Protecting your brain from stress – Part 2

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Protecting Your Brain from Stress – Part 2

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More Lifestyle Modifications to Lessen the Impacts of Chronic Stress

Meditation. ***Mindfulness meditation*** should be offered to patients as a durable treatment that assists with stress management by improving emotional regulation. This particular type of meditation, "is premised on stabilizing attention, acknowledging discursive sensory events as 'momentary' and 'releasing' them without affective reaction" (p.751).[97] The benefits of mindfulness meditation can be experienced rather quickly even when it is practiced for short periods of time. Some examples from the published literature will be cited as proof of the quick benefits that can be ascribed to mindfulness meditation.

For example, a study demonstrated that just four sessions of mindfulness meditation (i.e., 20 minutes/session) over four consecutive days modulated areas of the brain responsible for state anxiety (i.e., the anterior cingulate cortex, anterior insula, and the PFC area known as the ventromedial PFC). The changes in this PFC area presumably reflected changes in cognitive reappraisal processes, and in down-regulating negative emotions, such as amygdala activity.[97]

In another study, 13 novice university students were given eight weeks of mindfulness meditation with daily practice at home in sessions lasting around 45 minutes.[98] Before and after, ratings of depression and anxiety demonstrated a significant reduction in depression scores after meditation training, and a significant reduction in trait anxiety but not in state anxiety scores following meditation training. Moreover, the significant reductions in depression scores were shown to reflect changes in the resting state functional connectivity of particular brain regions implicated in depression. In other words, meditation training uncoupled certain brain areas that tend to be coupled (i.e., hyperconnected) in major depression, and this was presumed to be the antidepressant effect attributed to mindfulness meditation.

With respect to amygdala activity, another study showed that short-term mindfulness meditation (i.e., 8 weeks) resulted in increased functional connectivity between the amygdala and the ventromedial PFC.[99] The results demonstrated that mindfulness meditation assisted with emotional regulation by reducing amygdala reactivity, and increasing the coupling or functional connectivity between the amygdala and PFC when challenged with affective stimuli. This positive benefit attributed to mindfulness meditation in this study was shown to happen over the short-term, as evidenced by modulating the connectivity between these brain structures. Overall, it appears that short-term mindfulness meditation can produce symptomatic reductions in anxiety and depressive symptoms by altering the way the brain operates and responds to emotional stimuli.

With respect to markers of physiological stress, mindfulness meditation, including other types of meditation, were shown in a systematic review and meta-analysis to decrease biomarkers of stress (i.e., cortisol, blood pressure, heart-rate, lipids and peripheral cytokine expression) in a range of populations.[100] When evaluated in aggregate, all meditation types reduced cortisol, C-reactive protein, blood pressure, heart rate, triglycerides, and tumor necrosis factor-alpha.

Mindfulness meditation was highlighted here because it is among the most popular types of meditation available. It has a rapidly evolving literature base supporting its efficacy as a durable treatment with therapeutic effects happening rather quickly with consistent daily practice (i.e., for as little as 20 minutes/day).

Sleep. Numerous research publications have repeatedly shown deleterious impacts on health when people suffer from chronic insomnia. Among the many factors implicated in chronic insomnia, stressful life events, personality patterns, and psychiatric diagnoses are more etiological in both the development and persistence of chronic insomnia.[101] In terms of stressful life events, insomniacs report less satisfying interpersonal relationships and poor self-concepts, which result in poor coping ability and problems with stress management. Insomniacs also have high levels of psychopathology as evidenced by high scores in depression, hysteria, and psychasthenia as measured by the Minnesota Multiphasic Personality Inventory. As a result, the personality traits of individuals with chronic insomnia

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include problems with the expression of anger, depressed mood, chronic anxiety, rumination, and with the inhibition of emotions. Having chronic insomnia and a psychiatric illness is also really common, and sometimes the presenting symptom of an undiagnosed psychiatric illness are sleep problems. In chronic insomnia, mood disorders dominate (i.e., dysthymic disorder, major depression disorder, bipolar disorder, and cyclothymic disorder), followed by anxiety disorders, and substance abuse disorders.

