Disclosures

Kathleen Matt, PhD
has nothing to disclose.

The relationship between mood and food and health.
Study published in Journal of the American Dietetic Association, (2010) indicated poor diet quality was significantly correlated with increased symptoms of depression (p<.0001)

Study published in the British Journal of Psychiatry (2009) indicated that participants with highest intake of whole foods (fruit, vegetables, fish) were less likely to report depression. Those with highest intake of processed food (processed meat, sweet desserts, fried food, refined cereals, high fat milk-products) showed higher risk of depression.

Relationship between Diet and Depression

Mood is affected by the foods you choose:

Carbohydrates and sugary foods make you depressed, sleepy, and impair memory.

Fish, chicken and eggs increase neurotransmitters and enhance mood, memory, and energy.

Blueberries, avocados, oranges, and spinach improve memory and concentration.

Why? It’s in your biochemistry!
Stress and Nutrition – the foods you choose are affected by your mood.
A research study in Britain reported that workers with high levels of stress were 68% more likely to develop heart conditions. Workers with stress had higher stress hormones, heart rates and more heart disease. This was seen in both male and female workers and this effect was seen most strongly in workers under age 50.

“What is it that makes us unable to think, unable to sleep, increases our cravings for salty snacks and sweet foods?”
“What is it that enables an individual to demonstrate unbelievable speed, concentration, focus, mental abilities and creativity”
Complimentary and Alternative Medicine

**Acupuncture**

**Biofeedback**

Yoga

Exercise

Mechanisms of Integration

Acute Stress (+)

Chronic Stress (-)

Performance

Disease

Functional Stress Score - Pre and Post Assessments effects on mental and physical performance
“Neuroendocrine Responses to Stress: Linkages to Disease”
Kathleen S. Matt, kmatt@asu.edu

The Challenge:
To develop new more sensitive, and non-invasive methods to measure nano-quantities of biomarkers such as: steroids, catecholamines, and peptides in saliva, sweat, etc. in real time analysis.

A neuroendocrine model of stress

Sympathetic Nervous System
Catecholamines
Norepinephrine
Epinephrine

Hypothalamic-Pituitary-Adrenal Axis
Cortisol

Heart racing, rapid breathing, nervousness, lack of appetite, loss of weight, difficulty sleeping, etc.

Increased appetite, weight gain, increased abdominal obesity, muscle wasting, confusion, etc.
Psychological Stress – It's not just in your head! It's in your physiology!
It affects your food choices, and your food choices affect your stress!

- Eating behavior - \(\uparrow\) Intake of salty and sugary foods

  (positive feedback loop on cortisol)

  Stress – increase in cortisol – increase in NPY
  – increase in food intake

- Unable to sleep - \(\uparrow\) Caffeine intake

  (positive feedback loop, it mimics the sympathetic nervous system (fight or flight)
  Increase HR, BP, respiration, anxiety, inability to concentrate

**Prolong the stress response**

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**Stress reduction:**

Sometimes we try to alleviate the stress response by:
- Drinking alcohol
- Smoking

(mimic the parasympathetic nervous system)
Negative consequences of elevated cortisol

- ↑ visceral obesity
- ↑ insulin resistance
- Negative lipid profile
- ↓ muscle mass
- ↓ bone mineral density
- Impaired cognitive function
- ↓ immune function
- Increased risk for disease:
  - Diabetes
  - CVD
  - Osteoporosis
  - Cancer
  - Alzheimer’s disease

Neuropeptides: CRH, NPY, vasopressin (AVP), Galanin, Oxytocin (OT), CCK, leptin

Stress

- AVP
- OT
- CRH
- NPY
- Galanin
- Opiods

Choice of Food
Amount of Food
Quality of Food

Decreased Eating
Weight Loss

Increased Eating
Weight Gain
Physical Stress

Psychological Stress

HPA

CRH

ACTH

cortisol

SNS

NE, E

Glucose and Fuel Production

Meet the metabolic demand of exercise

Products of metabolism, pH, O2 saturation, etc.
Matt Stress Reactivity Protocol — a technique developed in the Neuroendocrine Lab to assess the dynamic function of the Neuroendocrine Axis

Measurements:
- Heart Rate
- Blood Pressure
- Plasma ACTH
- Plasma Cortisol
- Cytokines
- CRP
Heart rate increased significantly in response to the stress reactivity protocol \((p<.001)\).

