Stress Management Series: Part 1
What is Stress After All?

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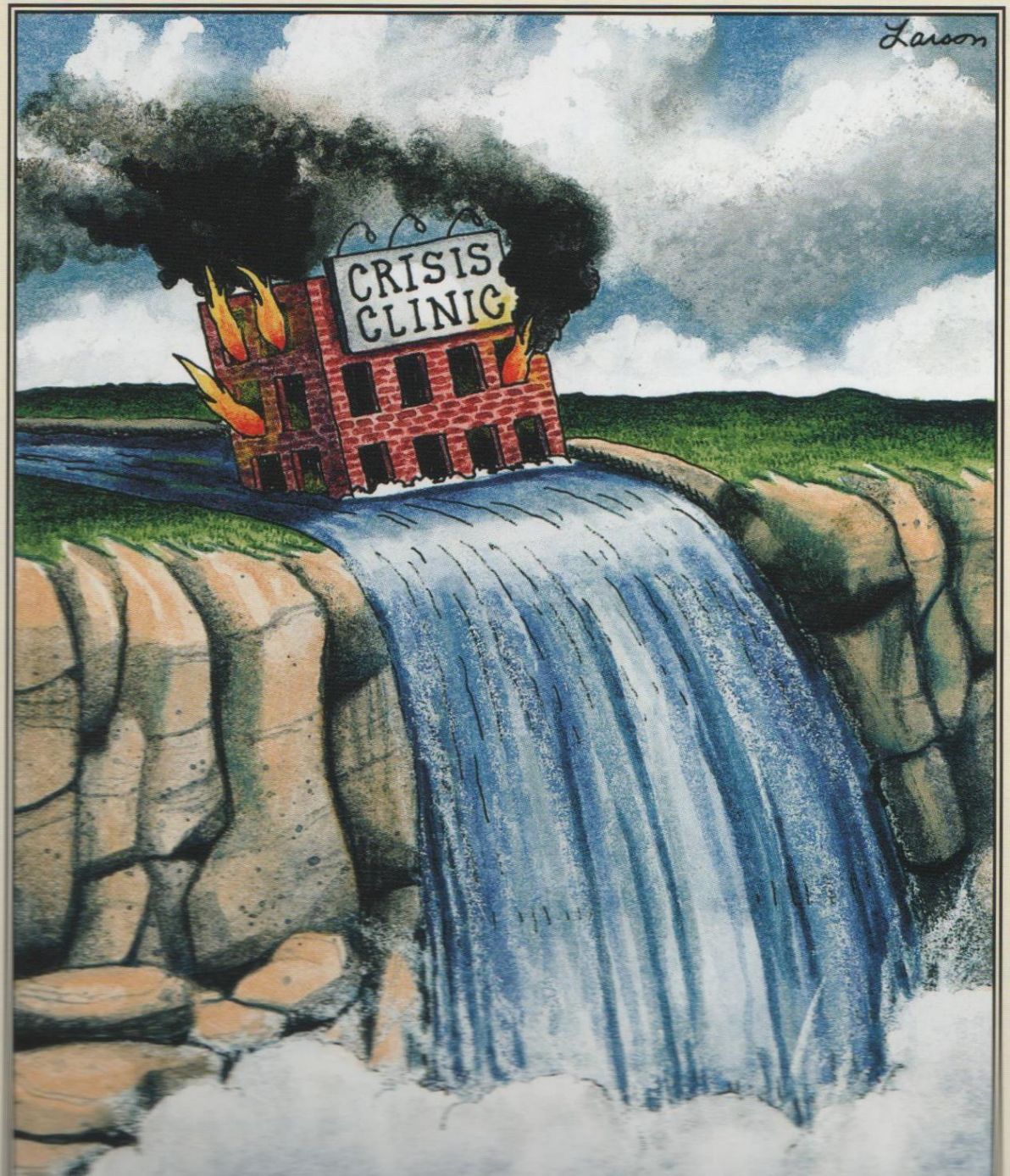
1/7/82



Stress Management Series

This educational series is my attempt to clarify some salient issues involved with defining, understanding, and treating what is commonly known as “stress”.

I am in a unique position as a physician and meditation instructor to define and give context to this truly modern-day epidemic.

So we will begin by simply defining stress, or, perhaps more importantly, does stress

define us?

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Stress may be defined as any **threat**, real or perceived, external or internal.

Let me define a **real threat** as a toxin, poison, or physical incident where perception plays a smaller role and adverse physiologic events proceed in a stereotyped fashion for nearly everyone exposed.

Let me define a **perceived threat** as things such as relationships and emotions where our perception of them plays a much larger role in determining if the condition threatens.

