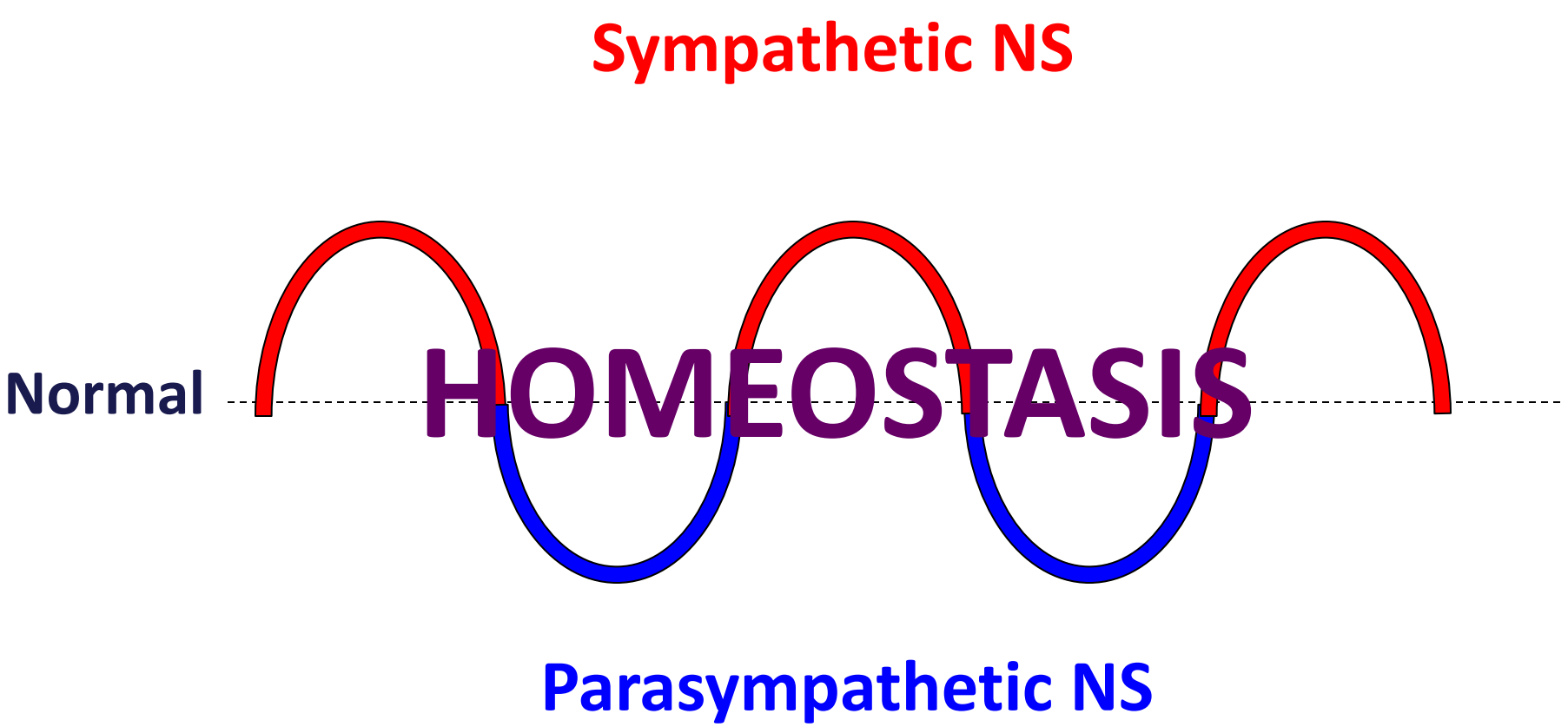
Sympathetic Nervous System

"Fight or flight"
Expend energy
Outer focused
High brain-wave frequencies

Parasympathetic Nervous System

"Rest and digest"
Store energy
Inner focused
Low brain-wave frequencies

Autonomic Nervous System



Autonomic Nervous System

ULTRADIAN RHYTHMS

MODULATED MIND-BODY ACTIVITIES

MIND	BODY
Right-left brain dominance	Left-right nasal dominance
Attention	Autonomic nervous system
Concentration	Gene-cell metabolism
Learning	Endocrine system
Memory	Immune system
Sensations	Breast-feeding
Perceptions	Hunger and sex
Emotions	Digestion
Dreaming	Work and sports
Fantasy	Stress response
Imagination	Psychosomatic response
Creativity	Cellular metabolism
Trans-personal sense	Drug sensitivity

