

# Stress

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Medical RN Education Days

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# Objectives

## Medical Aspects of Stress

- What is stress?
- Stress Hormones and Actions
- Effects of Chronic Stress
- Strategies to Reduce Stress

# What's Stress?

- “Not enough time...a common response”



# What is stress?

Imbalance between perceived demands of the environment and the individual's resources to meet those demands.

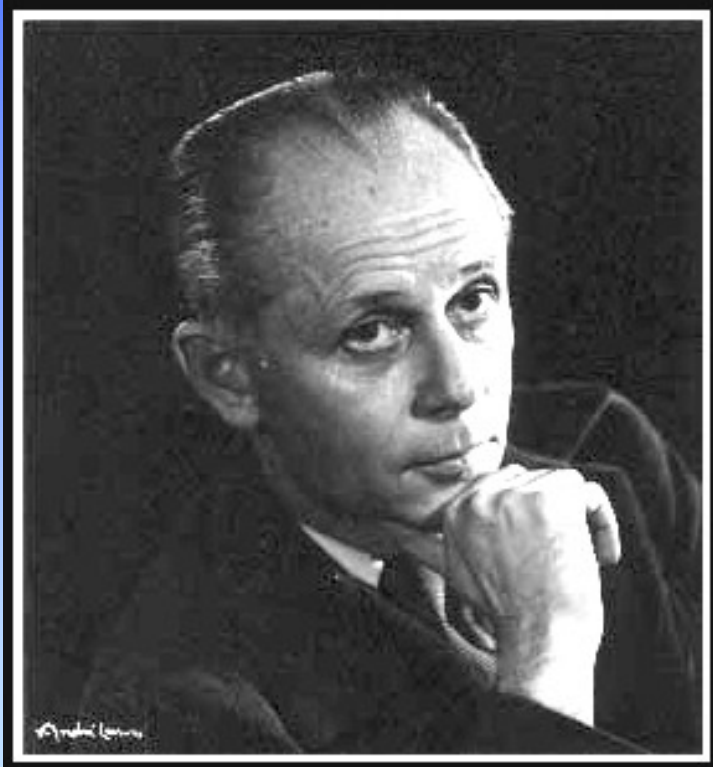


# Acute Stress Response

## Fight or Flight Response



# Hans Selye (1907-1982)



## Chronic Stress Response

- 3 phases of prolonged stress:
  - Alarm
  - Failure to adapt
  - Exhaustion

**'General Adaptation Response'**

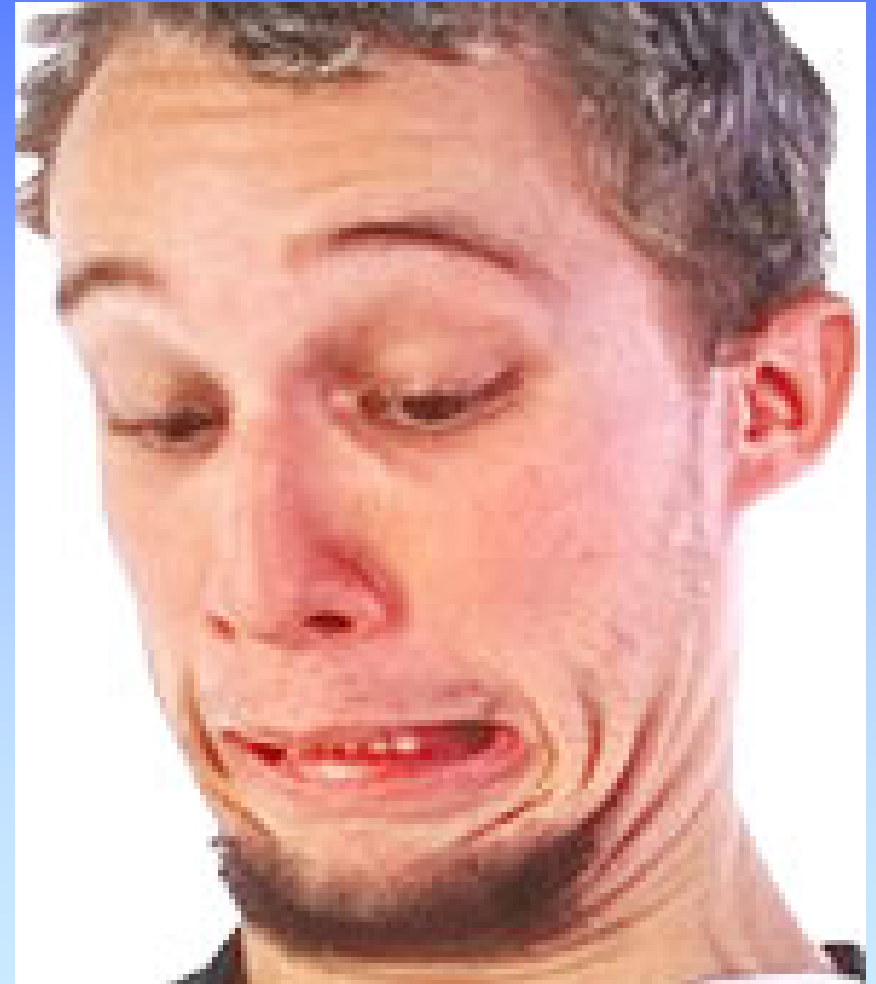
# Stress – not just psychological

- Stress → 4 components
  - the stress stimuli
  - the experience of stress
  - the physiological stress response
  - the experience of the stress response

