

## Entry Level Clinical Nutrition

April 2014 Update:

Is companionship an essential  
nutrient? – Part I

Jeffrey Moss, DDS, CNS, DACBN  
jeffmoss@mossnutrition.com

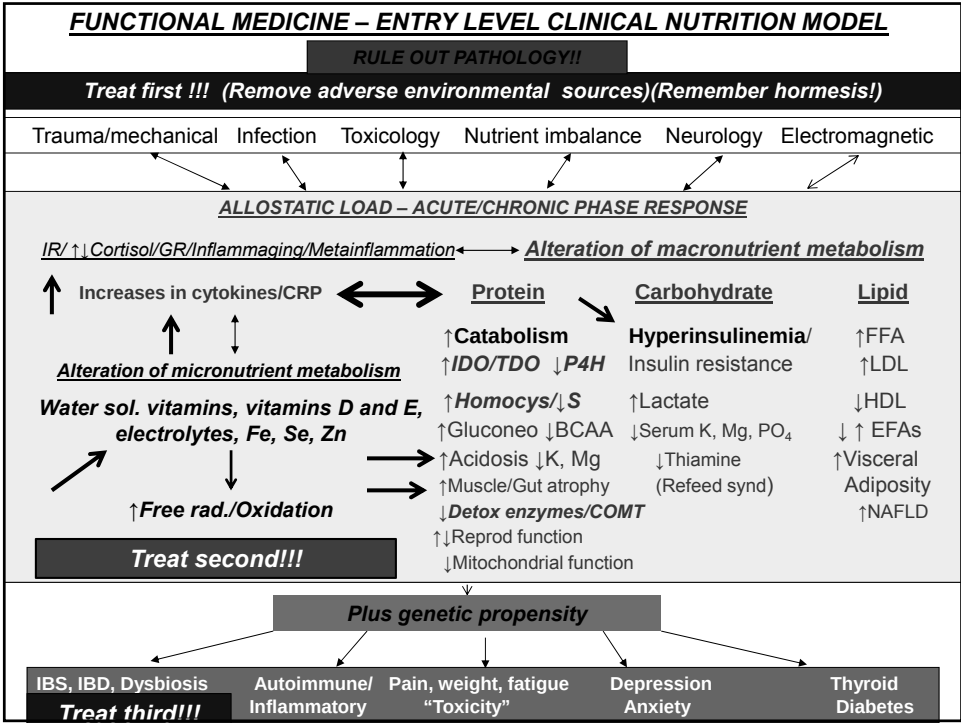
1

- *“You see, we can feed the stomach with concentrates, we supply microfilm for reading, recreation, even movies of a sort, we can pump oxygen in, and waste material out, but there’s one thing we can’t simulate. That’s a very basic need. Man’s hunger for companionship. The barrier of loneliness, that’s the one thing we haven’t licked yet.”*

The Twilight Zone  
Season 1, Episode 1  
*Where is Everybody?*  
Broadcast October 2, 1959

2

Is Companionship an Essential Nutrient? Part 1  
Presented by Jeff Moss, Moss Nutrition



The Archipelago of Pain - NYTimes.com

http://www.nytimes.com/2014/03/07/opinion/brooks-the-archipelago...

The New York Times

http://nyti.ms/1nkEmRD

THE OPINION PAGES | OP-ED COLUMNIST

**The Archipelago of Pain**

MARCH 6, 2014



David Brooks

We don't flog people in our prison system, or put them in thumbscrews or stretch them on the rack. We do, however, lock prisoners away in social isolation for 23 hours a day, often for months, years or decades at a time.

We prohibit the former and permit the latter because we make a distinction between physical and social pain. But, at the level of the brain where pain really resides, this is a distinction without a difference. Matthew Lieberman of the University of California, Los Angeles, compared the brain activities of people suffering physical pain with people suffering from social pain. As he writes in his book, "Social," "Looking at the screens side by side ... you wouldn't have been able to tell the difference."

The brain processes both kinds of pain in similar ways. Moreover, at the level of human experience, social pain is, if anything, more traumatic, more destabilizing and inflicts more cruel and long-lasting effects than physical pain. What we're doing to prisoners in extreme isolation, in other words, is arguably more inhumane than flogging.

