



## Managing Pain from the Inside Out

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## Managing Pain from the Inside Out

- Disclosures: no financial, professional or personal relationships

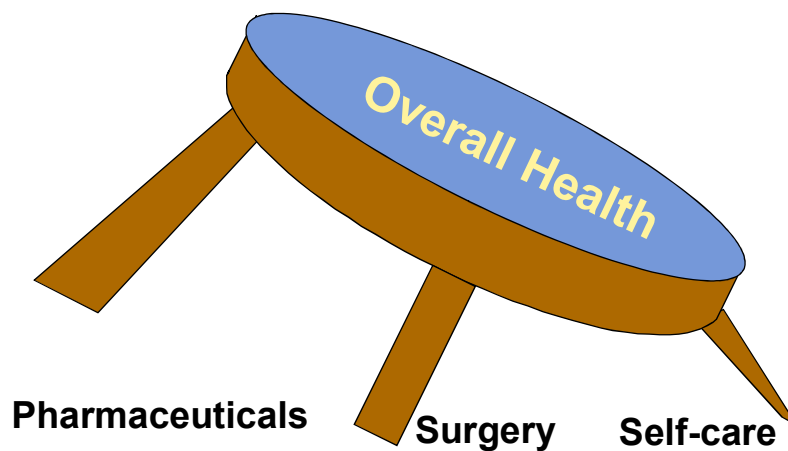
## Managing Pain from the Inside Out

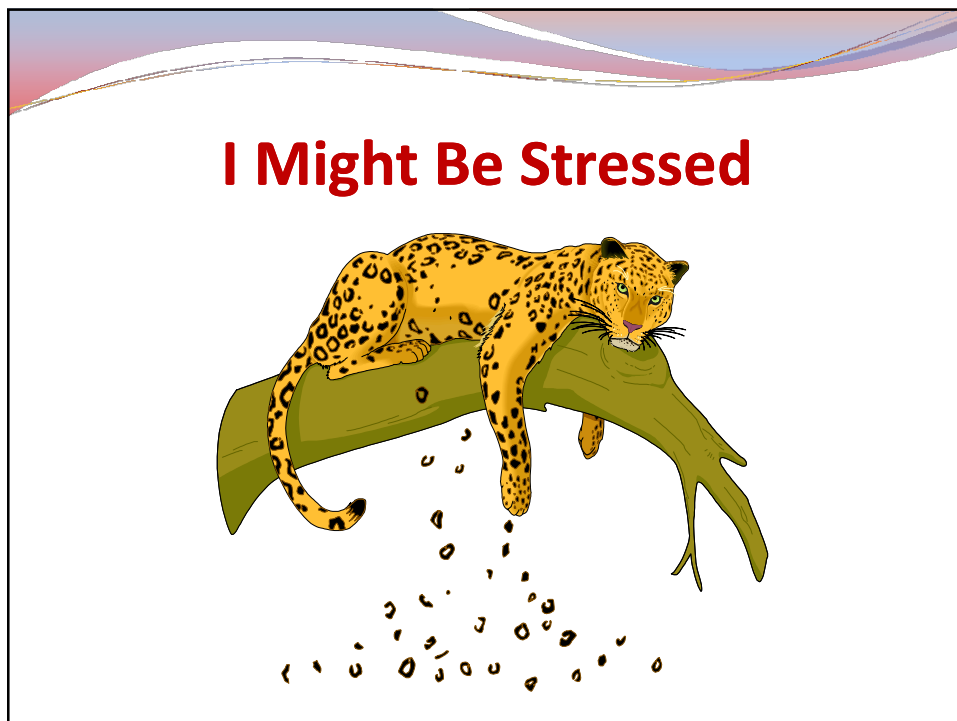
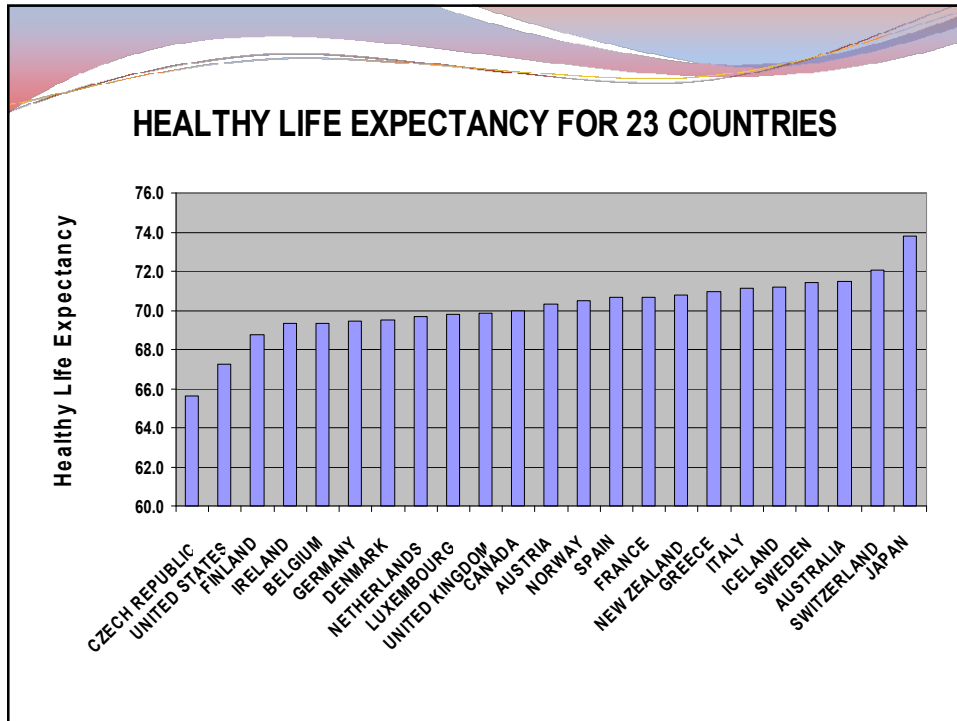
Objectives:

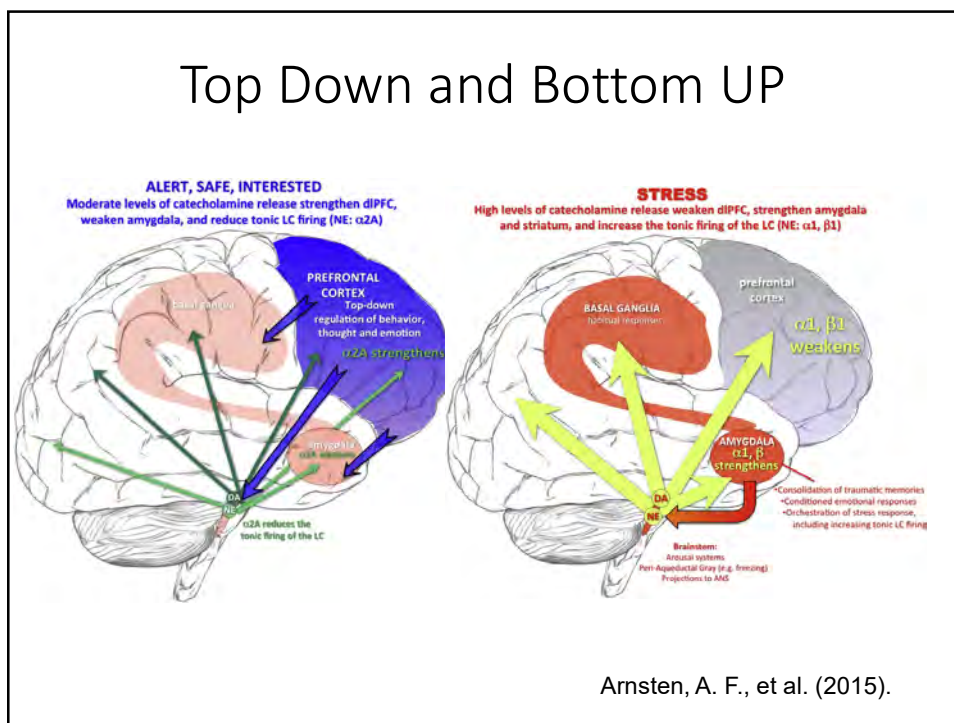
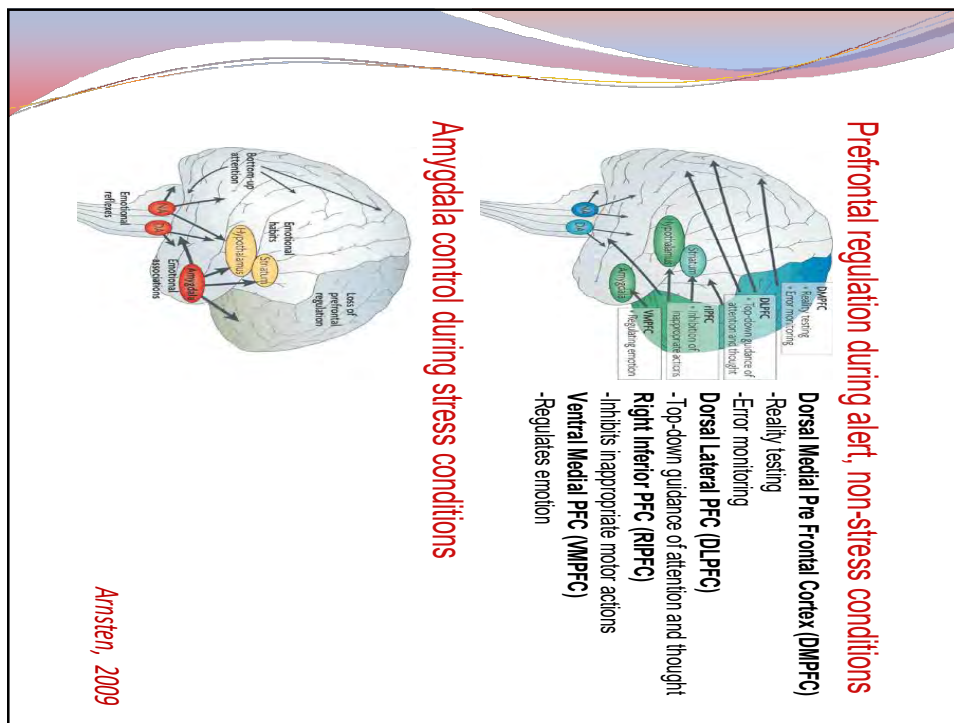
Participants will be able to:

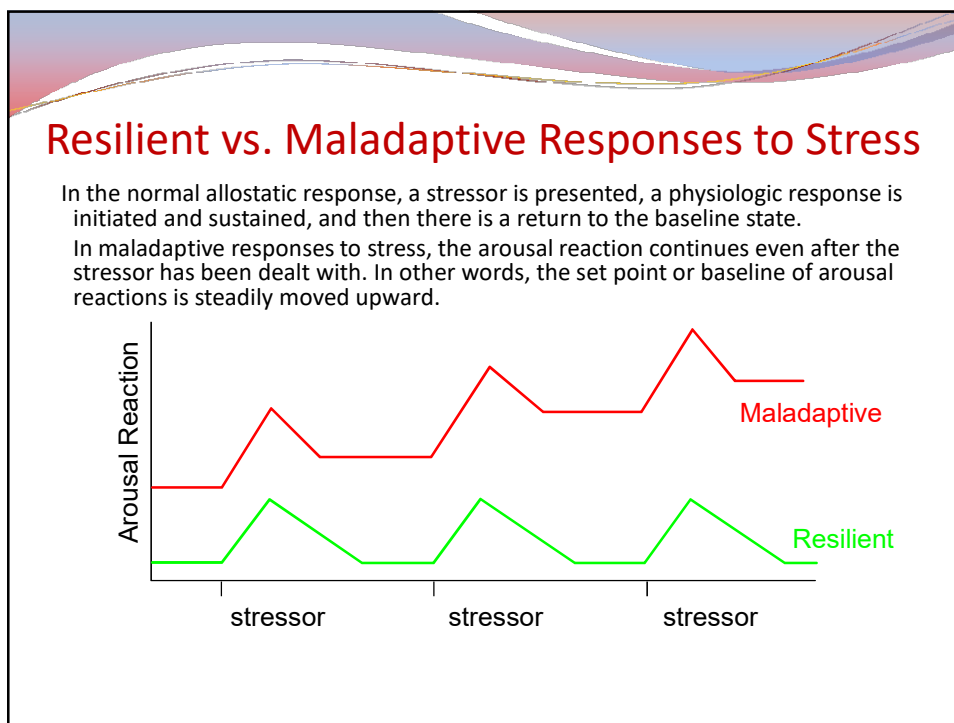
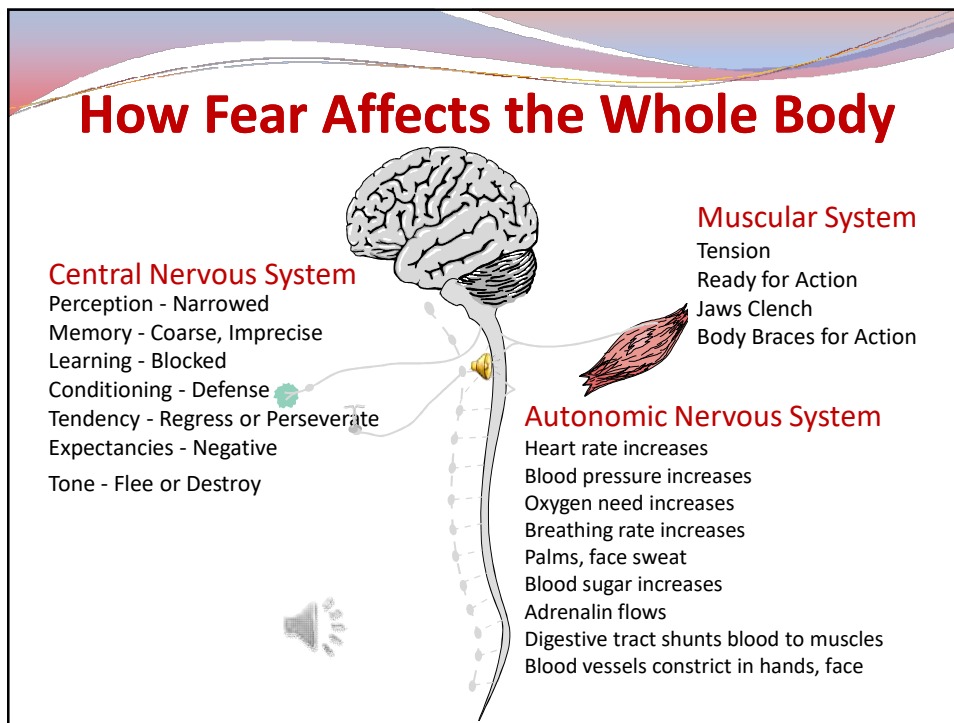
- Define allostasis
- Articulate the effect of chronic stress on the mind and body
- Demonstrate at least one strategy that can be used to reduce allostatic load

## Health is like a Three-Legged Stool









## Acute Stress Vs Chronic Stress

### Acute Stress

- produces the General Adaptation Response
- saves our lives
- is a survival mechanism

### Chronic Stress

- produces pathological changes
- produces or exacerbates life-style diseases
- can lead to death

## Allostasis and Resilience

- ▶ The process by which the body responds to stressors in order to regain homeostasis
- ▶ Stress promotes adaptation, e.g. “Maintaining stability (‘homeostasis’) through change”
- ▶ Capacity to adapt (constantly change) by modifying physiological parameters in order to adjust to ever-shifting environment
- ▶ Resilience is the ability to achieve a successful outcome in the face of adversity.