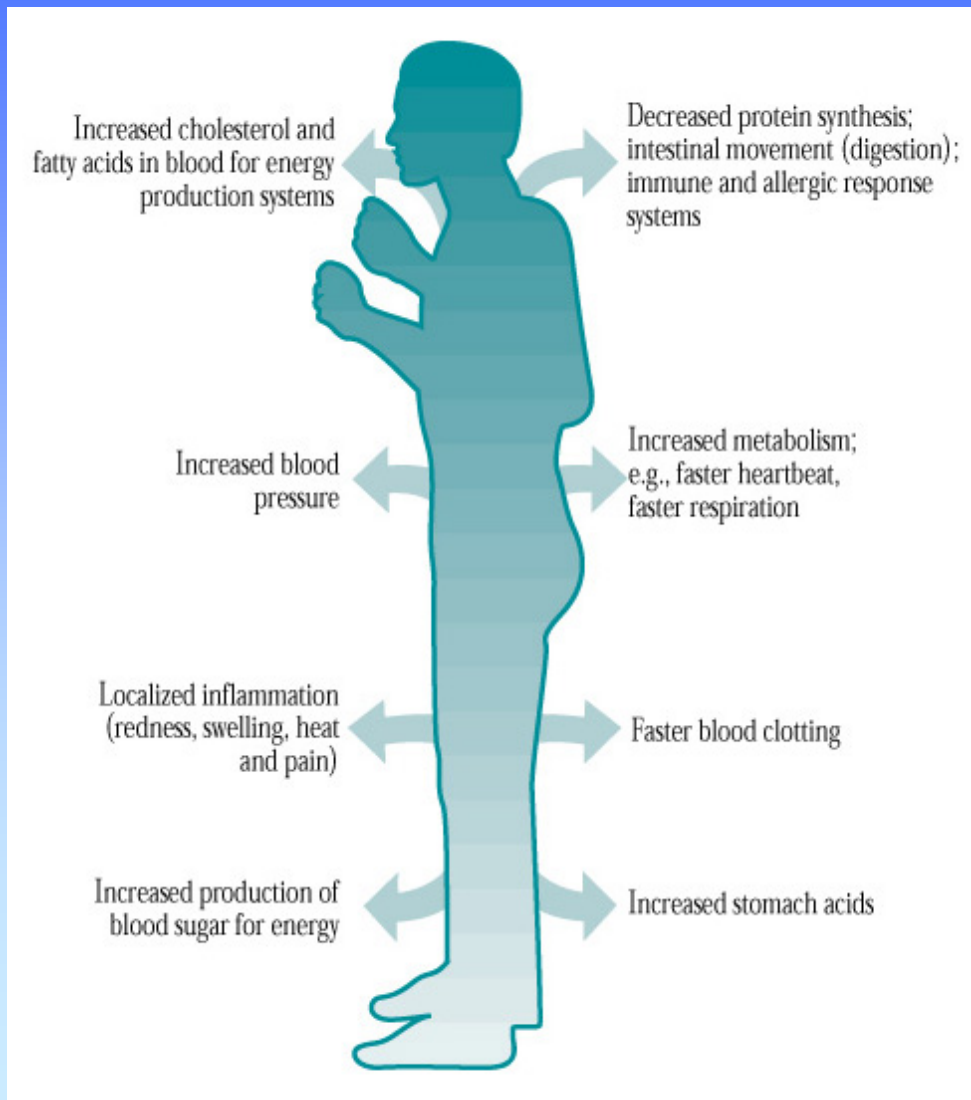
# Stress Stimuli



# Experience the stimuli

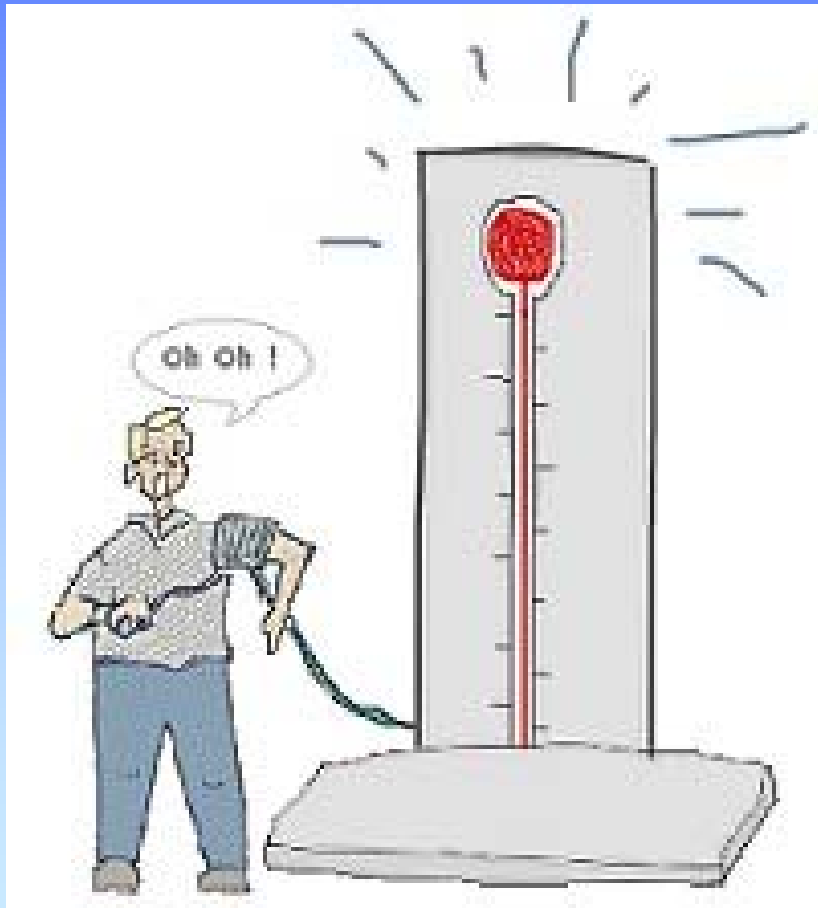


# Physiological Response (Body Chemistry Response)



- Hormones
- Neurochemistry
- Immunochemistry
- Energy Metabolism

# Experience of the Physiological Response



# Recipe for Stress

What makes things Stressful?

1. Novelty
2. Unpredictability
3. Threat to ego
4. Sense of loss of control

# Categories of Stress

- **Absolute Stress**

- threat to life
- earthquake, fire, physical attack...



# Categories of Stress

- **Relative Stress**
  - implied threat based on interpretation



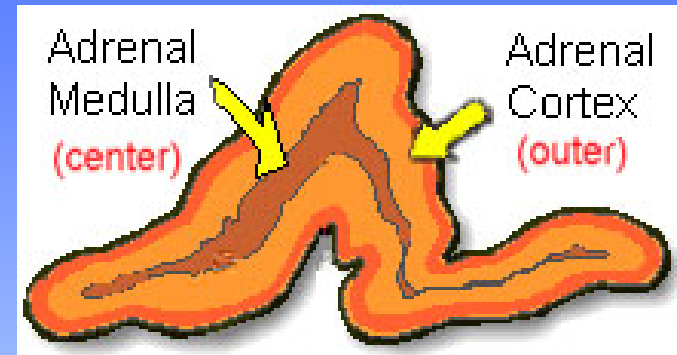
# Good Stress vs Bad Stress

- Relative Stress:
  - Interpretation of our stressor is very important.

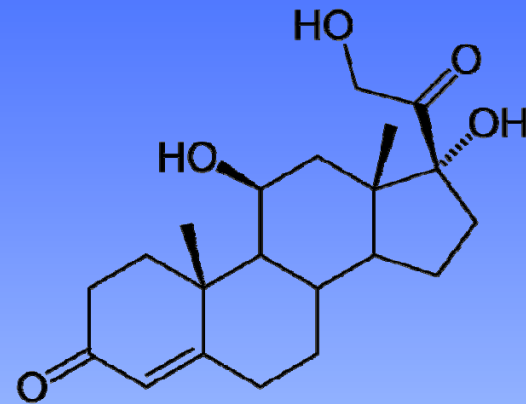
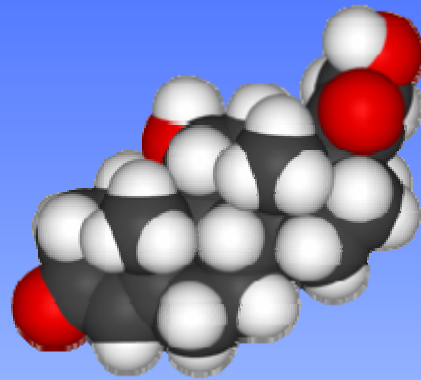
“Challenge versus Opportunity”

# Stress Hormones

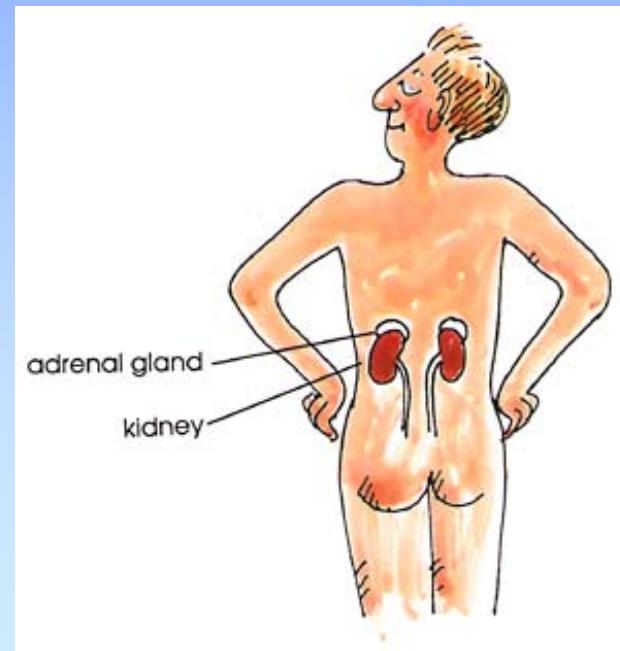
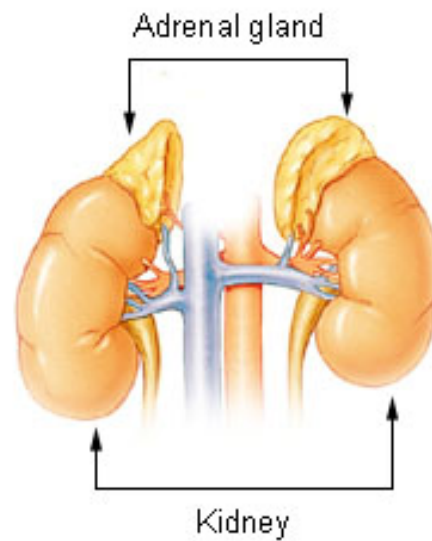
- Corticosteroids
  - Cortisol
- Catecholamines
  - Adrenaline (Epinephrine)
  - Nor-adrenaline (Nor-epinephrine)