1 of 3

3/7/2014 2:51 PM

4

- “In general, mammals do not do well in isolation. In the 1950s, Harry Harlow studied monkeys who had been isolated. The ones who were isolated for longer periods went into emotional shock, rocking back and forth. One refused to eat after being reintegrated and died within five days. Most of the rest were permanently withdrawn.”

5

- “Some prisoners who’ve been in solitary confinement are scarcely affected by it. But this is not typical. The majority of prisoners in solitary suffer severely – from headaches, an oversensitivity to stimuli, digestion problems, loss of appetite, self-mutilation, chronic dizziness, loss of the ability to concentrate, hallucinations, illusions or paranoid ideas.”

6

# Is Companionship an Essential Nutrient? Part 1

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- “Many just disintegrate.”
- “According to rough estimates, as many as half the suicides in prison take place in solitary, even though isolated prisoners make only about 5 percent of the population.”

7

A Wedding in Intensive Care - NYTimes.com <http://opinionator.blogs.nytimes.com/2014/03/19/a-wedding-in-inten-...>

**The New York Times**

The Opinion Pages  
Private Lives March 19, 2014, 8:59 pm

**A Wedding in Intensive Care**

By HAIDER JAVED WARRAICH

Private Lives: Personal essays on the news of the world and the news of our lives.

BOSTON — There wasn't going to be a happy ending. The patient had metastatic cancer and had just gone through her third unsuccessful regimen of chemotherapy. Now it seemed that everywhere we looked, we found disease. An X-ray of her belly revealed an obstruction in her intestines. A CT scan of her chest uncovered a pulmonary embolism. Her labs demonstrated that she had almost no white blood cells left with which to defend herself.

When she arrived in the intensive care unit, she was delirious. I asked her the usual questions, about her medical history, and whether she wanted us to do CPR if her heart were to stop beating, but she didn't answer. I was just setting the clipboard aside when she raised a hand and told me, in a moment of lucidity: "Doc, do everything you can. I need to make it to my daughter's wedding."

She was in a lot of pain. She had a tube down her nose draining her stomach.

"When is the wedding?" I asked.

"Next summer."

I blinked. I blinked again. She didn't — she was looking right at me. At this point, I doubted she'd make it through the hospitalization, let alone

1 of 4 3/21/2014 12:16 PM

8

- “There wasn’t going to be a happy ending. The patient had metastatic cancer and had just gone through her third unsuccessful regimen of chemotherapy. Now it seemed that everywhere we looked, we found disease. An X-ray of her belly revealed an obstruction in her intestines. A CT scan of her chest uncovered a pulmonary embolism. Her labs demonstrated that she had almost no white blood cells left with which to defend herself.”

9

- “Doc, do everything you can. I need to make to my daughter’s wedding.”
- “At this point, I doubted she’d make it through the hospitalization, let alone eight more months.”
- “Stephanie called her fiance that morning. Crying, she told him the news. But he flipped the fatalistic script. Without hesitation he told her, ‘I want her to be there, too.’ and he proposed not only to have the wedding done sooner, but to have it done right her in the I.C.U.”