A possible mediator of chronic insomnia is that of ***high sleep reactivity***, which "is the degree to which a stressor (broadly defined) disrupts sleep," and "behaviourally, sleep reactivity is the degree to which individuals exhibit acute sleep-disruptive responses to stress" (p,3-4).[102] Among individuals with chronic insomnia, usually a major stressor happens at some point, and then an insomnia disorder mediated by high sleep reactivity develops shortly thereafter. It is probable then that many chronic insomniacs have the high sleep reactivity phenotype. Precisely what influences high sleep reactivity is evolving, but female gender, familial history of insomnia, genetics, and environmental stress all impact upon how an individual's sleep system reacts to stress. Moreover, the etiological links to high sleep reactivity include "disrupted cortical networks and dysregulation in the autonomic nervous system and hypothalamic-pituitary adrenal axis" (p.1).[102]

In terms of the brain, in a small pilot study hippocampal volumes were shown to be decreased among patients with chronic insomnia.[103] This was a significant finding since this area of the brain is involved in learning and memory processes. A larger study found hippocampal atrophy among chronic insomniacs, which was also associated with impaired cognitive function.[104] These findings were significant as more current research identified that even one night of sleep deprivation makes it difficult for the brain to clear beta-amyloid (i.e., known as the ***brain beta-amyloid burden***), which is a metabolic waste product that has clear correlations to the development of Alzheimer's disease.[105] The study hypothesized that the increased brain beta-amyloid burden in the hippocampus due to sleep disruptions might result in local neurotoxicity but without "necessarily resulting in marked plaque accumulation" (p.4486).[105]

Ensuring that sleep becomes restful and rejuvenating must therefore be a priority when working with chronically stressed patients. It is imperative then that good sleep is achieved. ***Good sleep*** "is characterized by subjective satisfaction, appropriate timing, adequate duration, high efficiency, and sustained alertness during waking hours" (p.12).[106] Achieving good sleep, therefore, depends on achieving with consistency the following targets: regularly waking up and falling asleep at around the same times (i.e., within an hour) each day; feeling satisfied from sleep; being alert/awake during the day after a night's sleep without any napping; being asleep during the night and not struggling to remain asleep especially between 2AM and 4AM; having less than 30-minutes of total awake time during sleep (i.e., which includes falling asleep and awakenings during the night); and having a sleep duration of around 7-9 hours each day.[106,107]

Helping patients to achieve good sleep depends on their adherence to proper sleep hygiene practices and ensuring that stimulus control is being followed. To learn more about sleep hygiene, see the following reference,[108] or the Sleep Foundation link: https://www.sleepfoundation.org/. For stimulus control, please refer to this article on the Somnology website: https://www.somnologymd.com/2015/05/stimulus-control-therapy/.

Patients with chronic insomnia are often prescribed sleep medications, which are needed in many cases when they cannot fall asleep and remain asleep with consistency. Inadequate sleep will add to the burden of allostatic load (AL) and allostatic overload (AO) and result in durable and adverse brain changes that are unlikely to be reversible with treatment. The most commonly prescribed sleep medications include specific benzodiazepines (i.e., estazolam, flurazepam, quazepam, temazepam and triazolam), which typically have half-lives of over eight hours (except for triazolam).[109] The problems with this class of medication are numerous and include "next-day (residual) fatigue, psychomotor and neuropsychological dysfunction" (p.2).[109] Additional problems involve dependence, withdrawal and rebound symptoms when they are abruptly

Table 5. NHPs that possess calming, sedating and hypnotic effects, and/or that facilitate improved sleep

Treatment	*Primary therapeutic effects*	*Suggested Dose (30-60 minutes prior to bedtime)*	*References*
Broad-Spectrum Micronutrients	Non-sedating anxiolytic that lowers central nervous system hyperarousal and improves an individual's ability to process emotional stress	3 pills twice daily	114
Lavender extract	Non-sedating anxiolytic that produces a calming effect, and improves various sleep parameters	80 mg	115-117
Magnesium bisglycinate	Improves various sleep parameters, and assists with periodic limb movements of sleep and restless leg syndrome	400-600 mg	118,119
Melatonin (timed- or sustained-release formulation)	Sedating, and improves various sleep parameters	2-5 mg	120,121
Passion Flower extract (low-dose extracts often standardized to 4% isovitexin)	Sedating and hypnotic effects, and improves various sleep parameters	425-900 mg or low doses between 60-80 mg (i.e., when standardized)	122-124
Valerian root extract (0.8% valerenic acids)	Sedating and hypnotic effects, and improves various sleep parameters	300-600 mg	112,113,123

discontinued, and the potential for abuse especially among vulnerable patients with prior alcoholism and drug abuse.[109]