# Cortisol

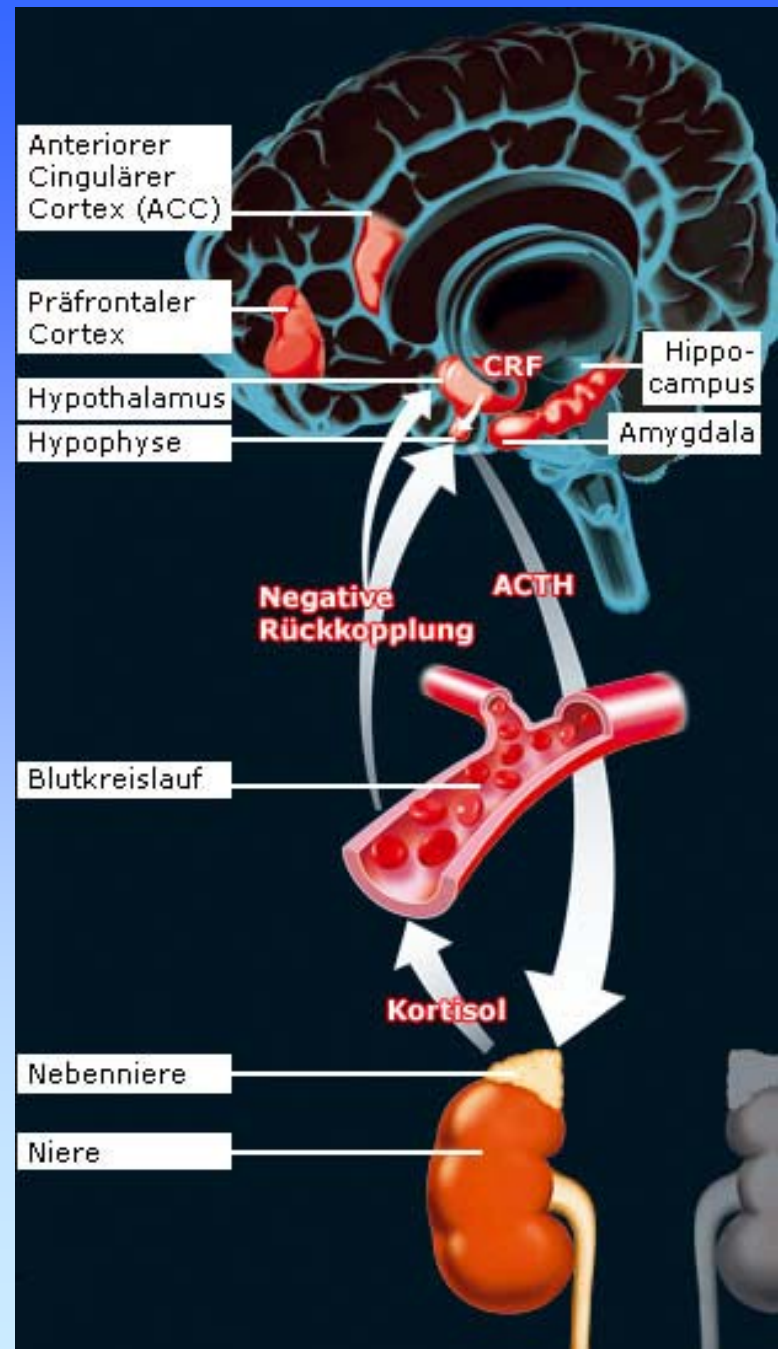


## Adrenal Gland



# Cortisol Regulation

- Brain
  - emotion, pain, memory
- Hypothalamus
  - autonomic function
- Pituitary
  - stimulating hormone
- Adrenal Gland
  - cortex



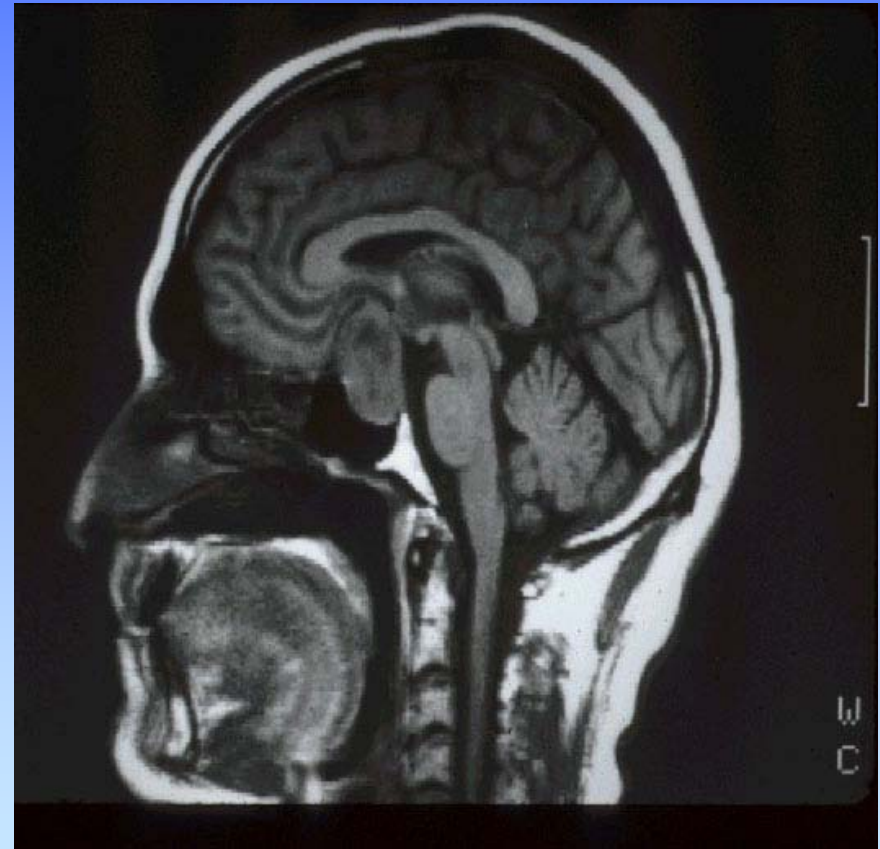
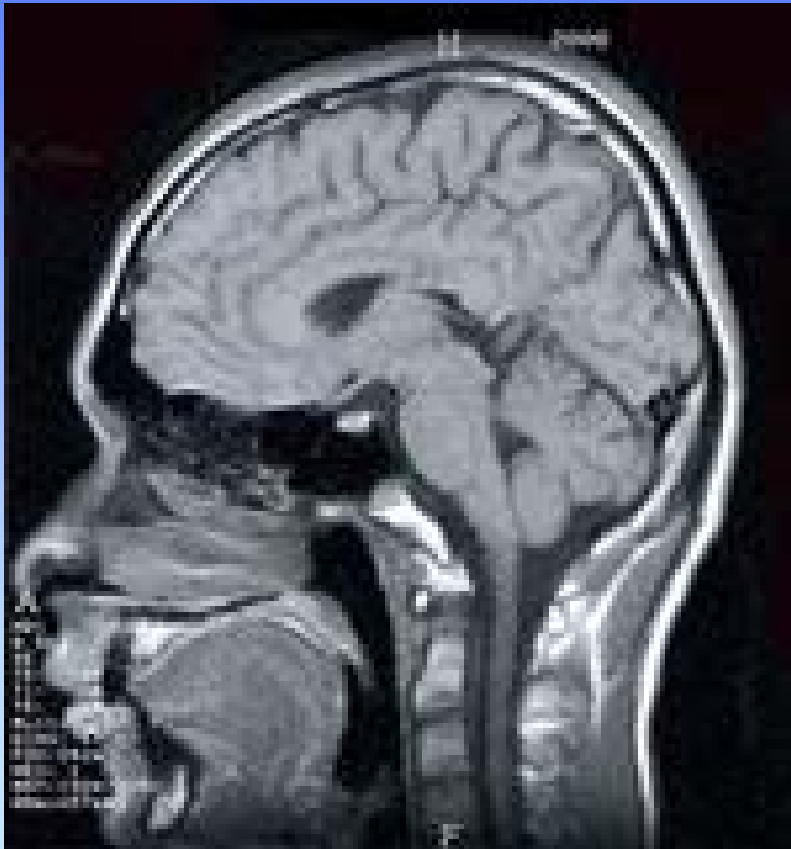
# Immediate Effects of Cortisol