10

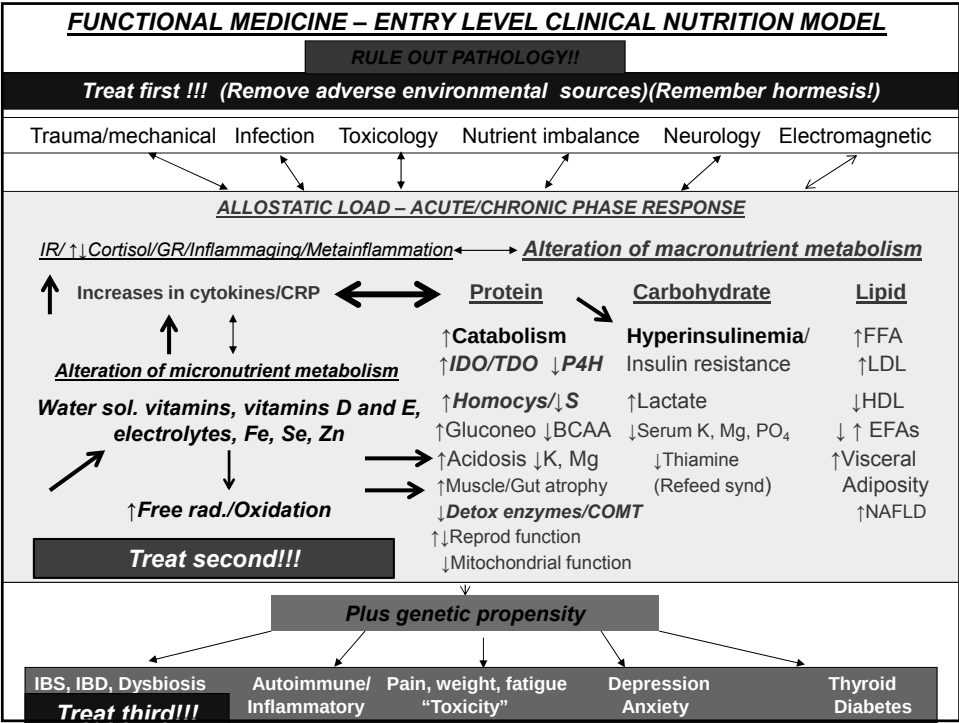
- “My job was to make sure the patient’s pain was controlled while also avoiding the confusion that is a side effect of narcotic medications.”
- “But almost miraculously, she didn’t need pain medications for hours and was fully aware of everything that was going on.”
- “Looking at the bride and groom from her hospital bed, she seemed more comfortable than I had seen her before.”

11

- “The next morning, the family decided to transition to hospice. No intubation, no CPR – nothing that would prolong life. It was all about trying to make the patient comfortable.”
- “(And yet, four months later, she is still alive, and doing as well as can be hoped in hospice.)”
- “One of the nurses, smiling through her tears, spoke to me after it was all over. ‘It was magical,’ she said. ‘None of the patient alarms went off.’”

12

Is Companionship an Essential Nutrient? Part 1  
Presented by Jeff Moss, Moss Nutrition



Biological Psychology 79 (2008) 260–267

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**Biopsychosocial responses to social rejection in targets of relational aggression**

Jennifer Zvolinski \*

Psychology Department, University of San Diego, 5500 Alcala Park, San Diego, CA 92161, United States

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**ABSTRACT**

A total of 28 college students participated in a live interpersonal challenge to assess psychosocial and neuroendocrine stress responses to social exclusion in females. Using the tend-and-befriend theory as a model for interpersonal stress response, this study examined how social exclusion is related to social information processing, willingness to affiliate, psychological state affect, and cortisol reactivity in women with a history of relational victimization. Results revealed that cortisol reactivity was associated with better social information processing among women who reported the least relational victimization. Most women, regardless of relational victimization history, were willing to pursue relationships with rejecting female peers. Following the social exclusion stressor, women who reported the most state

**Zvolinski J. Biopsychosocial responses to social rejection in targets of relational aggression, *Biological Psychiatry*, Vol. 79, pp. 260-267, 2008.**

Although the current study applied Taylor's tend-and-befriend (2006) theory to investigate the biopsychosocial affiliative stress response

interpersonal rather than agentic stressors in general (Stroud et al., 2004, 2002) might be related to the finding that women are more likely than men to report relationship vulnerability concerns including fear of social evaluation, neediness, and interpersonal dependency (for a review, see Rose and Rudolph, 2006). All of these tendencies heighten the tend-and-befriend pattern and place women at greater risk for biobehavioral reactivity to social threats. One type of social threat that women are particularly vulnerable to given the value they place on affiliation (Taylor, 2006) is relational aggression. This form of covert aggression targets relationships and tends to include social exclusion/rejection, gossip spreading, and relationship manipulation. Relational aggression has been shown to be more stressful for females than males (Crick et al., 1990) which might explain why it is used by females throughout childhood (Crick, 1996) and early adulthood (Lenio-Zvolinski, 2007; Wiener and Crick, 1999) in order to maintain and/or damage another female peer's social status in the group, exert control (Bukowski, 2003), and establish social norms (Putallaz, 2003 as cited in Taylor et al., 2008). Female targets of relational aggression, based on this history of relationship problems, would be expected to be especially vulnerable to interpersonal threats, and therefore, utilize a tend-and-befriend response style to reduce their distress. The current study applied Taylor's tend-and-befriend (2006) theory to investigate the biopsychosocial affiliative stress response