There is another class of sleep medication known as the non-benzodiazepines ("but also benzodiazepine receptor agonists") that "selectively attach to the benzodiazepine recognition site on the GABA-A receptor" at the level of the alpha-1, or alpha-2, and/or alpha-3 subtypes (pp.2-3).[109] Sleep medications in this class, known as Z-drugs, include Zaleplon, Zolpidem, and Eszoplicone. Even though they have shorter half-lives compared to benzodiazepines (i.e., 8 hours or less) they still have a spectrum of adverse effects that are similar to benzodiazepines and include "sedation, anterograde amnesia, complex sleep-related behaviors, and impaired balance with subsequent falls" (p.3).[109]

Given how serious these adverse effects are, it is preferable to recommend specific natural health products (NHPs) (Table 5) as first-line treatments since they do not possess similar dependence, withdrawal, and rebound symptoms, and do not appear to be associated with abuse. Among all the NHPs noted, there is data demonstrating that melatonin may assist with benzodiazepine withdrawal[110] though this is by no means conclusive.[111] There is also data demonstrating that valerian extract may help with benzodiazepine withdrawal,[112] but there are equivocal studies that raise concerns about the overall efficacy of valerian extract as an effective sleep treatment.[113]

Substance abuse (e.g., alcohol, cannabis, and cocaine). Chronic stress is a well-recognized risk factor in the use of substances and addiction vulnerability.[125] The etiology is very complex, but early life stress, adverse childhood experiences, and accumulated adversities alter allostasis and associated mechanisms, and are believed to play a significant role in the genesis of addiction. The effects of excessive and repeated substance use result in changes mediated by central catecholamines, particularly norepinephrine and dopamine, both being key players in modulating motivational pathways within the brain. Chronic stress and abuse of substances operate in a feedforward manner to activate the mesolimbic system and beget feelings of reward. This also impairs prefrontal brain circuits, disinhibits executive functioning, activates the amygdala and other brain regions, and causes problems with impulse control, compulsive behaviors, and delaying gratification.

Given this reality, I do not believe it is possible for patients to manage chronic stress and be emotionally regulated if they choose to continue abusing substances. Though harm reduction is a viable approach to managing substance abuse,[126] I have not had many patients improve their ability to manage chronic stress (and all the accompanying problems) with continued but reduced substance use. The goal should be to eliminate substance use so patients can learn to live and manage their complex lives without feeling the need to consistently alter their mental state through the compulsive use of substances.

Psychotherapy and/or Social Support to Lessen the Impacts of Chronic Stress

Promoting or recommending psychotherapy is another important treatment that reduces the impact of chronic stress and has therapeutic effects that promote positive brain changes. As Nobel laureate, Dr. Eric R. Kandel, MD, noted in his seminal paper "Psychotherapy and the Single Synapse":

> When [*capitalization added*] I speak with someone and he or she listens to me, we not only make eye contact and voice contact but the action of the neural machinery in his or her brain, and vice versa. Indeed, I would argue that it is only insofar as our words produce changes in each other's brains that psychotherapeutic interventions produce changes in patients' minds. From this perspective, the biologic and psychologic approaches are joined (p.1037).[127.]

Stress

Psychotherapy has been articulated as an ***epigenetic drug*** by inducing "changes in brain circuits that can enhance the efficiency of information processing in malfunctioning neurons to improve symptoms in psychiatric disorders, just like drugs" (p.249).[9] Published studies have shown, for example, that cognitive behavioral therapy for phobias decreases activity in the limbic and paralimbic areas.[128] In depression, psychotherapy was shown to increase and decrease prefrontal metabolism.[129] The effects of psychotherapy implicate more top down effects compared to psychiatric medication that produce more bottom-up effects.

A systematic review showed an increase in BDNF levels among depressed patients given treatment with psychotherapy and psychiatric medication.[130] The same systematic review also demonstrated a rise in BDNF levels among patients with post-traumatic stress disorder (PTSD) that were given both psychotherapy and physical activity, and a rise in BDNF levels among psychotherapy responders diagnosed with bulimia, borderline, and insomnia.[130] A study evaluated the effects on the brain after 15 months of long-term psychodynamic psychotherapy.[131] Compared to the control patients, the patients that received long-term psychotherapy showed marked reductions in depressive symptoms, and more activity in the medial prefrontal cortex (PFC). The latter therapeutic effect is important to note since this particular area of the PFC is associated with voluntary emotional regulation.[131] Based on the data presented

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above, psychotherapy has established therapeutic effects that alter brain areas implicated in emotional regulation.

In terms of social support, it would seem reasonable to conclude that similar therapeutic changes would result when people are more socially engaged in meaningful ways. One such example is that of the Experience Corps©--a high-intensity program that combines education, physical activity, and social engagement (as well as other factors not easily quantifiable like meaning and purpose in life) – that trains elderly volunteers to be teachers' assistants for younger children in neighborhood schools focusing on reading achievement, library support, and classroom behavior.[132,133] Participation in the program resulted in improvements in both physical and mental health, but also improved executive functioning in the PFC among the elderly volunteers having an elevated risk for cognitive impairment.