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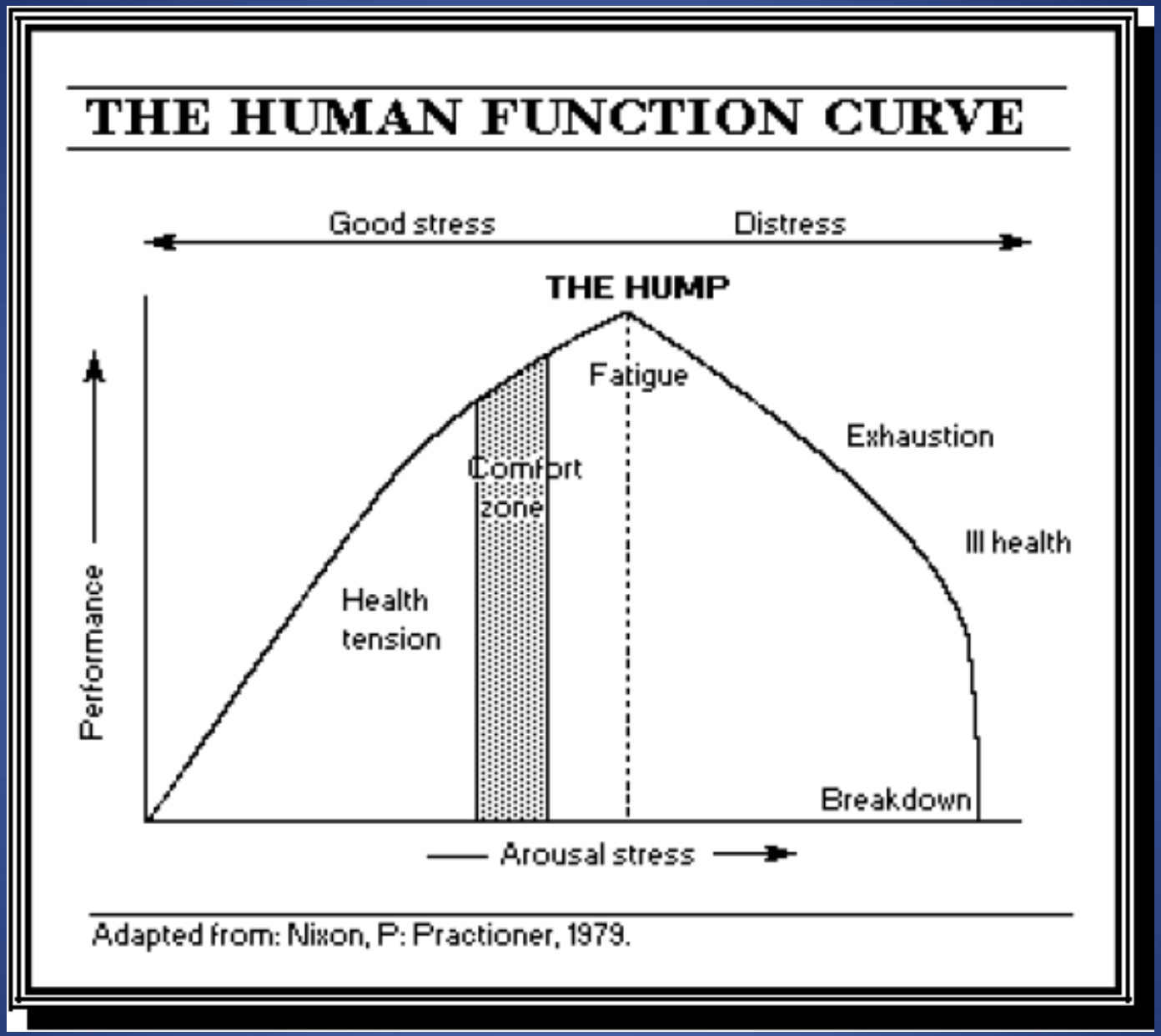
Now, many of you may delineate between “good” and “bad” stress, yet we know that the physiologic consequences of a marriage and a divorce are quite similar. Finding and losing a job are also similarly stressful. So then it is the perception of an event, external or internal, which leads to a cascade of chemical changes meant to help ready our bodies to battle this threat.

These changes most typically involve the **fight or flight** response meant to help us kill or prevent ourselves from being killed. That same stress can improve function can be graphically represented in Figure 1:



www.Stress.org

Bio-behavioral responses to stress in females: tend-and-befriend, not fight-or-flight.

Psychol Rev. 2000 Jul;107(3):411-29.

Taylor SE, Klein LC, Lewis BP, Gruenewald TL, Gurung RA, Updegraff JA.

Source

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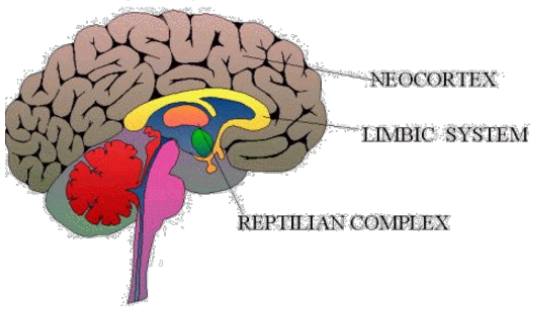
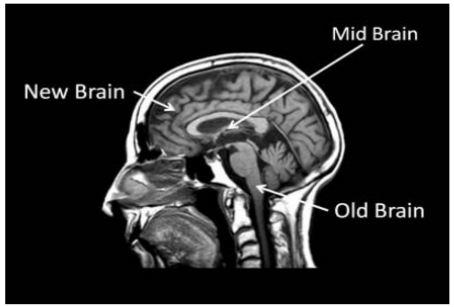
Abstract