By National Scientific Council of the Developing Child

## Stress and Allostasis

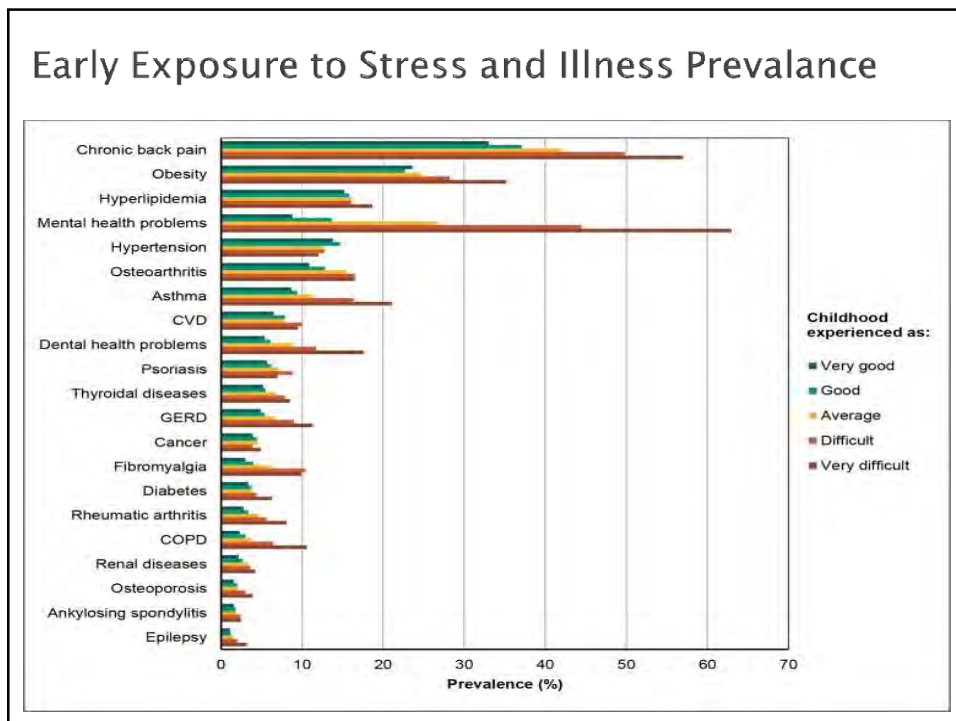
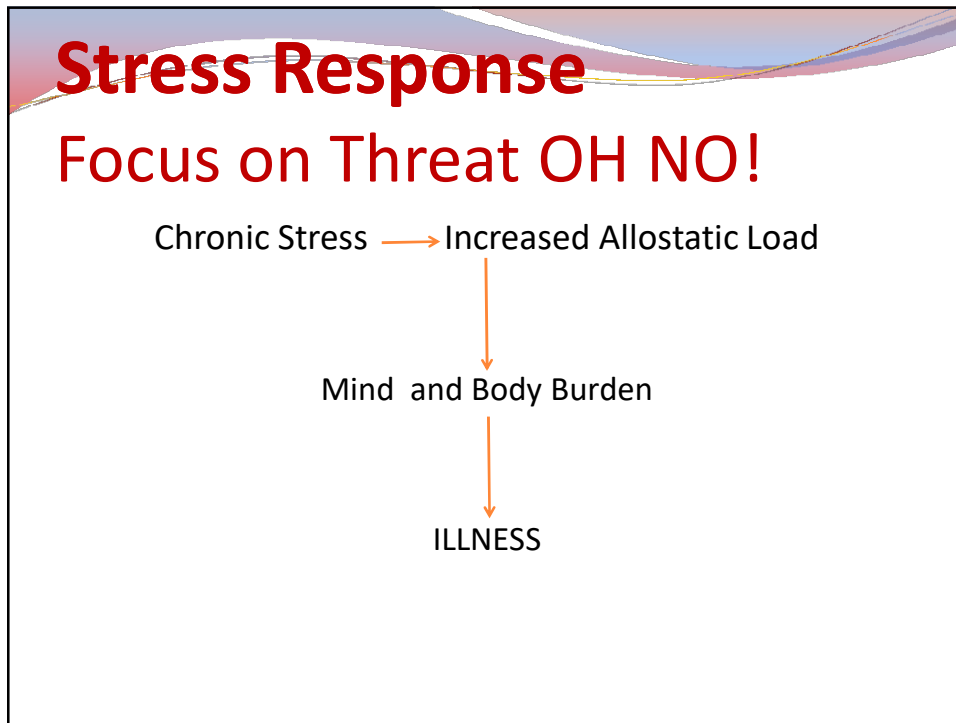
- Every challenge to the organism is a stressor
- Every stressor produces stress;  
some stress is eustress and some stress is distress
- Every stress triggers the process of allostasis
- Too little or too much stress works against resilience