The brain also expects social relationships to happen, as described in an extensive review paper by Holt-Lunstad on why social relationships are important.[134] A brief section of the review discussed ***social baseline theory***, which posits that the brain needs to have social relationships that include common goals, interdependence, and attention. In fact, when this expectation is not met, the brain will respond as though there are scarce resources, resulting in increased cognitive and physiological effort, often accompanied by acute and chronic distress. All of this presupposes that the brain has been designed for social relationships as its normal state of being. So when socialization has been limited for a variety of reasons, such as social withdrawal from being depressed or alienation due to neighborhood bullying, the individual suffers both emotionally and neurologically from wounds emanating from the outside in, and from the inside out. It is imperative then that the practicing clinician encourage social integration – for example, weekly recreational sports, book clubs, communal organic gardening – as a central goal when helping all patients to assuage the AL and/or AO from being chronically stressed.

An interesting and more widespread example of fostering social integration (as noted by Holt-Lunstad[134]) includes the Blue Zones Project (https://www.bluezonesproject.com/), which supports communities by promoting the same principles as described in the book (i.e., *The Blue Zones Solution* by Dan Buettner). Essentially, the Blue Zones Project advocates for nine factors described in the Blue Zones Solution with the aim to "transform environments to drive physical, mental, social, and professional well-being." Three of the nine factors are social ones (i.e., family first, right tribe, and belong). Multiple cities across the United States are currently engaged in this project.

Additional Strategies to Lessen the Impacts of Chronic Stress

Having practiced naturopathic medicine for over 20 years, and more recently as a psychotherapist, additional strategies need to be embraced by chronically stressed patients if they want durable improvements over time. I am certain that none of the strategies described below are my own original ideas, for I have learned them from clinical experience, training, and regular supervision. When many of these strategies are adhered to (including those mentioned previously), patients find themselves feeling better while gaining increased capacities to manage their chronic stress and complex lives.

Accept and learn to endure emotional discomforts. All chronically stressed patients need to learn that fighting their difficult emotions seldom works. It is actually better for patients to feel emotions without resistance. Tension is about resistance; relaxation is about acceptance and letting go. Working on acceptance is therefore essential, so when patients feel emotionally overwhelmed, they become more adept at coping with their difficult emotions. The more they resist, the more tension develops. Acceptance assists with living in the present, and not in the future or the past.

Additionally, for patients to improve means that they will have to accept what is happening (as described above) and allow the uncomfortable feelings to exist within. Emotions, though intense and sometimes powerful (and sometimes even destructive), are usually impermanent and will lessen. Patients must accept that they will not be able to go through life without experiencing regular discomforts, including periodic massive spikes in the levels of anxiety and depression, as well as other emotions. Setbacks are part of the process, and patients need to know that this will happen even when treatments have been consistently effective. As patients improve and become more emotionally tolerant, setbacks usually become less intense and less frequent. Patients can gain wisdom by understanding that their emotional maturity depends on their capacity to endure difficult experiences. The obvious caveat being, that if things do become too intolerable and/or extreme, they will likely need to go to the nearest emergency department for an evaluation and treatment.

Seek out inspiration through the success stories of other people. A wonderful way for patients to become more hopeful is by listening to podcasts or watching videos about people that have overcome enormous obstacles only to find life worth living again. Hope is something that all patients can access by listening or watching incredible stories. Just by doing some searching on the internet, patients should be able to find great stories of human triumph amidst incredible struggles.

Read (or listen) and learn. This is called bibliotherapy whether through reading or audio books. Patients must commit to self-help or other types of books that facilitate personal growth and/or increased psychological flexibility. They need to have sustainable methods of help in between office visits. Bibliotherapy is a tremendous way in which to develop additional skills of emotional regulation and chronic stress management.

Make decisions. It is unbelievable how often chronically stressed patients willingly refrain from rendering important decisions that, in most situations, would lessen their stress levels and heightened emotionality. I have personally seen patients stew in their own decisional paralysis for months and even years before taking concrete action on something that would invariably improve their emotional and physical well-being. Indecision keeps the brain locked in uncertainty and yields too much bottom-up control by the amygdala and other limbic structures. All decisions exclude other options, or as psychiatrist Dr. Irvin D. Yalom, MD, noted, "alternatives exclude."[135] Patients need to commit to making actual decisions

to move their difficult lives forward; otherwise, they will not find the type of relief, contentment, and emotional freedom that is possible.