The human stress response has been characterized, both physiologically and behaviorally, as "fight-or-flight." Although fight-or-flight may characterize the primary physiological responses to stress for both males and females, we propose that, behaviorally, females' responses are more marked by a pattern of "tend-and-befriend." Tending involves nurturant activities designed to protect the self and offspring that promote safety and reduce distress; befriending is the creation and maintenance of social networks that may aid in this process. The bio-behavioral mechanism that underlies the tend-and-befriend pattern appears to draw on the attachment-caregiving system, and neuroendocrine evidence from animal and human studies suggests that oxytocin, in conjunction with female reproductive hormones and endogenous opioid peptide mechanisms, may be at its core. This previously unexplored stress regulatory system has manifold implications for the study of stress.

THE TRIUNE BRAIN

A system according to Dr. Paul Maclean,
Chief of the Laboratory of Brain Evolution and Behavior at the NIMH, 1971-1985





The Brain Stem (a.k.a. Reptilian Brain)

- Always on the alert for life-threatening events
- Controls basic life functions: heart rate, breathing, pain response, etc.
- We "downshift" when responding to life-threatening conditions
- "Flight or Fight" level of the brain (self preservation / aggression)
- Action takes place without thinking;
- Anything that is a threat – real or perceived – causes brains to "downshift"
- When "downshifting" occurs, learning cannot take place

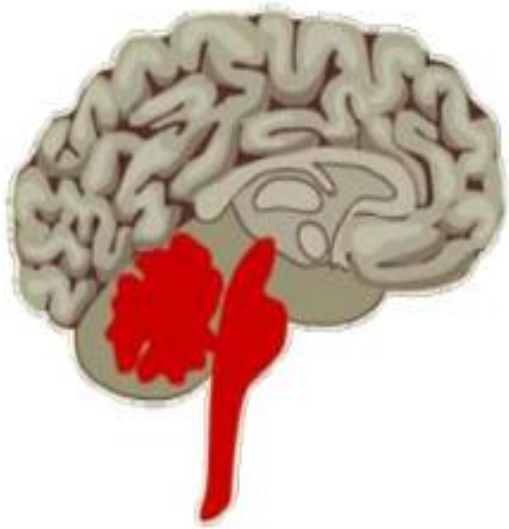
The Limbic System (a.k.a. Paleo-mamillian System)

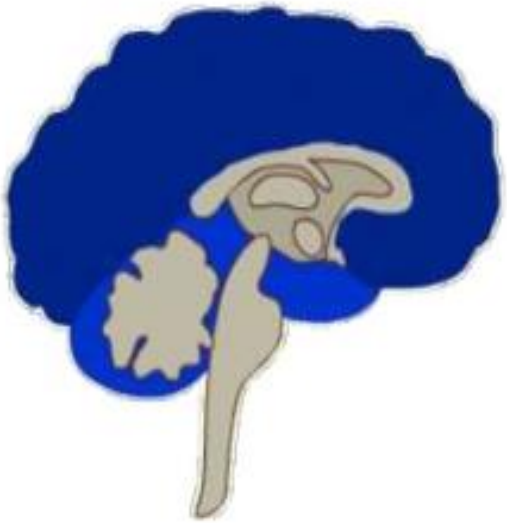
- This is the home of the emotions, pleasure, memory formation, sense of smell
- This part of the brain has visual memory, but language is limited to yells, screams, expletives
- Threats can cause downshifting, but not to "blanking out" stage of the brain stem
- Military trainers deliberately provoke this system in trainees

The Cerebral Cortex / Neocortex (a.k.a. Neo-mamillian)