- Response to Absolute Stress
  - increase vigilance
  - respond to emotion → don't think
  - raise blood sugar
  - increase psychomotor activity
  - obtain food

# Prolonged Effects of Cortisol

- increase appetite
- increase blood sugar
- increase fat stores
- redistribute fat
- salt retention → BP +
- reduce acid barrier
- menstrual cycle problems
- male impotence
- bone calcium loss
- muscle wasting
- insomnia
- irritability
- depressed mood
- memory loss\*
- immune dysfunction
- 2006 > Negative fx

# Pituitary Tumor & Cushing's Disease



# Disease States

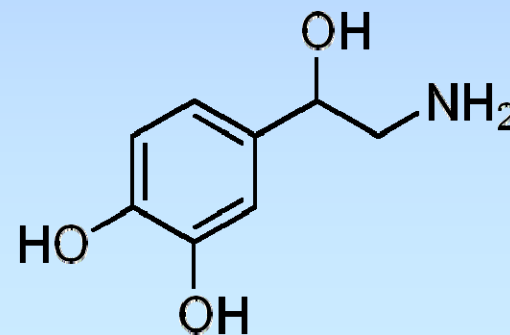
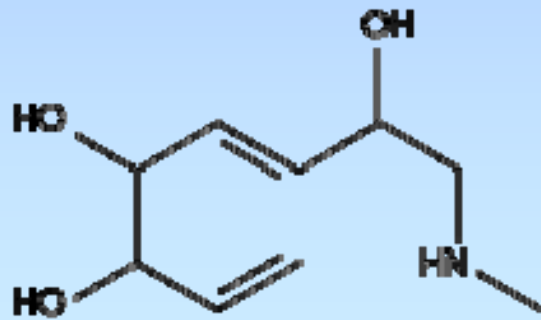
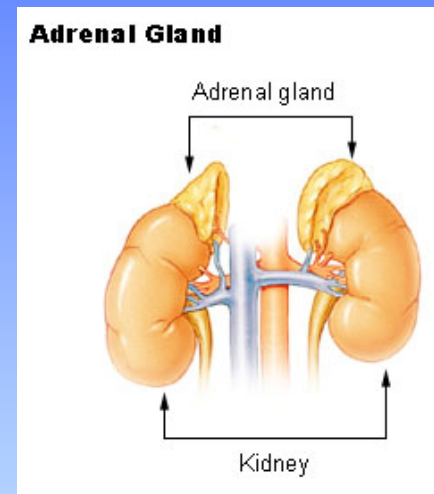
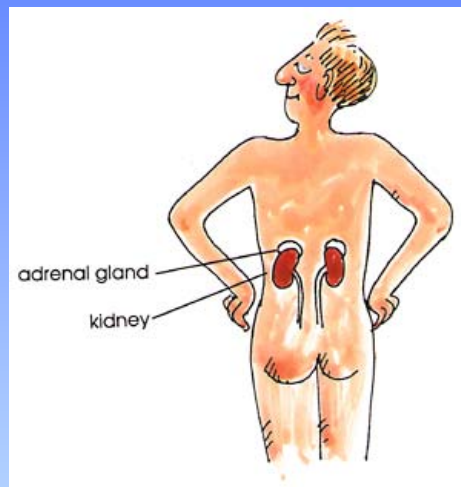


- Moon facies



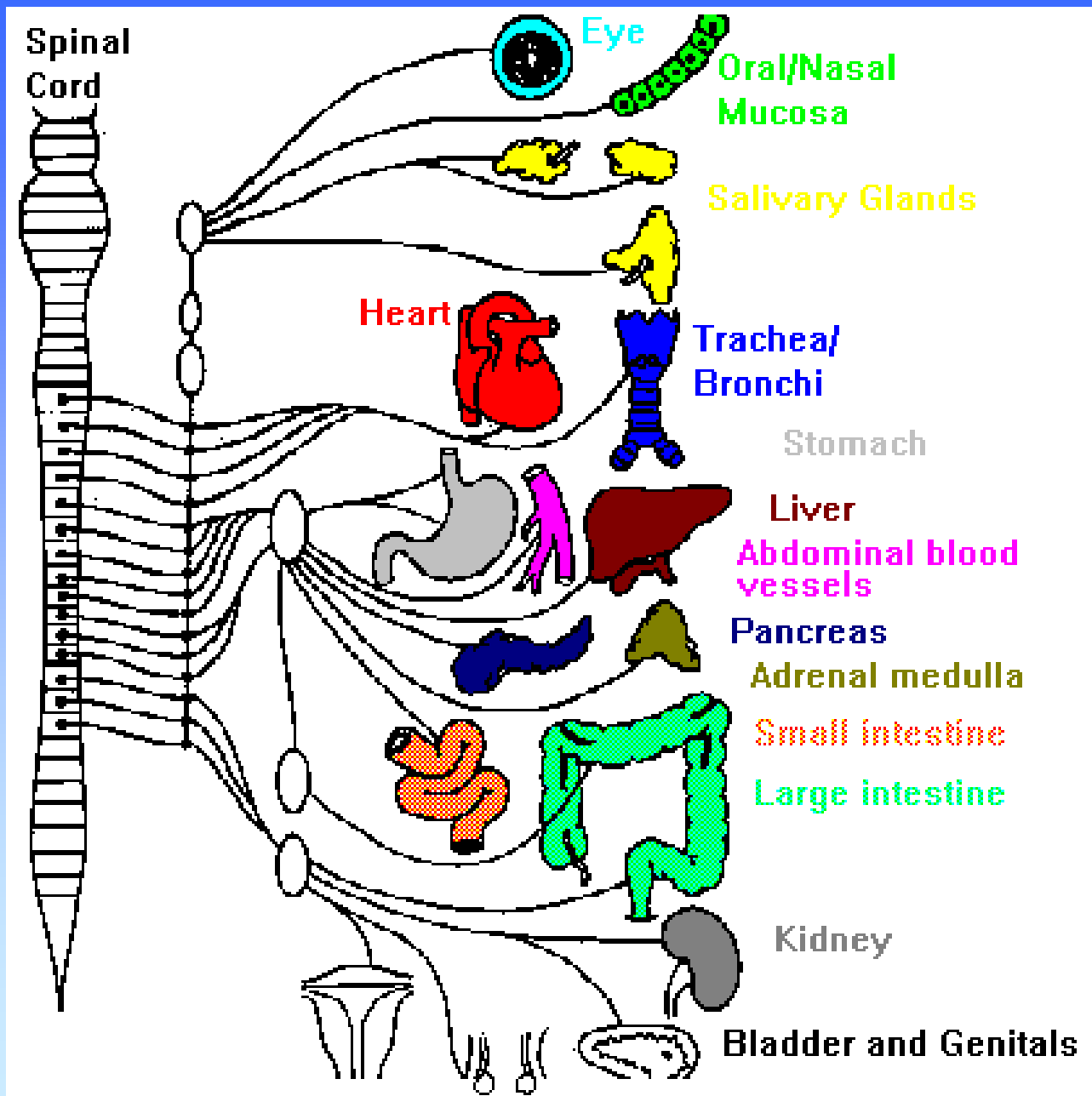
# Catecholamines

- Adrenaline (Epinephrine)
- Nor-adrenaline (Nor-epinephrine)