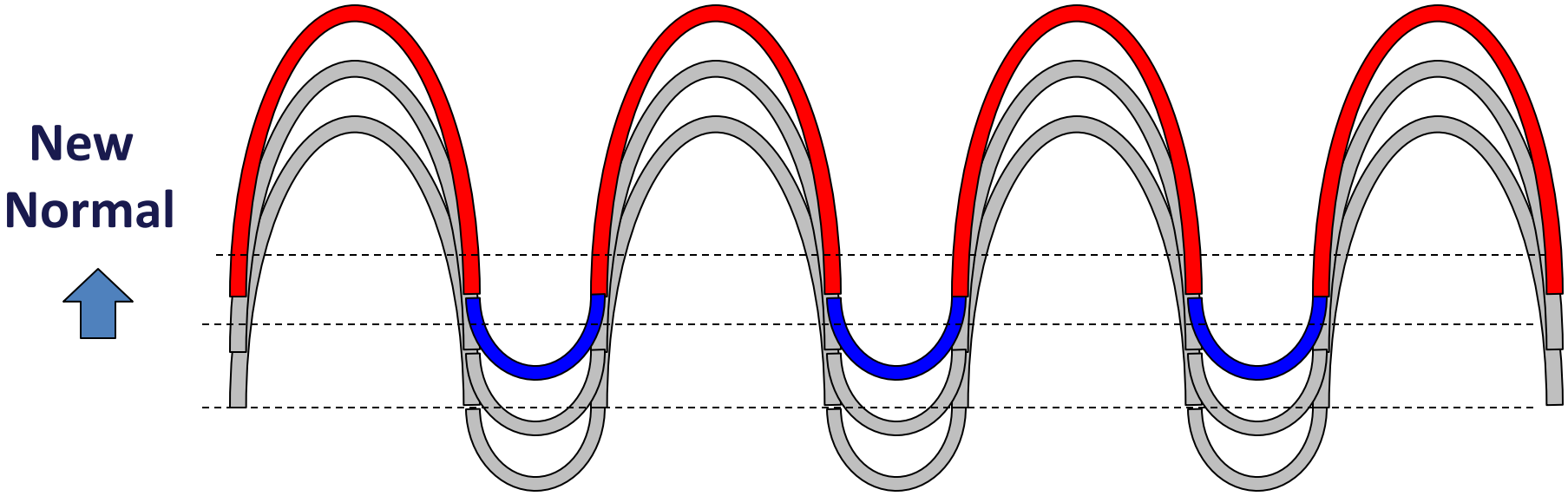
Source: E. Rossi, *The 20 Minute Break: Using the New Science of Ultradian Rhythms*

Autonomic Nervous System

ALLOSTATIC LOAD

Sympathetic NS

New Normal



Parasympathetic NS

General Adaptation Syndrome

High and sustained stress in students can foster:

- **impaired cognition**
- **impaired creativity**
- **increased pressure on attention**
- **diminished social skills**
- **discipline problems**
- **motivation problems**

General Adaptation Syndrome

ALLOSTATIC LOAD

- The physiological costs of chronic exposure to the stress response.

- Used to explain how frequent activation of the body's stress response can in fact damage the body in the long run.

- When chronic and pervasive the new stable base-line is difficult to withdraw from.