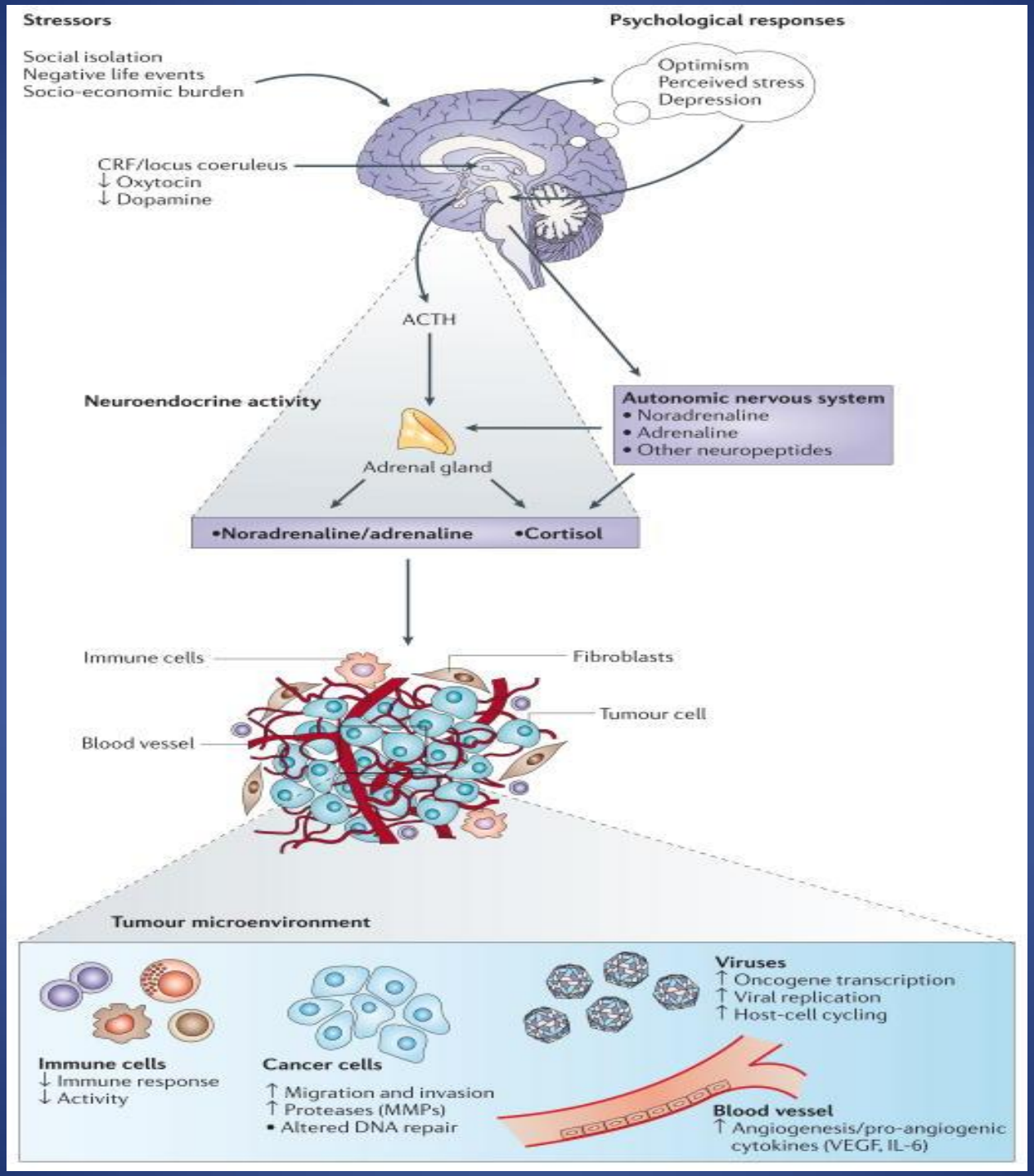
- Conducts intellectual / rational tasks
- Processes thousands of bits of information per minute
- Six levels deep and is 76% of human brain
- Slowest response time of the three levels of the brain
- The home of academic learning and cognitive thinking
- Students must be in this level if learning is to take place (therefore, learning environment must be absent of threats)

Get their attention → Stimulate Desire → Reinforce with Reasons





The Secret Language of Leadership, Stephen Denning


Stressors
Psychological responses
Social isolation
Negative life events
Socio-economic burden
Optimism
Perceived stress
Depression
CRF/locus coeruleus
↓ Oxytocin
↓ Dopamine
ACTH
Neuroendocrine activity
Autonomic nervous system
• Noradrenaline
• Adrenaline
• Other neuropeptides
Adrenal gland
•Noradrenaline/adrenaline
•Cortisol
Immune cells
Fibroblasts
Tumour cell
Blood vessel
Tumour microenvironment
Immune cells
↓ Immune response
↓ Activity
Cancer cells
↑ Migration and invasion
↑ Proteases (MMPs)
• Altered DNA repair
Viruses
↑ Oncogene transcription
↑ Viral replication
↑ Host-cell cycling
Blood vessel
↑ Angiogenesis/pro-angiogenic cytokines (VEGF, IL-6)