\* Tel.: +1 619 260 4216; fax: +1 619 260 0807.  
E-mail address: [jzvolinski@usd.edu](mailto:jzvolinski@usd.edu)

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- **“Although the fight-or-flight model provides a good characterization of some responses to stress, it provides an incomplete analysis for all types of stress responses in males and females. Taylor et al. posed an alternate ‘tend-and-befriend’ theory of stress response for females that may have selectively evolved to maximize survival of the self and offspring.”**

15

- **“Females tend to rely on interpersonal strategies such as exhibiting behaviors that protect offspring from harm and reducing neuroendocrine responses that might compromise offspring health (tending) as well as affiliating with social groups that reduce social threats (befriending).”**

16

- **“The neuroendocrine component of the model is based primarily on oxytocin and endogenous opioid mechanisms that contribute to bonding and affiliation which may lead to a reduction in the stress response.”**
- **“However, when affiliative efforts are unsuccessful and the exchange of the social contacts is unsupportive, it follows that biobehavioral stress is exacerbated, leading to an increase in the sympathetic nervous system and HPA axis activation.”**

17

- **“A number of studies have found biobehavioral differences in the stress response between males and females. For example, studies comparing communal and agentic stressors have shown cortisol reactivity to be highest for females following a social exclusion stressor and highest for males following an achievement challenge.”**

18

- **“These findings that women are more reactive to interpersonal rather than agentic stressors in general might be related to the finding that women are more likely than men to report relationship vulnerability concerns including fear of social evaluation, neediness, and interpersonal dependency. All of these tendencies heighten the tending-befriending pattern and place women at greater risk for biobehavioral reactivity to social threats.”**

19

- **One type of social threat that women are particularly vulnerable to given the value they place on affiliation is relational aggression. This form of covert aggression targets relationships and tend to include social exclusion/rejection, gossip spreading, and relationship manipulation. Relational aggression has been shown to be more stressful for females than males which might explain why it is used by females throughout childhood and early adulthood in order to maintain and/or damage another female peer’s social status in the group, exert control, and establish social norms.”**

20

Is Companionship an Essential Nutrient? Part 1  
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***“Cortisol reactivity tends to be heightened in individuals who are attentive to rejecting faces and even the fear of rejection is enough to elicit increases in both cortisol and progesterone.”***

21

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**Biobehavioral Responses to Stress in Females:  
Tend-and-Befriend, Not Fight-or-Flight**

Shelley E. Taylor, Laura Cossino Klein, Brian P. Lewis, Tara L. Gruenewald,  
Regina A. R. Gurung, and John A. Updegraff  
University of California, Los Angeles

The human stress response has been characterized, both physiologically and behaviorally, as “fight-or-flight.” Although fight-or-flight may characterize the primary physiological response 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 biobehavioral mechanism that underlies the tend-and-befriend pattern appears to draw on the attachment-caring 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 unappreciated stress regulatory system has manifold implications for the study of stress.

**Taylor SE et al. Biobehavioral responses to stress in females: Tend-and-befriend, not fight-or-flight. Psychological Rev. 2000;107(3):411-29.**

has implicitly assumed, but rather are more typically characterized by a pattern we term “tend-and-befriend.” Specifically, we suggest that, by virtue of differential parental investment, female stress responses have selectively evolved to maximize the survival of self and offspring. We suggest that females respond to stress by curtailing offspring, exhibiting behaviors that protect them from harm and reduce neuroendocrine responses that may compromise offspring health (the tending pattern), and by befriending, namely,

thalamic-pituitary-adrenocortical (HPA) responses to stress. In support of this biobehavioral theory, we consider a large animal and human literature on neuroendocrine responses to stress, suggesting that the tend-and-befriend pattern may be oxytocin mediated and modulated by sex hormones and endogenous opioid peptide mechanisms.

