Benefits of Meditation

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MEDITATION

- reproducible changes in the body
- positive psychological changes
- restful awareness
- deeper insight
RESTFUL AWARENESS

- lowers blood pressure and heart rate
- less stress hormones
- immune function improves
- changes brain waves
- telomeres lengthen
- changes gene expression—after one session
Large changes in gene expression toward health (salutagenesis) in vacation and meditation groups, and for those already trained in meditation, a retreat appears to provide additional benefits to cellular health beyond the vacation effect.
GENOMIC EXPRESSION AFTER 6 DAY MEDITATION RETREAT

Blood-Derived Molecular Meditation Network

- Regulation of Biological Quality (3x)
- Regulation of Body Fluids (6x)
- Wound Healing (7x)
- Platelet Activation (2x)
- Positive Regulation of Heart Rate (17x)

Increased Wellness

Activation

Response to Stress (3x)
Defense Response (2x)
Positive Regulation of Chemokine Production (6x)
Acute Inflammatory Response (7x)

Decreased Susceptibility to:
- Heart disease
- Diabetes
- Alzheimer's
Meditation modulates brain structure and function

- Mass Gen/Harvard/MIT...
- EEG patterns persist beyond time period of active practice
- MRI used to measure cortical thickness
- RESULTS SUGGEST MEDITATION “MAY BE ASSOCIATED WITH STRUCTURAL CHANGES IN AREAS OF THE BRAIN THAT ARE IMPORTANT FOR SENSORY, COGNITIVE, AND EMOTIONAL PROCESSING”
- FURTHER SUGGESTS MEDITATION “MAY IMPACT AGE-RELATED DECLINES IN CORTICAL STRUCTURE”

Lazar, S. et al. 2005
Mindfulness practice leads to increases in regional brain gray matter density

--Mass General/Harvard/Univ of Mass Med School…
--studies 16 participants in 8 week mindfulness meditation course
--MRI 2 weeks before and after course
--increased grey matter density in hippocampus, known to be important for memory and learning; and in structures associated with self-awareness, compassion and introspection
--reduced stress associated with decreased density in amygdala which plays a role in anxiety and stress.
--changes were a result of meditation; no changes in the control group

Holzel, B, et al. 2011
STRESS

- response to an unmet need
- response to a perceived threat
- normal psychological and physiological response to situations in life
- how we deal with stress is important
- linked to many health conditions if not managed
- meditation, yoga, pranayama, exercise
STRESS

- COMMON FACTOR IN MANY HEALTH ISSUES
- inflammation
- suppress immune system
- raises blood pressure
Modulating the Stress Response
HPA axis
Modulating the Stress Response
HPG axis and Immune system
The Gut-Brain System
Flight/Fight/Freeze Response

- It is an ancient, primitive response, grounded in the survival instinct
- Based on fear
- Perceive environment/situation as threatening
- Unmet need for security – serving to keep the body protected.
- Threats used to be primarily physical, now becoming more and more emotional
Normal Defensive Responses to High Threat

Normal defensive responses to high threat can impact treatment and treatment adherence.
Fight/Flight/Freeze

- Heart beats faster/pumps more blood
- Blood pressure rises
- Consume more oxygen and expel more carbon dioxide
- Perspiration increases
- Adrenal glands pumps out adrenaline, noradrenaline, and cortisol

- Pancreas releases more glucagon and less insulin, raising blood sugar
- Shunt blood from your digestive organs to your muscles.
- Release less rejuvenating hormones (DHEA, growth hormone)
- Immune system is suppressed
- Platelets become stickier
# Seeds of Illness

<table>
<thead>
<tr>
<th>Change in Physiology</th>
<th>Contributes to</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase blood pressure, heart stress</td>
<td>Coronary heart disease</td>
</tr>
<tr>
<td>Increase stress hormones</td>
<td>Anxiety, insomnia, addictions</td>
</tr>
<tr>
<td>Increase blood sugar</td>
<td>Diabetes, obesity</td>
</tr>
<tr>
<td>Decrease circulation to digestive tract</td>
<td>Digestive disturbances</td>
</tr>
<tr>
<td>Decrease growth, sex hormones</td>
<td>Premature aging</td>
</tr>
<tr>
<td>Decrease immunity</td>
<td>Infections, cancer</td>
</tr>
<tr>
<td>Increase in sticky platelets</td>
<td>Heart attacks, strokes</td>
</tr>
</tbody>
</table>
Restful Awareness