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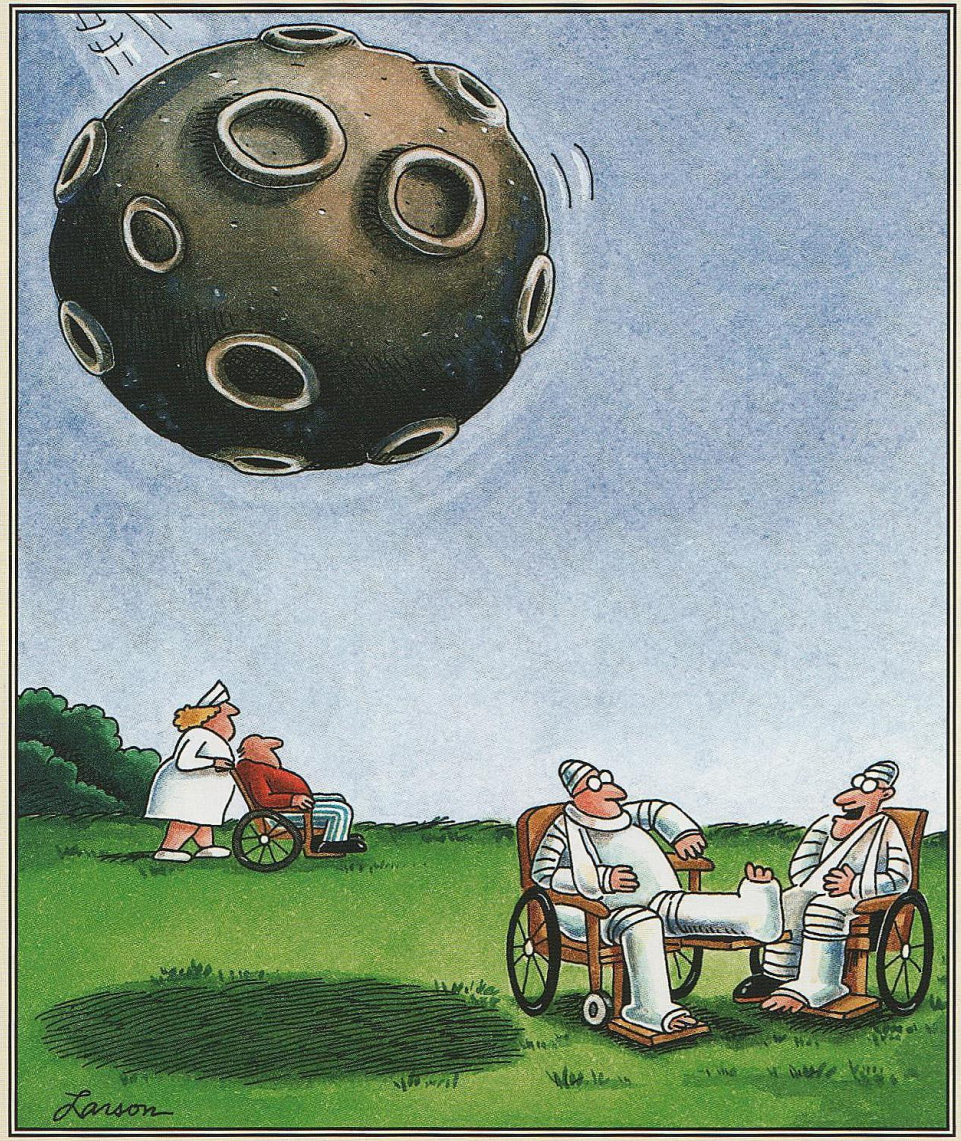

"You're kidding! I was struck twice by lightning too!"

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An **event** can be a thought or a memory, indeed our own intellects may, on many levels, be our

greatest threat to our own survival! An event may be a phone call, a creditor, or a cranky bank

teller. An event may be a lion or tiger or bear. What happens to us physiologically when these

threats invade our day?

“I just can’t hibernate.”

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Many key determinants play a role in our preparedness for any of these events. Knowledge, experience, and many physiologic factors will immediately tell *you* whether the event threatens. The subsequent physiological cascade solely depends on your perception (conscious and subconscious) when it comes to psychological threats and to a lesser extent when it comes to physiological threats. The next two figures demonstrate the autonomic response to perceived and real threats; note how dramatically the “self” plays a role in response to those threats:

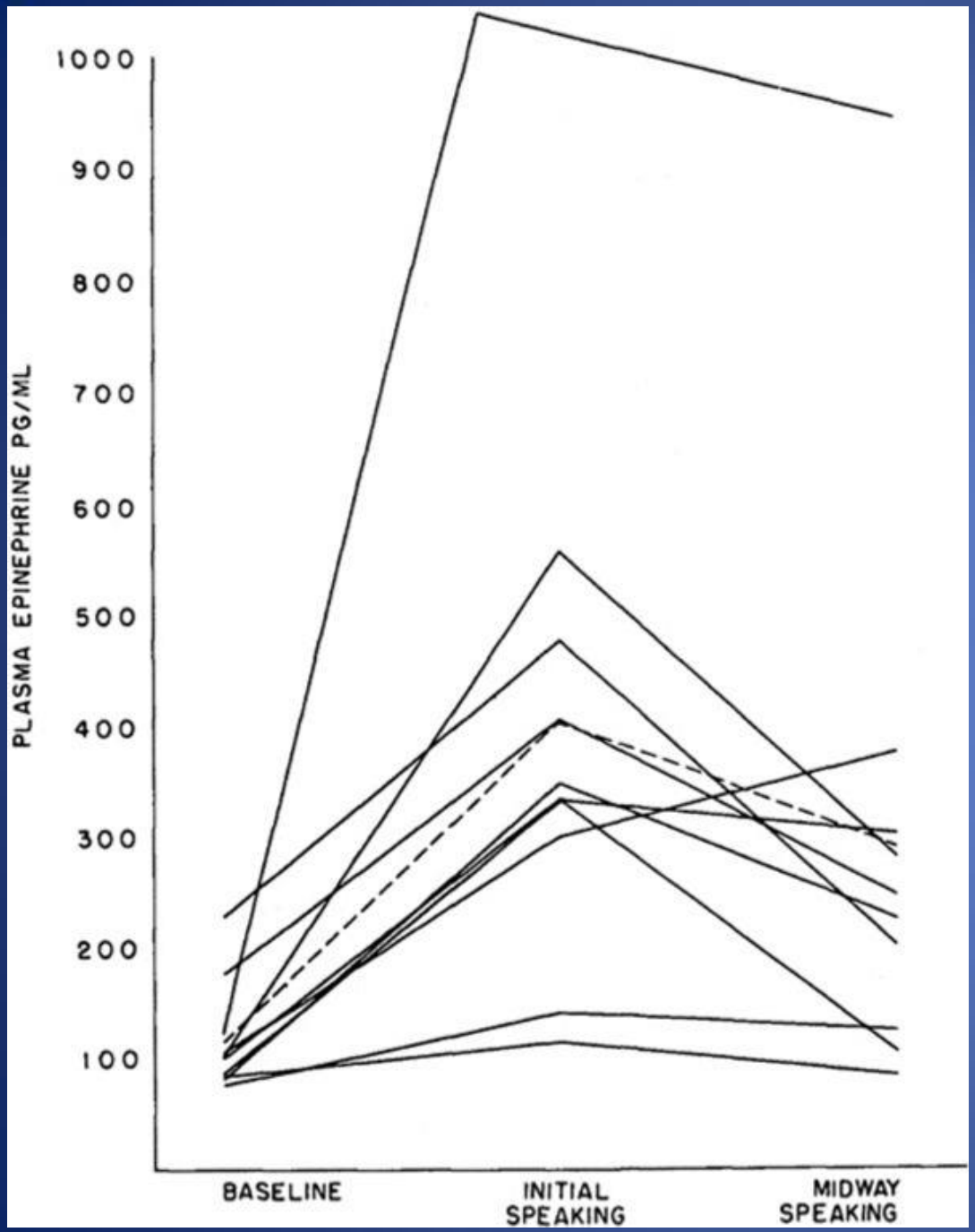

Figure2. Effect of Public Speaking on Plasma Epinephrine

Plasma epinephrine response to different activities. Each **line** represents a single subject; the **dotted line** indicates the mean.

Dimsdale, Joel. *J Am Coll Cardiol*. 2008 April 1; 51(13): 1237–1246. doi:10.1016/j.jacc.2007.12.024.