There was no effect of gender.

Diastolic blood pressure changed significantly in response to the protocol \((p<.001)\).

Males had a significantly greater DBP response to the stress \((p<.05)\) suggesting greater sympathetic activation.
CORTISOL

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**Low cortisol and Low HR response to stress**

**High HR response to stress Synchronized**

**Risk for**
- Autoimmune Diseases
- Eating disorders, Anxiety attacks (greater % females)

**Low Risk for Disease, Stress Resilient**
- Active Lifestyle
- Good Nutrition
- High SES

**High cortisol and Low HR response to stress Synchronized**

**Risk for**
- Diabetes,
- Abdominal Obesity,
- Cardiovascular Disease,
- Depression
- Cancer (greater % males)

**Cortisol response**
Linkages between Stress and Disease
Canyon Ranch
Stress Reactivity: Heart Rate

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High Disease
Low Disease

Canyon Ranch: Stress Reactivity
Norepinephrine (pg/ml)

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High Disease
Low Disease
Depression

Diurnal Salivary Cortisol
in Healthy and Depressed Patients

![Graph showing diurnal salivary cortisol levels in healthy and depressed patients.]

PTSD

![Graphs showing diurnal salivary cortisol levels for PTSD patients.]

![Graphs showing diurnal salivary cortisol levels for PTSD patients.]

![Graphs showing diurnal salivary cortisol levels for PTSD patients.]

![Graphs showing diurnal salivary cortisol levels for PTSD patients.]

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“Building Reliance: A Neurobiologically Based Affective Intervention for PTSD”, Dr. Martha Kent, Neuropsychologist, VA

Stressed Employees
Stress and Optimum Performance

Biosignatures in athletes with training …
Fig. 1. Multifactorial genesis of overtraining syndrome.
Increases in hormones in response to exercise both morning and afternoon bout – some changes through the season suggesting adaptation.

Burnout 2.8

Increase in hormones in response to exercise in morning bout but dampened response through the season

Burnout 4.07
VO2max testing
aerobic power

Wingate testing
anaerobic power

BDNF
Change the inputs to the system

Neural level -
- Perception to stress
- Reaction to stress
- Resilience to stress

Systemic level
- Physiological adaptations
- Exercise and Movement
- Food choices
Heart Rate Response to an Acute Bout of Yoga

**Heart Rate, beats per minute**

- Baseline
- End

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**Healthy News**

**The Biology of Hope: Look Forward to Good Health**

A new study finds that planning your summer vacation or weekend leisure is essential to your health. Looking forward to pleasurable events triggers healthy changes in your mood and maybe in your body, say researchers at the University of California, Irvine, College of Medicine.

Psychological tests indicated that anticipating laughter—in this study, preparing to watch a funny video—reduced levels of tension, fatigue, anger, and depression. Unpublished data by the same research team show that these mood changes are accompanied by favorable physical changes, such as reduced levels of stress hormones. “The body prepares itself for pleasure,” says study author Lee S. Berk, Ph.D. “Expectation is a synonym for hope. If doctors can learn to elicit hope in their patients, it could be a powerful tool for battling chronic disease.” So schedule some fun in your weekly planner and reap the benefits of looking forward to it.

**Contributors**

Rick CHILOM, Sa REID, Eva MARER, JIR DANIEL, Malcolm BEH
Positive Interpersonal Event

**Plasma cortisol (ug/dl)**

Stressors over time

![Graph showing plasma cortisol levels over time with stressors B, S, M, A, CP, I, R.](image)

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*The 5th Wave* by Rick Yancey

"I've tried Ayurveda, meditation, and aromatherapy, but nothing seems to work. I'm still feeling anxious and disconnected all day."
Protective Hormones
- Prolactin
- Oxytocin
- NPY

Differences in responses to stress –
- Fight or Flight –
- Tend and Befriend –

What do you see?