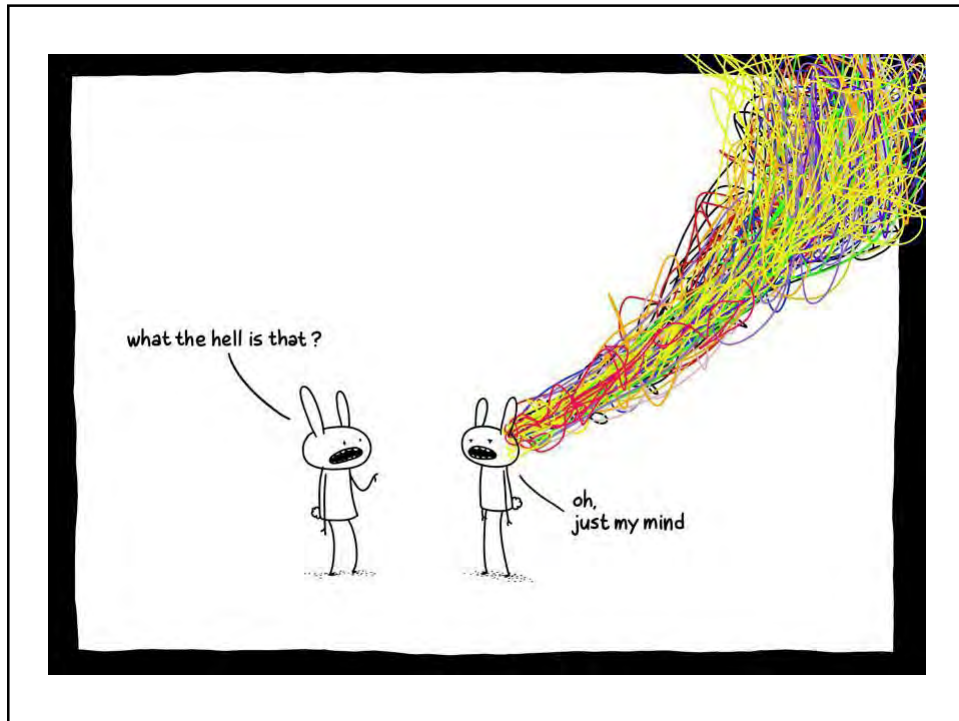
## **Stress Response**

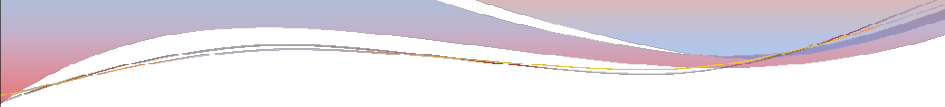
### **Focus on Threat OH NO!**

- Visual + auditory reaction  
approximately 1/15<sup>th</sup> of second
- Negative Conditioning
- Unconscious and Conscious
- Negative Beliefs and Emotions
- Mind – Body Interactions



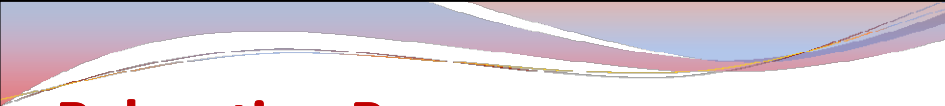






## Relaxation Response

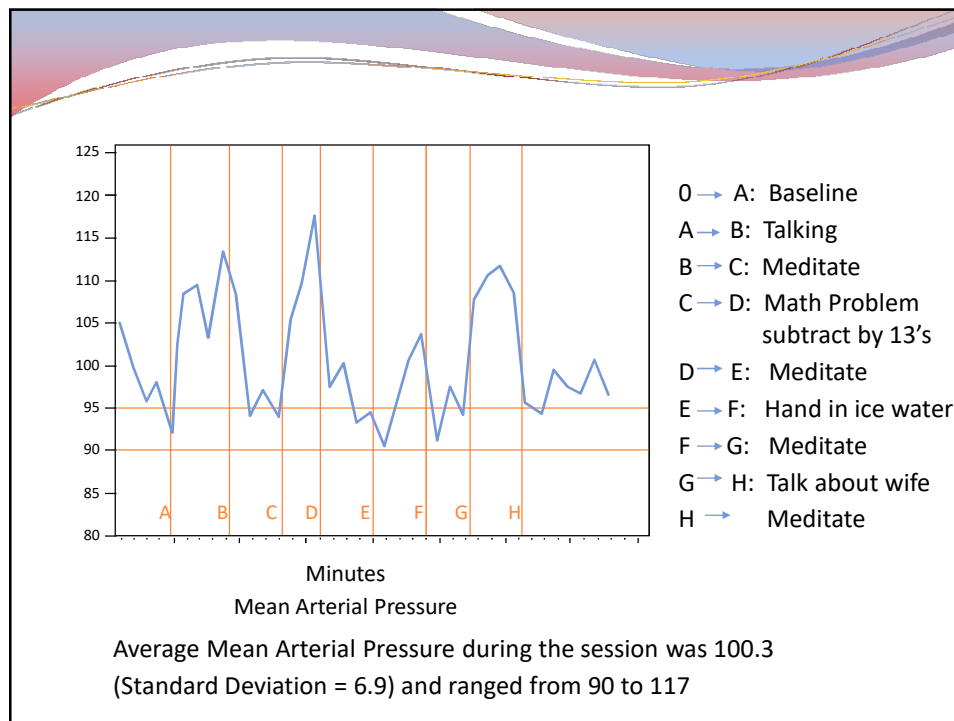
Focused, Receptive Awareness  
**OH WELL**