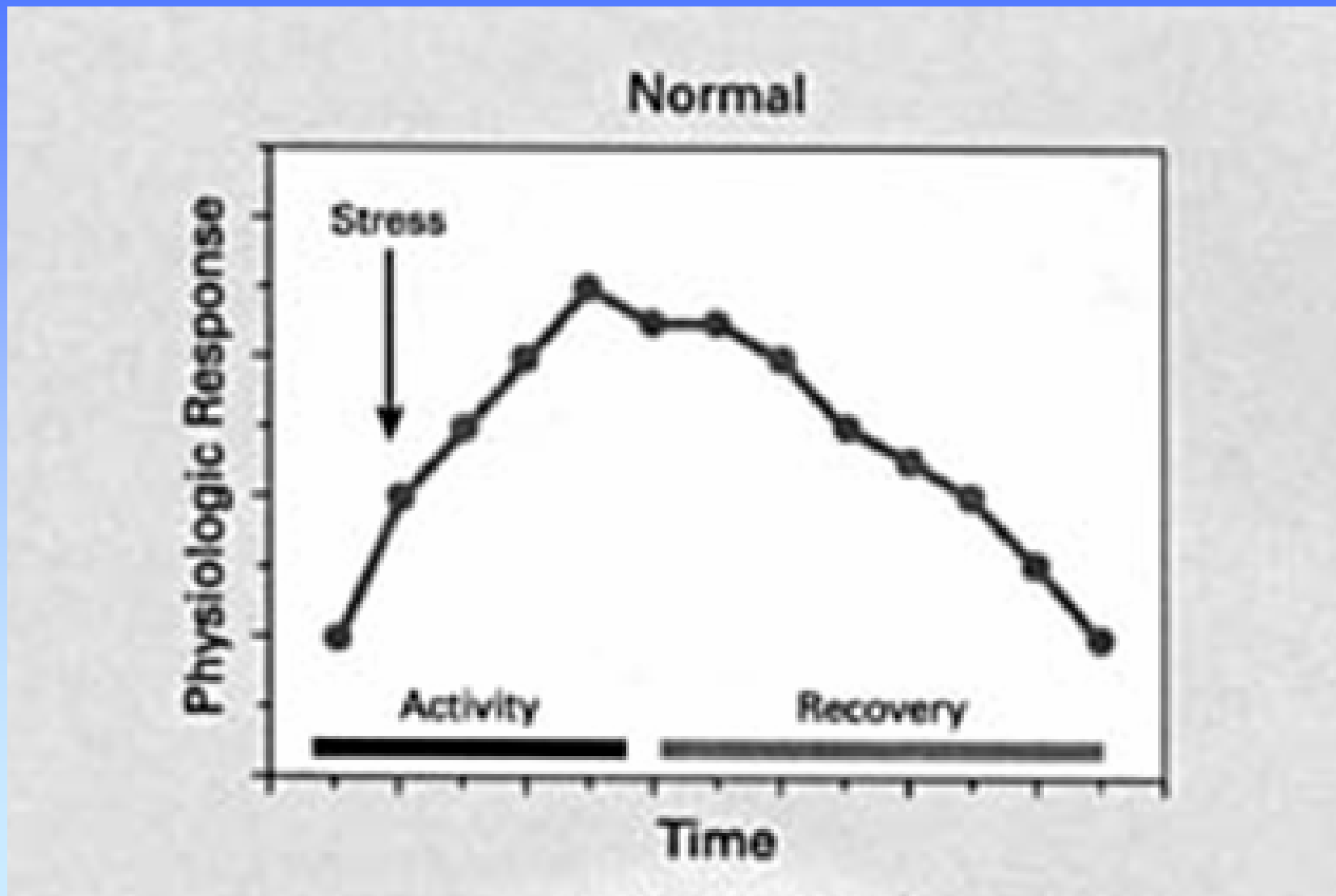


# Effects of Catecholamines

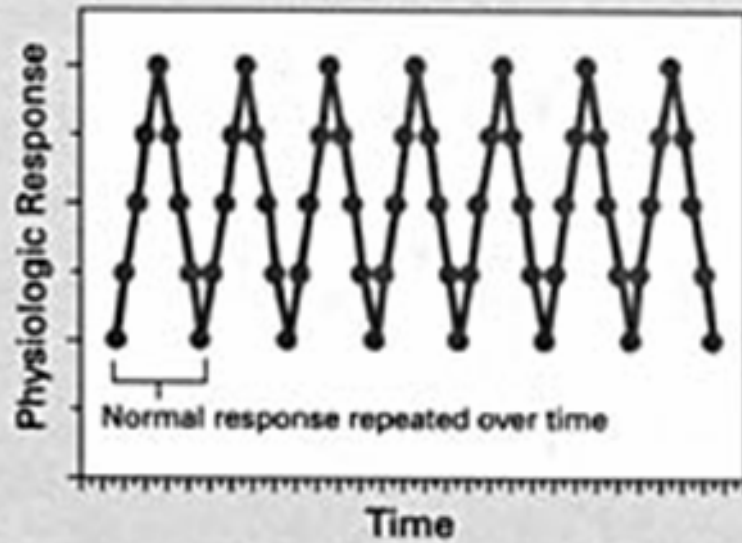
- increase heart rate
- increase cardiac force of contraction
- narrows blood vessels
- increase blood pressure
- dilates pupils
- dilates airways
- reduces flow of blood to GI tract
- reduces saliva production
- increases platelet adherence 'stickiness'
- increases sweat production



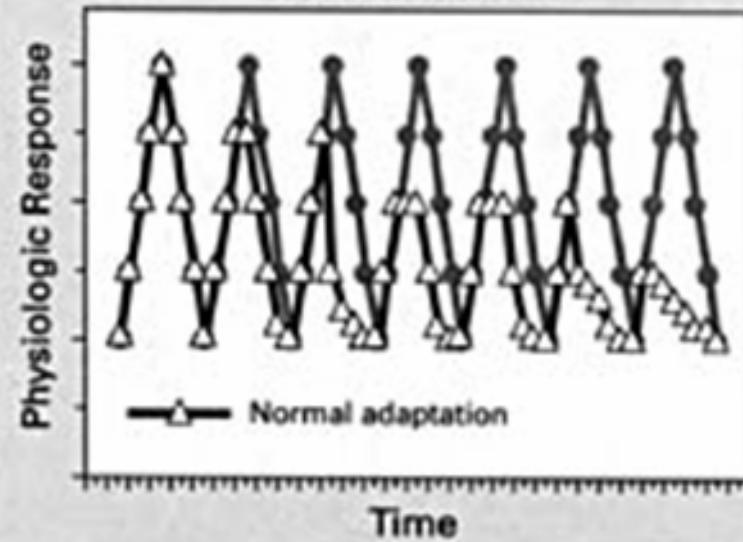
We hope to adapt to our stressors!