Accept responsibility. With almost predictable consistency, a large percentage of chronically stressed patients tell me that their misery is being caused because of someone else, or because of something else. And only if that someone else (or something else) would change, so too would their misery. Of course, I am well aware that there are malicious and horrible people in the world that do awful things to other people, such as stalking, abuse, extortion, oppression, etc. This is not what I am referring to when describing the importance of accepting responsibility. I sincerely believe that all patients must take deliberate personal action to change their circumstances for the better. Not accepting personal responsibility is just a version of learned helplessness, which denotes a self-imposed state of inertia even when viable options exist to significantly improve things. Patients need to mobilize themselves, sometimes matter over mind, to literally shift from their state of immobility, and overcome the stasis that has been ruining their lives.

No chemical treatment for mental health – whether naturopathic or otherwise – will result in a cure. Effective treatment will lessen the intensity of emotional overwhelm but cannot eliminate it. To additionally cope, all patients need to develop their own strategies of living that includes lots of self-care and purposeful work that confronts the very situations that cause anxiety and/or depression. Chemical treatment will not alter behavior though it may assist in facilitating important behavioral change. Some patients, for example, may experience anxiety when in social situations. Other patients, for instance, may feel guilty and bad about themselves and then socially isolate rather than spending time with their family and friends due to depression. Patients need to literally confront and immerse themselves in emotionally challenging situations (rather than avoid them) and learn that this type of committed approach is an essential part of their recovery and self-development.

Regularly do things that provide fun outlets. Having fun appears to be an underrated treatment or activity. Patients need to be encouraged to have fun so as to give their brains and minds a break. Sitting in front of a computer all day will not help, nor will isolation and the avoidance of real human connection. Patients will feel better by intentionally including fun activities into their daily routines.

End toxic relationships. Far too often therapists and other health professionals tell their patients to work harder and remain in their toxic relationships that have been horrible for many years. In fact, most patients have worked pretty hard at trying to make these brutal relationships work long before they have sought help. I take a different perspective. Plus, life is too short! Why try harder if misery has been a constant and omnipresent companion? Calling it quits can be liberating, health promoting, and often necessary for a person's survival. That is why I am a strong believer that most patients in toxic relationships must find a way to emancipate themselves; otherwise, chronic stress will continue to wreak havoc on both their minds and bodies.

Don't compare yourself to other people. I could easily find a person that is far more intelligent than I, far more attractive, has more money, and is way more capable in all the domains of life. Why should I do that to myself? It will only bring me down, resulting in dysphoria, anxiety, stress, and feelings of worthlessness. A much better strategy that I follow is to compare myself to who I was one day before. That way, I attain a realistic baseline and goals can be achieved. Heck, yesterday, I consumed too much processed meat (I happen to like pepperoni sticks), which is a weakness of mine. Today, I can commit to eating better and to not have any pepperoni sticks. This is a completely achievable strategy and works much better than comparing myself to other people. I often recommend that patients jot down 1-2 items to work on when comparing themselves to the day before. They often can reach their daily goals and end up feeling much better about themselves in the process.

Conclusion

There is nothing more difficult than trying to find regulation amidst the constant challenges and chaos of life. The net effect is that chronic stress will insert itself in some manner or another while life continually moves forward in time. One day you are 28 years old and feeling on top of the world, and then decades later you can't believe that you are now 53 years old and suffering from relational loss and estrangement, chronic depression, prostate cancer, and metabolic syndrome. No one is spared. That is why numerous integrative treatments were discussed as viable options that target, regulate, and potentially optimize allostatic mechanisms. In promoting treatments that impact brain and body health, clinicians have a powerful role in materializing this information when working with their patients. Integrative approaches, such as those mentioned in this article, should serve as models of the kinds of interventions that can realistically and dramatically affect the course of chronic stress and prevalent medical diseases via allostatic brain mechanisms.

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At the Canadian College of Naturopathic Medicine, Dr. Prousky's primary responsibility is the delivery of safe and effective naturopathic medical care in his role as the chief naturopathic medical officer. He was the first naturopathic doctor to receive the "Orthomolecular Doctor of the Year" award in 2010. In 2017 he was also the first naturopathic doctor to be recognized for his longstanding commitment to mental health by being inducted into the "Orthomolecular Hall of Fame." Dr. Prousky is the author of several texts, such as *Textbook of Integrative Clinical Nutrition*, and *Anxiety: Orthomolecular Diagnosis and Treatment.*