- Heart rate slows/pumps less blood
- Blood pressure normalizes
- Consume less oxygen and expel less carbon dioxide
- Perspire less
- Adrenal glands produce less adrenaline and cortisol

- Produce more rejuvenating hormones (DHEA, growth hormone)
- Immune function improves
- Breathing slows
- Platelet function normalizes
- Less inflammation
**Fight/Flight/Freeze**

- ↑ Heart rate
- ↑ Blood pressure
- ↑ Respiration
- ↑ Perspiration
- ↑ Stress hormones
- ↓ Anti-aging hormones
- ↑ Platelet stickiness

**Restful Awareness**

- ↓ Heart rate
- ↓ Blood pressure
- ↓ Respiration
- ↓ Perspiration
- ↓ Stress hormones
- ↑ Anti-aging hormones
- ↓ Platelet stickiness
Cardiovascular and nervous system changes during meditation

Steven R Steinhubl, Nathan E Wineinger, Sheila Patel, Debra L Boeldt, Geoffrey Mackellar, Valencia Porter, Jacob Redmond, Evan D Muse, Laura Nicholson, Deepak Chopra and Eric J Topol

Journal Name: Frontiers in Human Neuroscience
ISSN: 1662-5161
Article type: Clinical Trial Article
Received on: 14 Oct 2014
Accepted on: 02 Mar 2015
Provisional PDF published on: 02 Mar 2015
Frontiers website link: www.frontiersin.org
First study to intensively monitor novice and experienced individuals during meditation for CNS, ANS and blood pressure changes.

Meditation was associated with a small, but statistically significant decrease in blood pressure. The most pronounced blood pressure decrease was in novice meditators on their first day of meditation.
MEDITATION IN CVD

Several studies show reduction in heart attack, death from CVD in regular meditators

- Lowered BP and stress
  - LOE B by AHA for mantra meditation

Part of Dr. Dean Ornish’s program for reversal of heart disease (as well as Dr. Dale Bredesen’s reversal of cognitive decline program)
MEDITATION in DIABETES

- Stress reduction
- Reduces inflammation
- Encourages discipline and commitment
- Reduces insulin resistance by modulating high cortisol from chronic stress

- Arch Int Med 2006 Mantra meditation improves insulin resistance/metabolic syndrome in pts with CAD (improved cardiac ANS function/response to stress)
MEDITATION IN DEPRESSION/ANXIETY

° Many studies show improved mood and decreased anxiety in people who meditate; beneficial for PTSD
° Better sleep
° Makes happy people happier
° Calms nervous system and also modulates brain/neurotransmitters which help with mood (also GI effects)
° Allows us to let go of ego
Findings suggest that a short-term intensive program providing holistic instruction and experience in mind-body healing practices can lead to significant and sustained increases in perceived wellbeing, and that relaxation alone is not enough to improve certain aspects of wellbeing.

In Progress: Questionnaire Study: examining measures of psychological, emotional and spiritual wellbeing before and after attending retreats/events at the Chopra Center.
SBTI Wellbeing Study

**Spirituality**

- PH
- RELAX

**Gratitude**

- PH
- RELAX

**Self-Compassion**

- PH
- RELAX
MEDITATION IN PAIN MANAGEMENT

- **PHYSICAL FACTORS**—
  - decreased inflammation

- **EMOTIONAL FACTORS**—
  - decreased mood increases pain; less emotional impact of pain; improved pain tolerance
  - Review of mind-body interventions showed meditation improves function and coping with low back pain and osteoarthritis, fibromyalgia, migraines
  - no adverse events or safety issues—especially important for elderly
MIND-BODY THERAPIES

• Practitioners of daily RR practice (different types of meditation, breath focus, yoga, repetitive prayer)
• Experienced/novice
• After 8 weeks, 2209 genes were differentially expressed in long-term practitioners relative to control; and 1561 genes were differentially expressed in novice group vs control

Dusek, 2008
Bhasin, 2013
PRANAYAMA


AHA—use of device guided breathing for HTN, LOE B