**Background**

The fight-or-flight response is generally regarded as the prototypic human response to stress. First described by Walter Cannon in 1932, the fight-or-flight response is characterized physiologically by sympathetic nervous system activation that innervates the adrenal medulla, producing a hormonal cascade that results in the secretion of catecholamines, especially norepinephrine and epinephrine, into the bloodstream. In addition to its physiological consequences, fight-or-flight has been adopted as a metaphor for human behavioral responses to stress, and whether a human (or an animal) fights or flees in response to sympathetic arousal is thought to depend on the nature of the stimulus. If the organism senses up a threat or predator and determines that it has a realistic chance of overcoming the predator, then attack is likely. In circumstances in which the threat is perceived to be more formidable, flight is more probable.

A coordinated biobehavioral stress response is believed to be at the core of reactions to threats of all kinds, including attacks by predators, assaults by members of the same species, dangerous conditions such as fire, earthquake, tornado, or flooding, and other threatening events. As such, an appropriate and modulated stress response is at the core of survival. Through principles of natural

Shelley E. Taylor, Laura Cossino Klein, Brian P. Lewis, Tara L. Gruenewald, Regina A. R. Gurung, and John A. Updegraff, Department of Psychology, University of California, Los Angeles.  
Laura Cossino Klein is now in the Department of Biobehavioral Health, Pennsylvania State University; Brian P. Lewis is now in the Department of Psychology, Syracuse University; and Regina A. R. Gurung is now in the Department of Psychology, University of Wisconsin—Green Bay.  
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Correspondence concerning this article should be addressed to Shelley E. Taylor, Department of Psychology, 1285 Frew Hall, University of California, Los Angeles, Los Angeles, California 90095-1563. Electronic mail may be sent to staylor@psych.ucla.edu.

411

22

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- **“Survival depends on the ability to mount a successful response to threat. The human stress response has been characterized as fight-or-flight and has been represented as an essential mechanism in the survival process. We propose that human female responses to stress (as well as those of some animal species) are not well characterized by fight-or-flight, as research has implicitly assumed, but rather are more typically characterized by a pattern we term ‘tend-and-befriend.’”**

23

- **”Specifically, we suggest that, by virtue of differential parental investment, female stress responses have selectively evolved to maximize the survival of self and offspring. We suggest that females respond to stress by nurturing offspring, exhibiting behaviors that protect them from harm and reduce neuroendocrine responses that may compromise offspring health (the tending pattern), and by befriending, namely, affiliating with social groups to reduce risk.”**

24

- **“We hypothesize and consider evidence from humans and other species to suggest that females create, maintain, and utilize these social groups, especially relations to other females, to manage stressful situations. We suggest that female responses to stress may build on attachment-caregiving processes that downregulate sympathetic and hypothalamic-pituitary-adrenocortical (HPA) responses to stress.”**

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- **“In support of the biobehavioral theory, we consider a large animal and human literature on neuroendocrine responses to stress, suggesting that the tend-and-befriend pattern may be oxytocin mediated and moderated by sex hormones and endogenous opioids peptide mechanisms.”**

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- **“A little-known fact about the fight-or-flight response is that the preponderance of research exploring its parameters has been conducted on males, especially on male rats. Until recently, the gender distribution in the human literature was inequitable as well. Prior to 1995, women constituted about 17% of participants in laboratory studies of physiological and neuroendocrine responses to stress. In the past 5 years, the gender balance has been somewhat redressed.”**

27

- **“Why have stress studies been so heavily based on data from males? The justification for this bias is similar to the rationale for the exclusion, until recently, of females from many clinical trials of drugs, from research on treatments for major chronic diseases, and from animal research on illness vulnerabilities.”**

28

- **“The rationale has been that, because females have greater cyclical variation in neuroendocrine responses (due to the reproductive cycle), their data present a confusing and often uninterpretable pattern of results. The fight-or-flight response may also be affected by female cycling, and, as a result, evidence concerning a fight-or-flight response in females has been inconsistent.”**