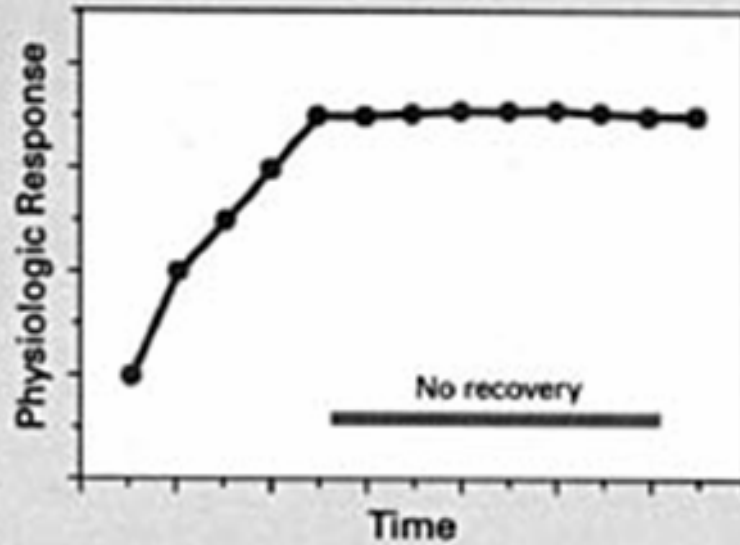
Repeated "hits"



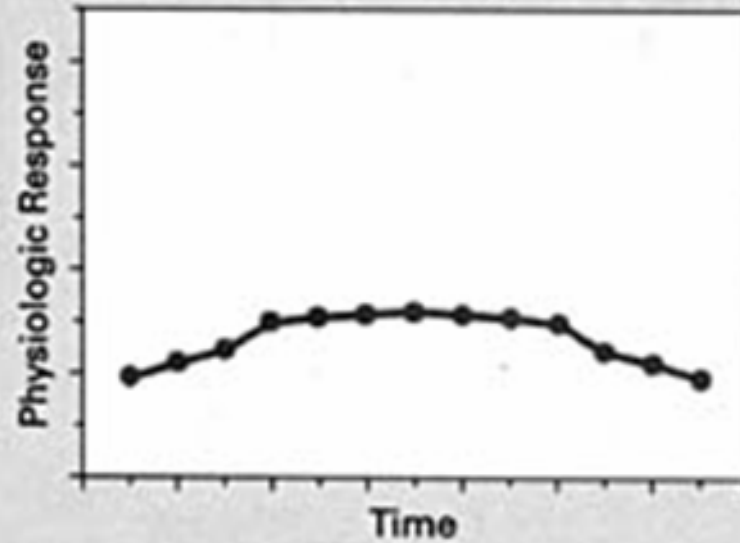
Lack of adaptation



Prolonged response



Inadequate response



# Stress Related Disease

# Disease Related Stress

- Headache
- Irritable Bowel Syndrome
- Obesity → Diabetes → Osteoarthritis
- Regional Pain Syndromes & Fibromyalgia
- Chronic Fatigue
- Are there others?



***Body Distress Syndrome***

## Symptoms and Syndromes of Bodily Distress: An Exploratory Study of 978 Internal Medical, Neurological, and Primary Care Patients

PER FINK, DR. MED. SC, TOMAS TOFT, PhD, MORTEN STEEN HANSEN, PhD, EVA ØRNBØL, MSc, AND FREDERIK OLESEN, PROF

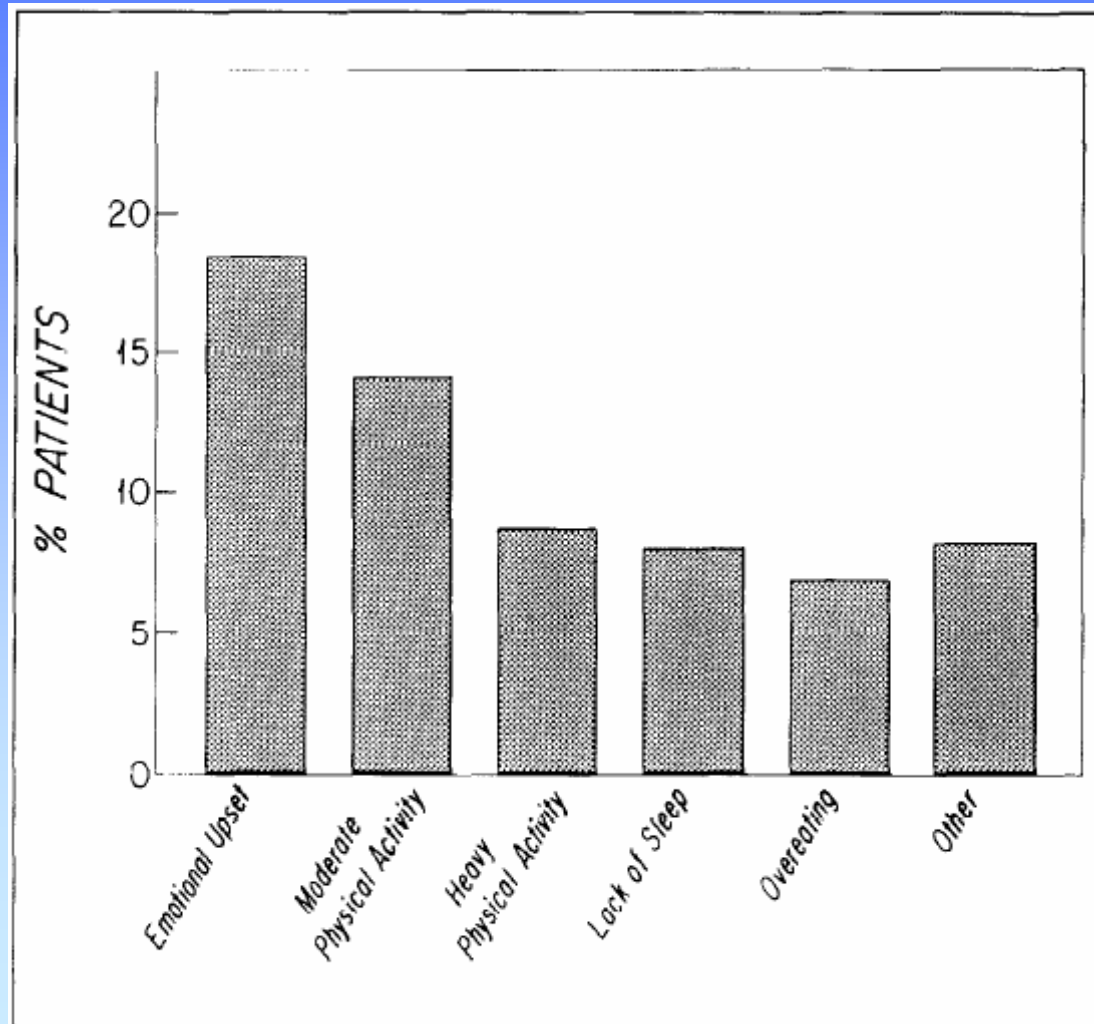
- Do functional symptoms cluster in a way that support multiple conditions?
- Cross sectional survey of patients with functional symptoms
- Screened 2,300 patients → 700 were judged functional

Psychosomatic Medicine 69:30–39 (2007)

# Acute Stress and Heart Attack

- **Mortality in Widowers**
  - 40% increase within 6 mo of spouses death
- **Myocardial Infarction Onset Study**
  - incidence of heart attack 14X among recent (6-12 mo) widows / widowers

# Triggering an Acute MI



**FIGURE 1. Possible triggers of acute myocardial infarction. A possible trigger was reported by 412 of 849 patients (48.5%); 109 patients (13%) reported 2 or more possible triggers.**

# Anger in Young Men and Subsequent Premature Cardiovascular Disease

## *The Precursors Study*

*Patricia P. Chang, MD, MHS; Daniel E. Ford, MD, MPH; Lucy A. Meoni, ScM; Nae-Yuh Wang, PhD; Michael J. Klag, MD, MPH*

**Background:** Anger can trigger myocardial ischemia and may be an independent risk factor for coronary heart disease, but its effect on early compared with late onset of disease is unclear.