## Relaxation Response

Focused, Receptive Awareness  
**OH WELL**

- Shift awareness
- Positive conditioning
- Unconscious and conscious
- Reward and motivation
- Move towards desire
- Allostasis: restores mind & body balance in support of resilience
- Feels good to be alive



## The Relaxation Response

- Powerful enough to ↓HR, BP, RR, and O<sub>2</sub> Consumption/ Metabolic Rate
- Cell mitochondria takes a break/Oxidative stress ↓
- Up regulates genes of anti-oxidizing mechanisms
- Reduces limbic system arousal
- Synchronization of alpha and theta waves on EEG correlate with relaxed wakeful awareness
- Brain fMRI studies show involvement of neural structures involved with attention and arousal, and autonomic control

## Neurogenesis and Dendritic Remodeling

All thoughts, behaviors, experiences, and emotions create a physical biologic reality within the brain

- New cells born all the time in certain regions of brain
- Cells that fire together, wire together, and even die together
- Dendritic remodeling by GC , i.e., shorter length and less branching
- Early childhood nurturance ↑Cort receptors in hippocampus and as adults more resistive to stress

## The Relaxation Response

- Heart rate slows
- Blood Pressure lowers
- Immune system improves
- Sense of well-being increases
- Less emotionally reactive
- Sleep improves
- Digestion improves

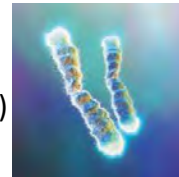
## Relaxation Response

**20 minutes a day !**

## Mindfulness Meditation and Telomerase

Telomerase activity is a predictor of long-term cellular viability

- 3-month meditation retreat
- Stress: Perceived Control (a/w decreased stress)  
Neuroticism (a/w increased subjective distress)
- Mindfulness and Purpose in Life (concentration meditation and benevolent states of mind)
- N=30 meditated for approximately 6 h daily; N=30 wait list
- PMN (peripheral blood) for telomerase activity, post retreat
- Telomerase higher in meditators
- ↑ Perceived Control, ↑ Purpose in Life and ↓ Negative Affectivity contributed to an increase in telomerase activity



*Jacobs, 2011*

## **Mindfulness**

### **Conditioning vs. Awareness**

If you don't know where your mind is, chances are it's up to no good.

## **The Power of Imagery**

### **What you see is what you get**

- Influences abilities and behaviors
- Sets expectations and mindsets
- Seeing = imagining to the brain
- Influence: intensity, direction, and duration

## Happy & Unhappy People

Live in different subjective worlds

- Happy: motivated by reward (top down)
- Unhappy: motivated by punishment or fear (bottom up)

## Characteristics of Happy People

- Appreciate themselves, others and the world at large
- Live in satisfaction and more often in the moment
- Don't compare themselves to others
- Reappraise negative situations from positive perspective
- Don't let negative circumstances define them
- Less reactive and less regretful
- Have same frequency of negative experiences as others
  - > Intensity & frequency of positive experience primarily from social relations
- Focus more on the quality and quantity of happy memories
- Positive expectations; they expect good things

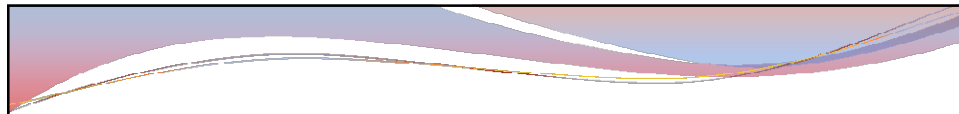
## Feelings Underlying Beliefs

Anger	Unfair
Anxiety	Not Safe/Not in control
Shame	You've done something wrong or you are wrong
Sadness	Loss
Guilt	Actions inconsistent from moral principles
Loneliness	Alone, and shouldn't be
Frustration	Unmet expectation
Inferiority	Compare yourself to others and fail to measure up
Jealousy	Wanting what another has

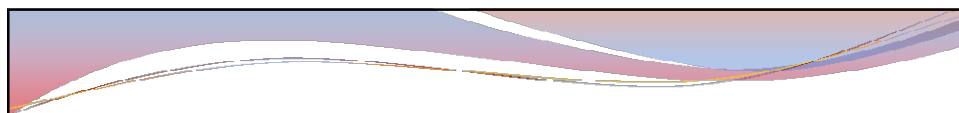
Without losing belief in an afflictive emotion, it cannot be abandoned.