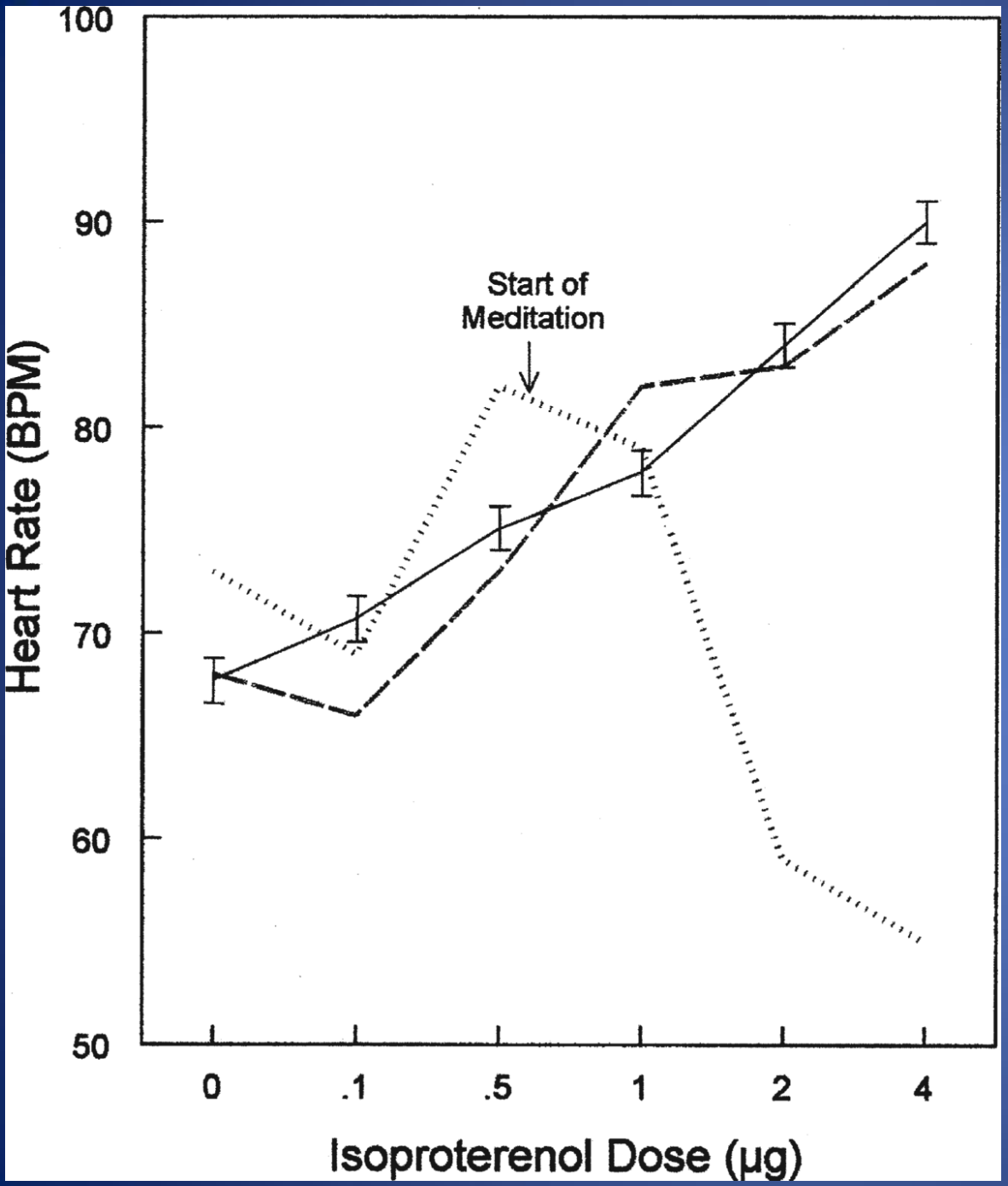

Figure 3. Effect of Meditation on HR Response to Infused Isoproterenol

Effects of meditation on chronotropic responses to isoproterenol. **(Solid line)** Mean ± standard error response to isoproterenol in 93 women; **(dotted line)** patient's response while meditating; **(dashed line)** patient's response while instructed not to meditate. BPM = beats/min; HR = heart rate.

Dimsdale, Joel. *J Am Coll Cardiol*. 2008 April 1; 51(13): 1237–1246. doi:10.1016/j.jacc.2007.12.024.

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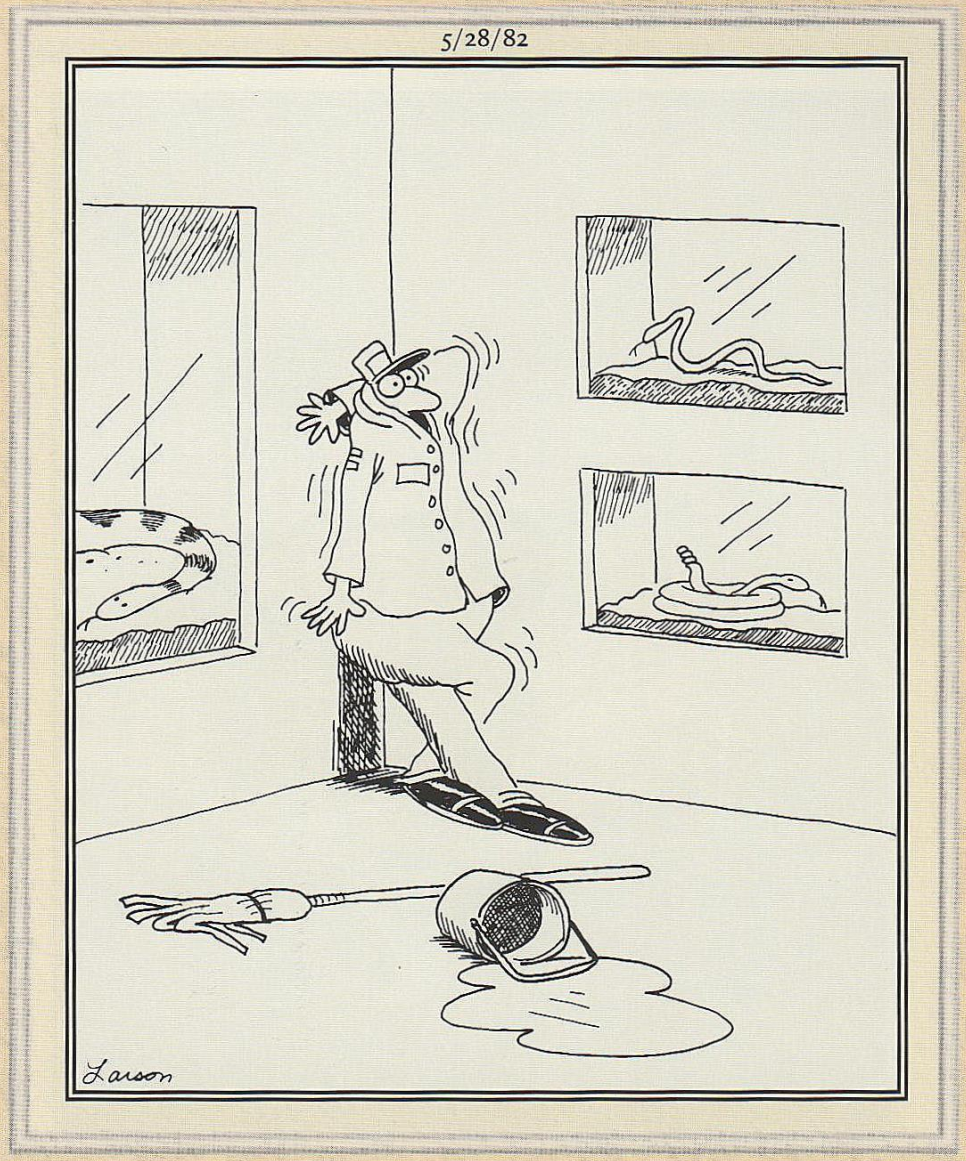
Allostasis is the process of achieving stability, **homeostasis**, through physiologic or behavioral change. This term may be new to you but provides for a more comprehensive understanding of the neuroendocrine and immune changes necessary for your body to maintain stability both in response to and in anticipation of "threat". We maintain stability through variability!