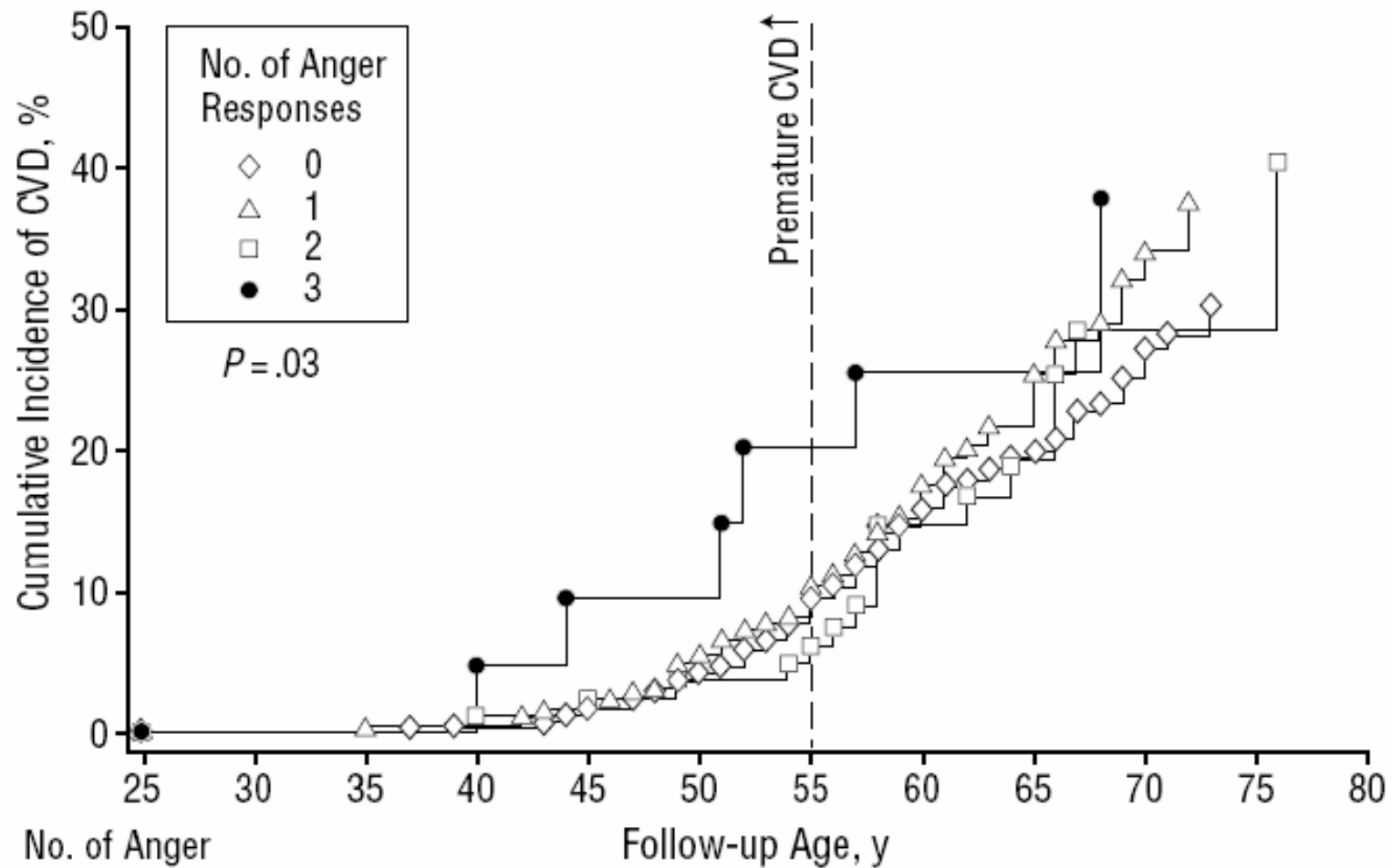
**Methods:** We performed a prospective study of 1055 men followed up for 32 to 48 years to examine the risk of premature and total cardiovascular disease (CVD) associated with anger responses to stress during early adult life. Highest level of anger was defined as a self-report of all 3 possible anger reactions to stress (expressed or concealed anger, gripe sessions, and irritability) on a checklist questionnaire administered in medical school. Premature disease was defined as events before age 55 years.

**Results:** During a median follow-up period of 36 years, 205 men developed CVD (cumulative incidence at 76 years, 34.5%), of whom 77 men developed premature dis-

ease (cumulative incidence before 55 years, 7.9%). The highest level of anger was associated with an increased risk of premature CVD (adjusted relative risk, 3.1; 95% confidence interval, 1.1-8.6), including premature coronary heart disease (relative risk, 3.5; 95% confidence interval, 1.1-11.8) and premature myocardial infarction (relative risk, 6.4; 95% confidence interval, 1.8-22.3), compared with lower levels of anger. When CVD events after age 55 years were included, there was no longer a statistically significant association between anger and CVD.

**Conclusion:** High level of anger in response to stress in young men is associated with an increased risk of subsequent premature CVD, particularly myocardial infarction.

*Arch Intern Med. 2002;162:901-906*



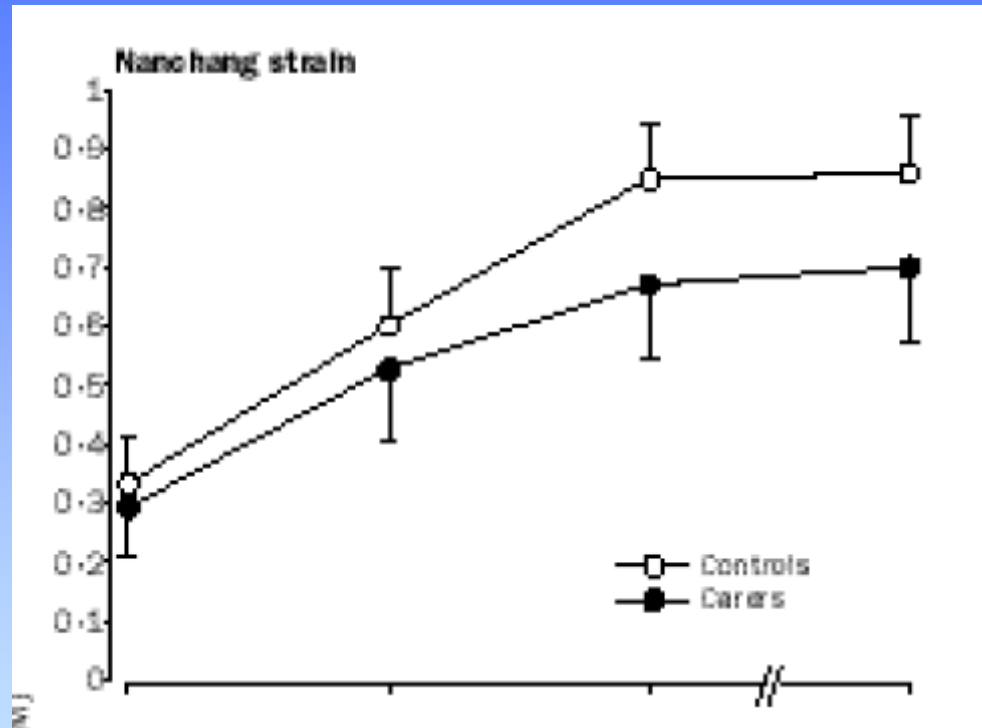
No. of Anger Responses

3	21	20	19	19	15	12	12	4	4	4
0-2	1021	999	964	905	803	558	312	120	38	16

**Premature**

<b>Disease and Anger Level</b>	<b>No. of Cases</b>	<b>Cumulative Incidence Before Age 55 y, %</b>	<b>Crude RR (95% CI)</b>	<b>Adjusted RR (95% CI)†</b>
Cardiovascular disease				
Highest	4	20.2‡	2.9 (1.1-8.0)‡	3.1 (1.1-8.6)‡
Lower	73	7.6	1.0	1.0
Coronary heart disease				
Highest	3	14.8	3.0 (0.9-9.5)	3.5 (1.1-11.8)‡
Lower	53	5.5	1.0	1.0
Myocardial infarction				
Highest	3	14.8§	5.1 (1.6-16.8)‡	6.4 (1.8-22.3)§
Lower	31	3.3	1.0	1.0

# Chronic Stress & Immune Dysfunction



- Influenza Vaccination
  - Difference between stressed and non-stressed group.
- Lancet 1999

- Wound Healing & Stress

# Wound Healing

## Punch Biopsies

- 13 Care Givers vs 13 Controls
- Complete wound healing
  - Caregivers 48.7 vs 39.3 days (9 day diff)
  - Age and income did not effect outcome

– Lancet 1995

## Slowing of wound healing by psychological stress

Janice K Kiecolt-Glaser, Phillip T Marucha, William B Malarkey, Ana M Mercado, Ronald Glaser