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***“...what if the equivocal nature of the female data is not due solely to neuroendocrine variation but also to the fact that the female stress response is not exclusively, nor even predominantly, fight-or-flight?”***

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- **“High maternal investment should lead to selection for female stress responses that do not jeopardize the health of the mother and her offspring and that maximize the likelihood that they will survive. ‘Tending,’ that is, quieting and caring for offspring and blending into the environment, may be effective for addressing a broad array of threats.”**

31

- **“In contrast, fight responses on the part of females may put themselves and their offspring in jeopardy, and flight behavior on the part of females may be compromised by pregnancy or the need to care for immature offspring. Thus, alternative behavioral responses are likely to have evolved in females.”**

32

- **"The protection of self and offspring is a complex and difficult task in many threatening circumstances, and those who made effective use of the social group would have been more successful against many threats than those who did not. This assumption leads to the prediction that females may selectively affiliate in response to stress, which maximizes the likelihood that multiple group members will protect both them and their offspring."**

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- **"Accordingly, we suggest that the female stress response of tending to offspring and affiliating with a social group is facilitated by the process of 'befriending,' which is the creation of networks of associations that provide resources and protection for the female and her offspring under conditions of stress."**

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***“Specifically, oxytocin and endogenous opioids mechanisms may be at the core of the tend-and-befriend response.”***

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- **“Female aggression is well documented. Our argument is not that female aggression fails to occur but that it is not mediated by the sympathetic arousal-testosterone links that appear to be implicated in fight responses for men. Extensive reviews of the human aggression literature suggest that males may not be inherently more aggressive than females, but that the patterns of aggression between males and females differ.”**

36

- **“Males are more likely to use physical aggression in struggles for power within a hierarchy or to defend territory against external enemies. Females reliably show less physical aggression than males but they display as much or more indirect aggression, that is, aggression in the form of gossip, rumor-spreading, and enlisting the cooperation of a third party in undermining an acquaintance.”**

37

- **“However, human females still show lower levels of verbal aggression than males, although this sex difference is smaller than that for physical aggression. Overall, female aggressive responses appear to be tied less to sympathetic arousal than male aggression and instead more cerebral in nature. For example, female aggressive behavior may be more moderated by social norms and learning and by cultural, situational, and individual differences.”**

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***“...female physical aggression appears to be confined to situations requiring defense, rather than to the broader array of threats that is found in males.”***

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- **“If fight behavior in response to stress is indeed inhibited in females, may there be a neuroendocrine basis for this inhibition? McCarthy alluded to such a mechanism in her animal studies of the behavioral effects of oxytocin and its modulation by estrogen. In particular, she argued that animals in the natural environment face a constant barrage of stress and a continuous stress response can have deleterious physiological effects.”**

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- **“Consequently, reactions that control stress responses have physiological advantages. Oxytocin release may be such a reaction. Oxytocin is a posterior pituitary hormone that is released to a broad array of stressors by both males and females. It is associated with parasympathetic (vagal) functioning, suggesting a counterregulatory role in fear responses to stress.”**

41

- **“...oxytocin has been found to enhance sedation and relaxation, reduce fearfulness, and decrease sympathetic activity, patterns of responses that are antithetical to the fight-or-flight response.”**

42

Why is the effect of oxytocin more pronounced in females compared to males?

- **"First, oxytocin release in response to stress appears to be greater in females than in males. Second, androgens have been shown to inhibit oxytocin release under conditions of stress. Third, the effects of oxytocin are strongly modulated by estrogen."**

43

- **"Oxytocin and endogenous opioids mechanisms may be at the core of the tending response. Evidence from a broad array of animal studies involving rats, prairie voles, monkeys, and sheep show that central administration of oxytocin reduces anxiety and has mildly sedative properties in both males and females."**

44

***“It may serve both to calm the female who is physiologically aroused by a stressor and also to promote affiliative behaviors, including maternal behavior toward offspring.”***