McEwen, B.S.Stress, adaptation, and disease: Allostasis and allostatic load. ***Annals NY Acad. Sci. 840:33-*** **44 (1998).**

Autonomic Nervous System

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Sympathetic Nervous System

Gas pedal

"Fight or flight"

High brain wave frequencies

Expend energy

OUTER FOCUS

Parasympathetic Nervous System

Brake pedal

"Rest and digest"

Low brain wave frequencies

Store energy

INNER FOCUS

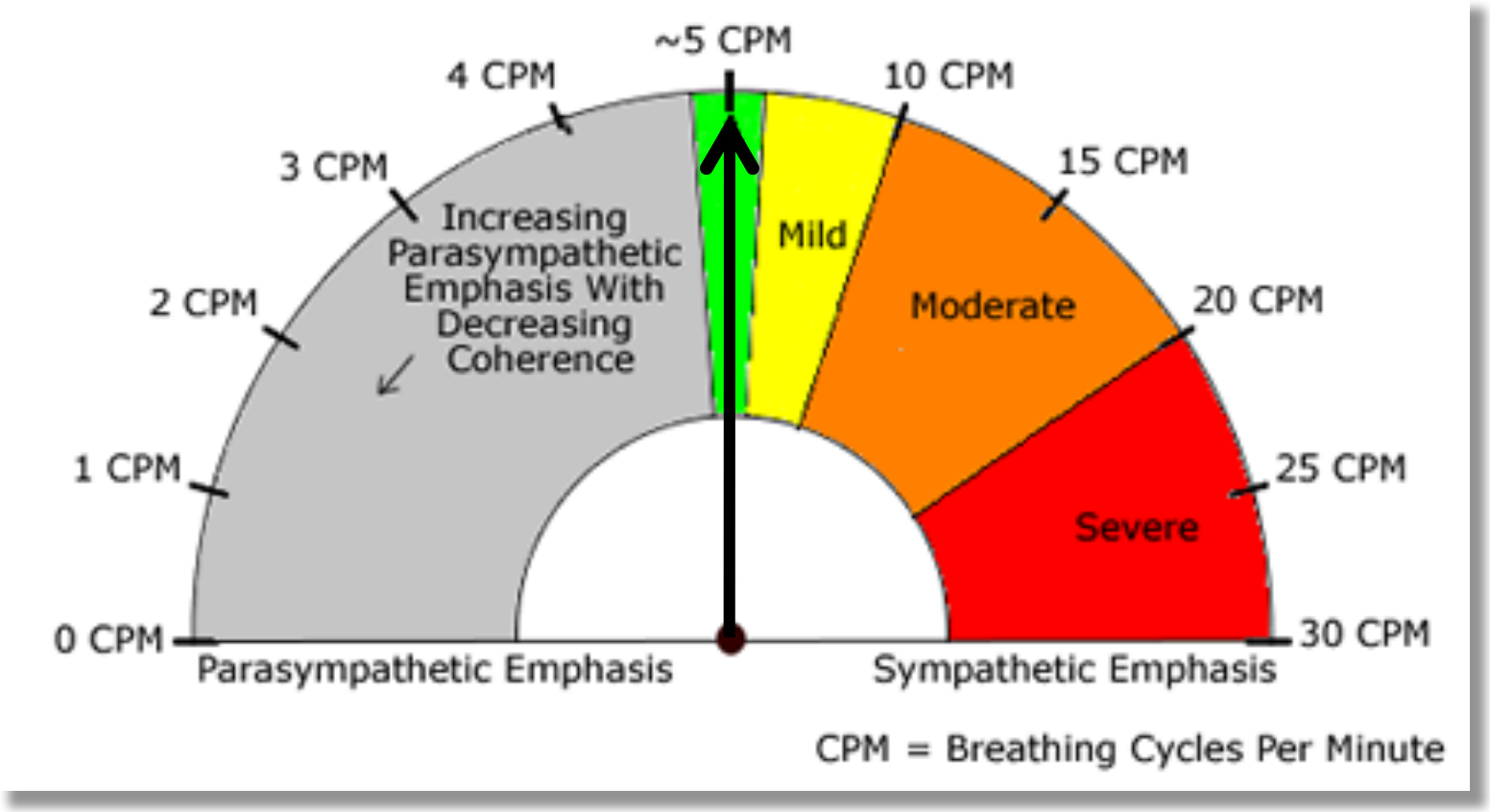
Mindful (Diaphragmatic) Breathing

Vagus nerve

- Activates the vagus nerve
- Releases serotonin
- Activates alpha/theta waves

Breath and ANS Balance

Optimal ANS Balance



Source: S. Elliott and D. Edmonson, *Coherence: The New Science of Breath, 2005*