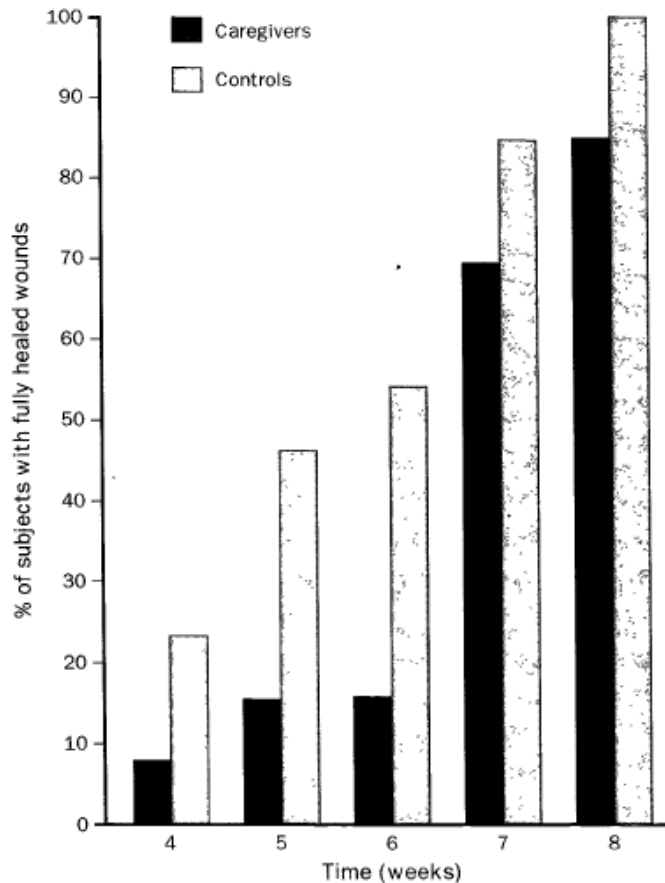


Figure 1: Percentage of caregivers and controls whose wounds had healed with time  
Range 24–68 days.

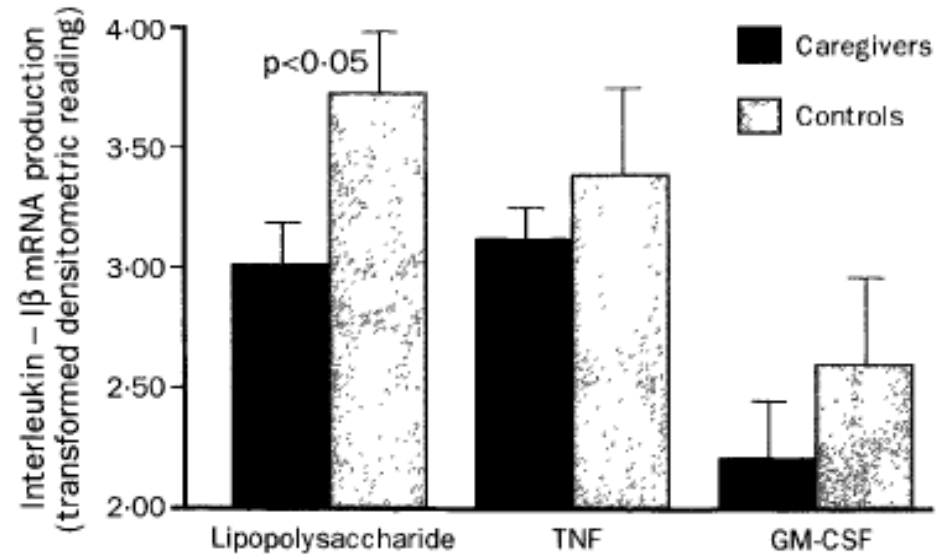


Figure 3: Interleukin-1 $\beta$  mRNA expression after stimulation with lipopolysaccharide, TNF, and GM-CSF

# Chronic Pain and Stress



# So now what?

- Our body does not understand that's it's 2006 AD, not 2006 BC
- Dr. Sonia Lupien
  - Stress researcher



# Recognize the Source of Stress

- Novelty
- Unpredictability
- Threat to Ego
- Sense of Loss of Control

**Have a Plan B**

# Distinguish Our Responses

- Emotional Response
  - primary instinct → biological factors
  - danger of incorrect interpretation
  - predisposes to hostility
  - risk factor for CV disease
- Cognitive Response
  - analyze
  - problem solve
  - gain control

# Techniques

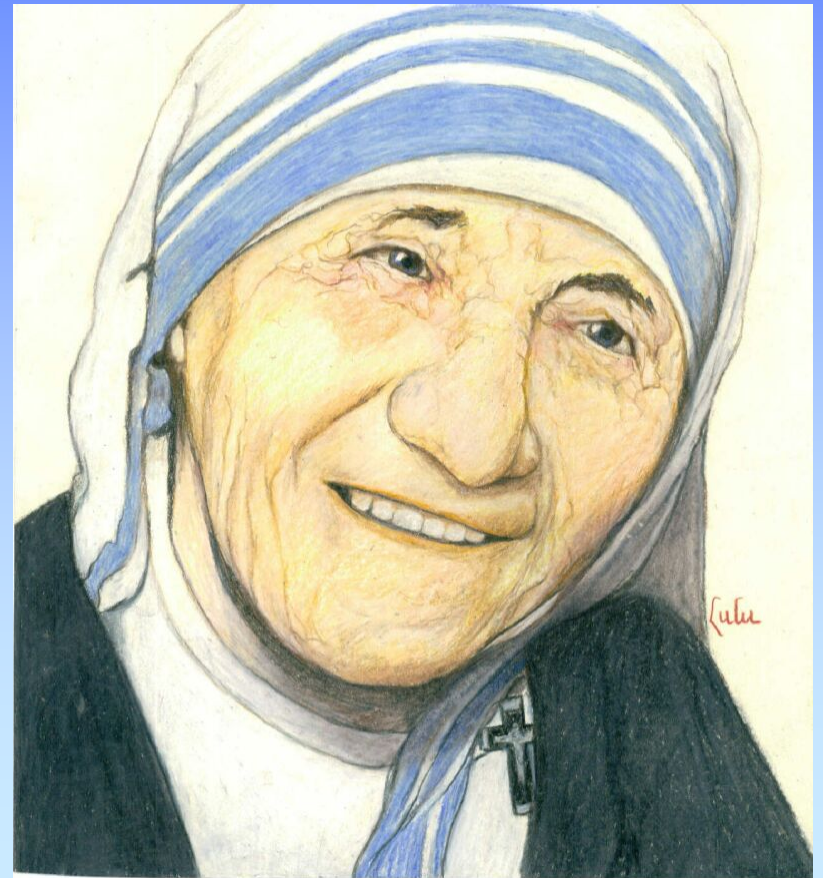
- Work on yourself
  - methods of resolving problems
  - learn to appreciate others
  - learn to appreciate yourself
  - practice goodwill
- Work on your Body
  - breathe
  - move
  - power of laughter and smiles

# Avoidance

- Avoid Avoidance
  - may work in short term
  - negative in the long term

# Goodwill

- Mother Theresa Effect
  - improved self-esteem



The image shows the front cover of a book titled "Healthy Living" by Andrew Weil, M.D. The cover features a photograph of a man with a full white beard and a dark blue jacket, looking slightly to the right. The background is a bright, clear blue sky with some faint, illegible text visible in the upper portion. The title "Healthy Living" is printed in a large, white, serif font on the left side. Below the title, the author's name "Andrew Weil, M.D." is printed in a smaller, white, serif font, framed by two horizontal white lines.

Healthy Living

Andrew Weil, M.D.

# The 'un-stressed' state...

- A balanced and stable internal environment.



# Summary

- Stress is physiological & psychological
- Novelty, Unpredictability, Threat, Control
- Hormones are the stress messengers
- Chronic stress has negative consequences
- Strategies to reduce stress are important