*Dharmakirti, Indian Buddhist Philosopher*





- **Nothing erases unpleasant thoughts more effectively than concentration on pleasant ones.**  
*Hans Selye*



<b>Feelings</b>	<b>Underlying Beliefs</b>
Patience	Waiting for right timing
Tolerance	Allow others to learn from their own actions
Love	Wanting the best for self or another
Compassion	To deeply understand; leads to love
Detachment	Doing one's level best and accepting the outcome
Judgment	Honest and loving awareness to bring about growth
Wisdom	Change one's attitude and/or one's situation
Respect	Treat with great value
Forgiveness	Letting go of suffering



## The Way of Happiness

Sovereignty	Kindness	Understand	Faith
Courage	Joy	Economy	Nurturance
Individuality	Discern	Loyalty	Will
Spontaneity	Kinship	Vigilance	Fearless
Creativity	Trust	Enthusiasm	Willingness
Inspiration	Discipline	Mastery	Fidelity
Constancy	Leadership	Vitality	Openness
Curiosity	Truth	Equanimity	Wisdom
Integrity	Dignity	Newness	Excellence
Stillness	Love	Vulnerability	Determination
Depth	Strength	Transformation	Justice
Intuition	Detachment	Surrender	Tolerance
Discernment			



## The Way of Happiness

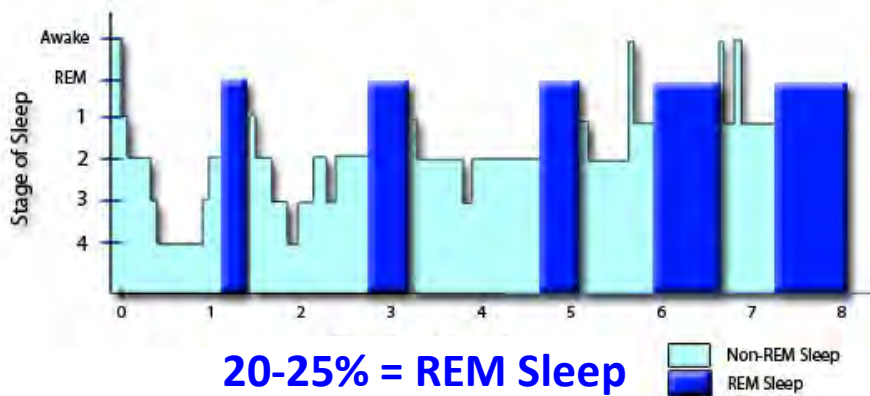
Abundance	Process	Charity	Honor
Flexibility	Beauty	Growth	Serenity
Patience	Grace	Awe	Community
Acceptance	Purity	Choice	Hope
Fulfillment	Beingness	Harmony	Service
Peace	Gratitude	Restraint	Compassion
Appreciation	Purpose	Clarity	Hospitality
Forgiveness	Oneness	Honesty	Silence
Perfection	Greatness	Sacrifice	Cooperation
Aspiration	Respect	Commitment	Humility
Freedom	Awareness	Positivity	Generosity
Perseverance	Friendship	Responsibility	Power
Balance			Gentleness



***Sleep is the best meditation.***

*His Holiness  
The 14<sup>th</sup> Dalai Lama of Tibet*

## Sleep Stages Through The Night

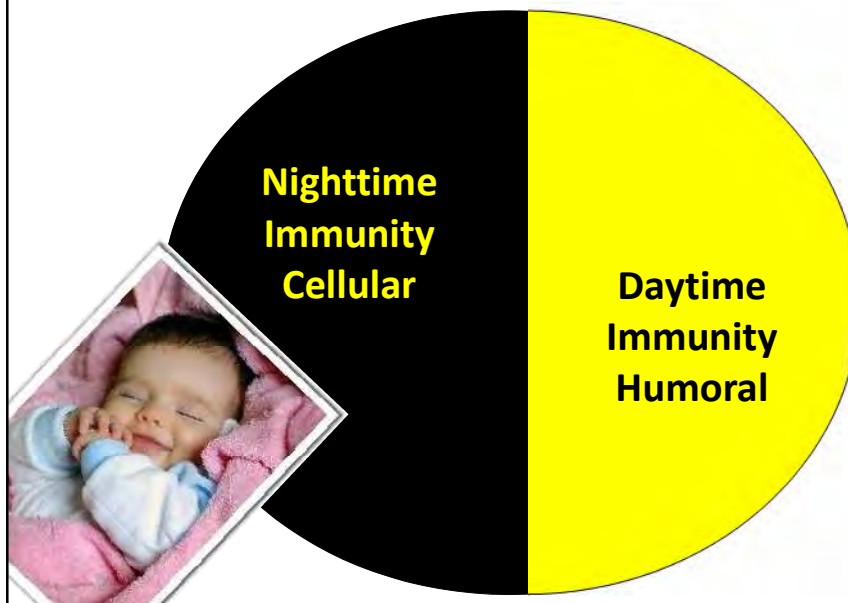


<http://www.end-your-sleep-deprivation.com/stages-of-sleep.html>

## Healthy Sleep

- 7 ½ to 9 hours; preset biologically
- Key is to awaken feeling refreshed and from pleasant dreams
- Consistent sleep/wake time
- Positive sleep thoughts
- Relaxation Response
- Daylight; 60 watts or 200 lux 2-3 hours pre sleep
- Exercise