*For resilience, we need to start not with what's missing,*

*but with what's already there.*
From the Greeks: “Happiness is the exercise of vital powers along the lines of excellence in a life affording them scope.”
Heartmath

Time for Yourself

Recovery and Rest
Hippocrates said, "walking is man’s best medicine"

Walking:
Strive for 10,000 steps/day,
lower blood pressure,
loose weight, increase insulin sensitivity,
 improve your health,

Decrease your calorie intake by 100 calories a day and you will
Loose 10 pounds in one year.

or

Burn 100 extra calories a day, by
Walking 1 mile a day and loose 10 pounds in a year.
Food Choices: A Path to Better Health

Protection

Calcium, Magnesium-Mood stabilizers,

Salt, Sugar, Caffeine, and Fat

Increase in: Abdominal Fat
Glucose Level
Heart Rate
Blood Pressure
Free Radicals
Oxidative Damage

Citrus fruits, broccoli, tomatoes, red peppers
Fiber, Protein, olive oil
Walnuts, seafood
Stress and Nutrition

- Decrease intake of salty and sugary foods “addictive” because they trigger changes in hormones that increase the “drive” to eat (increase cortisol)
- Decrease intake of refined and processed sugars and starches, eat more complex carbohydrates (less spikes in insulin)
- Increase fiber intake, decrease transit time of food in gut, less absorbed.

The Anti-stress Diet

Choose nutritious and healthy

Protein-endurance
Iron – mental speed

chewing
Healthy ways to meet those STRESS cravings -

- Salmon – omega 3 – mood
- Whole grain – slow released energy
- Almonds and carrots – crunch and Mg
- Whole grains – protein, fiber, iron, vitamins
- Fruit - sweet, energy, fiber
- Sweet and creamy – yogurt, calming
- Probiotics – help digestive system

“The less leg The better”

Core Performance. Mark Verstegen
"Eat a rainbow
Often..."

Core Performance. Mark Verstegen
Stress and Anxiety

Norepinephrine

Epinephrine

Caffeine

Dehydration

Lack of Sleep

Hypoglycemia

Hormonal changes

Heat

Making sense of it all...

(A) The Japanese eat very little fat and suffer fewer heart attacks than the British or the Americans.
(B) On the other hand, the French eat a lot of fat, drink a lot of red wine and also suffer fewer heart attacks than the British or the Americans.
(C) The Japanese drink very little red wine and suffer fewer heart attacks than the British or the Americans.
(D) The Italians drink excessive amounts of red wine and also suffer fewer heart attacks than the British or the Americans.
(E) Conclusion: Eat and drink what you like. It’s speaking English that kills you.

—Anonymous
Learn from the strategies of athletes, capitalize on the stress response.

Use the burst of energy created by adrenaline and noradrenaline to fuel your creativity, and give you the endurance and focus that you need to complete the project.

Break up these very concentrated intense periods of work with breaks, preferably exercise such as a walk, a run, lifting weights.

Refuel your body with high quality, nutrient dense foods and natural sources of anti-oxidants.

Personal bests come from a combination of a strong stimulus and an appropriate recovery period.  

Work + Rest + Refuel = Success

Diabetic Patient

Genes vs Environment
Diabetic Patient

Pharmacological Treatment – Insulin

Nutrition

Exercise

Personalized Medicine.
Interprofessional Teams in Education and Research

Explore Engage Experience Excel
Interdisciplinary Centers

Delaware Rehabilitation Institute
Optimum Performance and Health Institute
Aging and Chronic Disease Center
Memory Care Center

Center for Women and Children’s Health Research
Center for Global Health

Faculty Hires in the College of Health Sciences

1 Named Chair in School of Nursing
2 Junior Faculty positions in School of Nursing
Chair of Behavioral Health and Nutrition
Chair of Kinesiology and Applied Physiology
Unidel Chair in Physiology
Enjoy life, live it well, and live it balanced!

Contact information:
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