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- **“Emerging evidence suggests that oxytocin is associated with relaxation and interpersonal outcomes in nonlactating women as well. For example, in a sample of nulliparous women, Turner, Altemus, Enos, Cooper, and McGuinness found that oxytocin levels increased in response to relaxation massage and decreased in response to sad emotions. Women who reported fewer interpersonal problems of intrusiveness showed greater increases in oxytocin in response to these sources of stimulation.”**

46

- **“Data showed that maintaining oxytocin levels during sadness was associated with lower anxiety in close relationships, and high basal levels of oxytocin were associated with greater interpersonal distress. In an experimental study with older women, Taylor, Klein, Greendale, and Seeman found that higher levels of oxytocin were associated with reduced cortisol responses to stress and with faster HPA recovery following an acute stress laboratory challenge.”**

47

- **“With reference to humans, Carter suggested that oxytocin may be at the core of many forms of social attachment, including not only mother-infant attachments but also adult pair bonds and friendships.”**

48

## The reproductive cycle and oxytocin

- **“If the hypothesized neuroendocrine underpinnings of female stress responses are correct, then we might expect to see cyclical variation in these responses, as well as a degree of dependence on critical reproductive-related events in a woman’s life, including onset of puberty, pregnancy, lactation, and menopause.”**

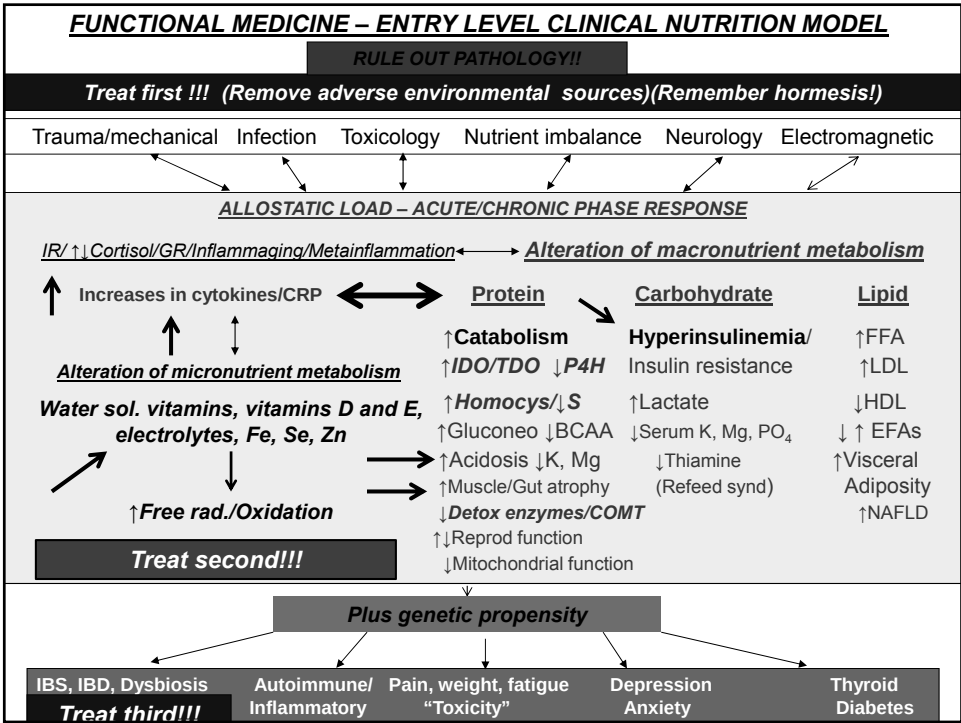
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- **“For example, if estrogen is involved in the modulation of oxytocin-related affiliative or maternal responses, the so-called tending-befriending pattern may be stronger during the late luteal phase of the cycle, as opposed to the follicular phase, and diminished in postmenopausal women.”**

50

- “Consistent with these suggestions, in rhesus monkeys, females are most social around the time of ovulation or when they are treated with estrogen, and oxytocin, in interaction with estrogen, has been suggested as the mechanism by which this sociability occurs.”

51



Is Companionship an Essential Nutrient? Part 1  
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***Thank you!!***

53