## Sleep and Immune Response



## Sleep

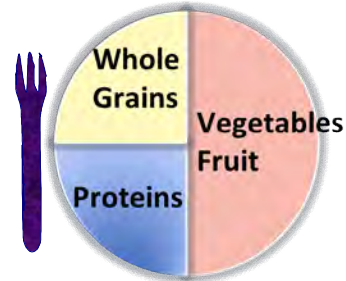
- Modest sleep loss is associated with increased secretion of proinflammatory cytokines
- Short or refracted sleep is associated with decreases in circulating GH levels
- Short sleep duration is associated with reduced leptin, elevated ghrelin and increased appetite

*There is no love sincerer  
than the love of food.*

*George Bernard Shaw*

## Healthy Diet

- Eat Mindfully
- Portions: balance your plate
- Limit sugar and other low fiber carbs
- Poly/Mono Unsaturated Fatty Acids
- ↑Fiber from typical 13 → >35 grams/day
- Timing and frequency
  - ✓ Eat within 1 hour of wakening (unless exercising)
  - ✓ Eat every 3-4 hours thereafter
  - ✓ No late evening meals



## Exercise is considered essential for health, however:

- 60% adults in US minimally active
- 22% no leisure activity at all, estimating 25% essentially sedentary
- Recommendation is 30 minutes/most days of moderate activity
- Only 30% western populations exercise on weekly basis
- Exercise program attrition is high: 50% return to non active state in 3-6 month
- Worse stats for those with psychiatric dx

*Those who think they have not time for bodily exercise will sooner or later have to find time for illness.*

*Edward Stanley (1779 - 1849)  
Former (3x) Prime Minister of the United Kingdom*

**INTERHEART STUDY (n ~ 30,000)**

90% risk for MI is explained by 9 predictors consistently across 52 countries:

- Smoking
- HTN
- DM
- Central adiposity
- Psychosocial factors-such as type A
- Lack of daily consumption of fruits/vegetables
- Lack or excessive alcohol (rec: 1/d/women & 2 /day/men)
- Lack of regular physical activity
- Higher scores of stress nearly doubled MI risk

Yusef, et al, 2004

## Exercise

- Associated with decreased mortality and morbidity
- Associated with a decrease in anxiety and depression
- Improves cognitive functioning
- Increases levels of circulating dopamine, beta-endorphin, and serotonin
- Both exercise and relaxation increase levels of CRH and improve mood
- Increases neurogenesis in the hippocampus
- Powerful antioxidant

## Exercise and Immune Function

- Physical activity (PA) increases anti-oxidant defenses; decreases inflammation and stress

### Moderate to vigorous exercise

- Transient increase in neutrophils, natural killer cells, immunoglobulins
- Stress hormones are not elevated
- Inflammatory chemicals are not elevated
- 25-50% reduction in sick days

### Heavy doses of exercise (marathon)

- Suboptimal immune function and increase odds of sickness over 1-2 weeks

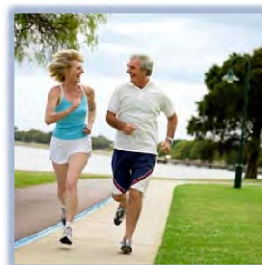


## Exercise as an Antidepressant

- 9 cross-sectional and 9 prospective studies show higher levels of physical activity correspond with little or no anxiety and depression  
Dunn, et al, 2001
- Exercise and medication (Zoloft) achieved higher remission rates compared with placebo after 16 weeks of treatment. N=156
  - 45% of MDD patients undergoing supervised exercise
  - 40% undergoing home-based exercise
  - 47% receiving medication
  - 31% receiving placebo
 Blumenthal, et al, 2007
- Dose response is likely to be a critical factor
- BDNF decreased in depression and increases in response to exercise
- N=2078 post MI (ENRICHD: Enhancing Recovery in Coronary Heart Disease); depressed or low social support, with 2 year f/u; those who exercise reported less than half events c/w those without regular exercise

## Exercise

- 3-5 Aerobic  
~ 30-60 minutes  
≥5 min. warm↑ cool↓
- 2-3 Strength training  
Resistance, weights, Pilates, toning  
duration ~ 30 minutes
- Weight loss
  - 3 Aerobic/week x 60 min.  
plus 3 ST/week x 60 min.
  - 4-5 Aerobic/week x 60 min.  
plus 2 ST/week x 30+ min.



What you *think*, you *become*;  
What you *feel*, you *attract*;  
What you *imagine*, you *create*.

*Buddha, Dhammapada*

## Transformation