The short term benefits to adaptive allostatic changes (fight or flight responses) often come at the long term expense of the organism, an accumulative threat known as **allostatic load** (the proverbial straws on the camel's back).



After 23 uneventful years at the zoo's snakehouse, curator Ernie Schwartz has a cumulative attack of the willies.

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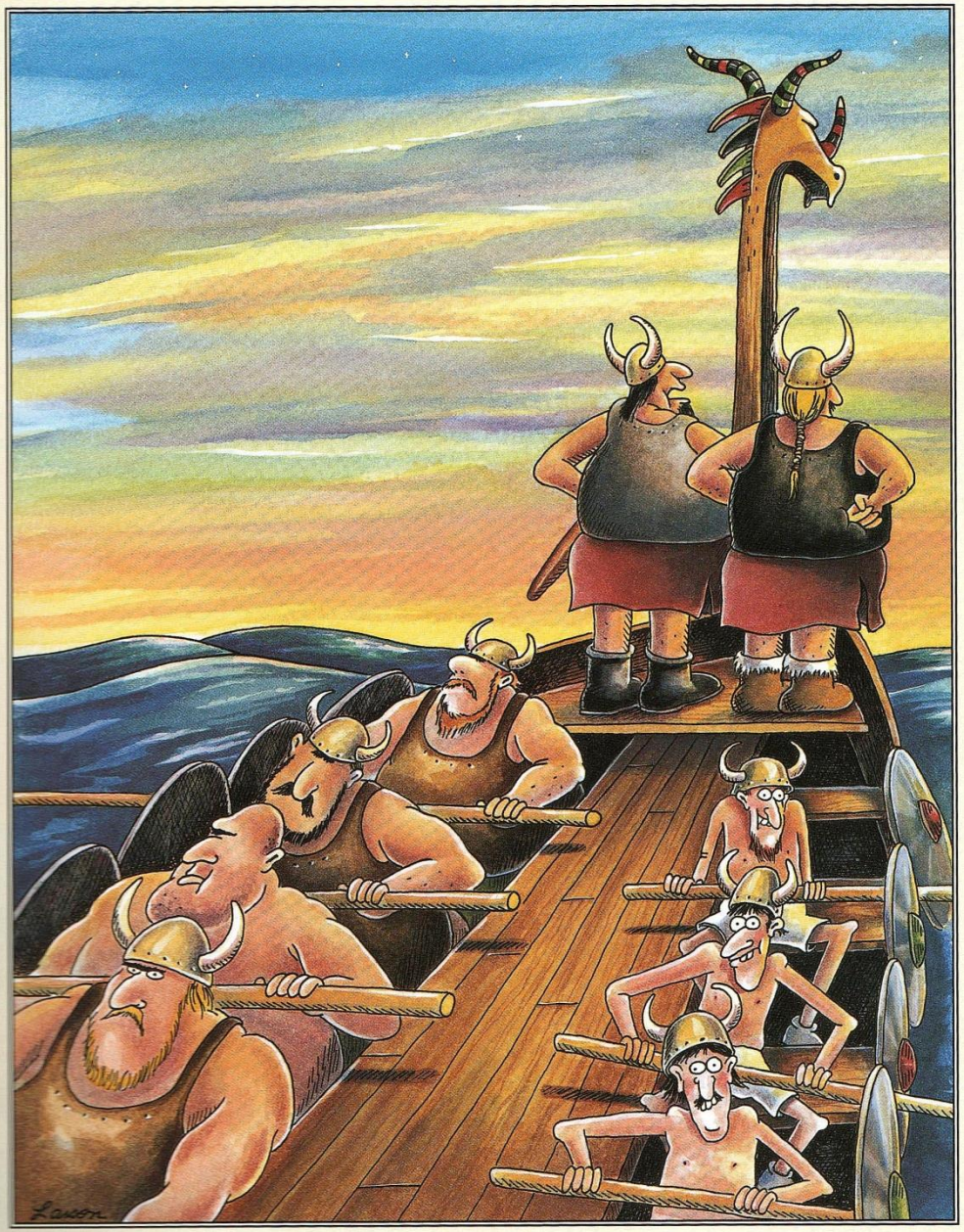
Through this definition, **stress** becomes the accumulative adaptive allostatic changes of the organism both psychological and physical at the time of the threat, real or perceived. This more comprehensive definition allows us, requires us, to understand the history of that individual as reflected by his or her adaptive capacity at the time of the stress if we want to understand the spiritual, mental, and physical response that is “stress”. When we look at this definition we may not find it too far-fetched (maybe even spot-on) to describe stress as that which defines us.

2/18/82



"I've got it, too, Omar ... a strange feeling like we've just been going in circles."