

# Cryogenics: A Biological Intervention for Treating Complex PTSD?

*A Hypothesis for Patients and Experts to Consider*

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Recently I read an article about cryogenics in the treatment of bulging disks, muscle fatigue, and its benefits to athletes (Paturel, 2018). The author detailed how cryogenics is becoming a “biohack.” As I was reading the in-flight magazine during a move to DC to open a new practice there (after being in practice for 13 years in Florida), I thought of the many PTSD patients I have treated (and will continue to treat). My thoughts moved specifically to some few patients that have been very troubling to an expert in his field. The article didn’t speak of psychological benefits to cryogenics, but it increasingly seemed that this “biohack” could potentially become a ‘bio-psycho-hack’. It was a non-academic, non-peer reviewed, non-journal submitted, and non-psychologically based article that discussed the key components of cryogenics and what it is that seems to create its effectiveness. The author’s reference to various MD’s adds to the credibility of cryo as a biohack. Cryogenics just might be a hack in treating complex, chronic, and long-term PTSD clients.

Many of us working in the social sciences, and in the treatment of PTSD, have cases where success is seemingly not in reach, or what is accomplished leaves much to be desired for both provider and patient. Cryogenics is a way of intentionally inducing a physiological fight/flight blood flow process (during a safe event) that I think, may be the next tool to winning the battle against PTSD; it is certainly worth investigating in the chronic cases. Cryogenics, I suspect, is the *bio-psycho-hack* for PTSD, building on the concept of a “biohack,” as Paturel calls it in her article.

Cryogenics is believed to help with biological injuries, not psychological ones; I am admittedly suggesting a controversial intervention idea, while extrapolating information from the physical sciences and applying it to psychological sciences. I argue here, that in the understanding of PTSD and in the basic understanding of cryogenics, the two specific biological and psychological sciences, particularly as a physical process, are inseparable. I acknowledge too, that any extrapolation of data or information from one kind of field, carried over to another, is in and of itself invalid, particularly as far as research, statistics, and data are analyzed, interpreted, and

utilized. The implications are worth discussing, regardless, as I attempt to articulate here.

Paturel's article breaks down the cryo process in such a way that the science is easy to digest. I will attempt to do similarly with the PTSD process. Then I will hope to apply a crossover consideration in how these two, PTSD and Cryo, are bedfellows in the making.

Like many non-traditional interventions, cryogenics is not without criticism or limitation in the biological fields. The same can be said about PTSD treatments that cover the gamut across disciplines, theories, and research. Cryogenics may not fully even be a "hard" science, although not everyone agrees (The Cryogenics Society of America, 2018). Cryo has been effective in treating damage to bones, muscles and even brain injuries, according to many, anecdotally and collectively, for years.

Whole body cryogenics, a freezing of the skin using nitrogen gas, causes blood flow in the extremities to lessen, while in other areas of the body blood flow intensifies. As the freezing occurs (not possible in nearly the same way with ice, by the way), blood travels increasingly around the heart, lungs, the brain, and to other vital organs necessary to life. As the treatment continues, the body warms, and during warming the blood moves back to the extremities with a curative effect (at least in the physical injuries as Paturel reports it).

The blood leaving the extremities rushing to the organs during freezing and then returning while thawing - having curative impacts all along the way - sounds very protective, and evolutionarily beneficial. It is during the freezing blood flow cycle in cryogenics that Paturel identifies it as that which would occur in fight and flight. While I know little about cryogenics, I can speak a good bit about PTSD. It appears that there is something similar occurring in both cryogenics and PTSD. The fight/flight process is key to both. And, fight or flight as an extreme process, is always protective, even as side effects result. It would appear the negative side effects of trauma during fight or flight (hormone active), may be one part of a curative side effect in the freezing fight/flight stages of cryogenics (blood active). The blood active aspect to PTSD is seldom discussed as a part of fight / flight, as the emphasis in the literature is on damaging stress hormones; my supposition is that blood flow as fight/flight occurs in cryo *and* PTSD. This is what I propose may be the crossover effect, moving from trauma to cure, in cryo for PTSD.

The difference between the cryo based fight/flight process and the trauma based fight/flight process is the voluntary (cryo) and involuntary (trauma) nature by which these take place as well as hormone production in trauma that is likely less or maybe

even absent in cryo. Too, the intention (and/or lack of intention) in the process of cryo and PTSD, and a curative versus invasive paradigm are entirely dissimilar. It is in the physiological benefits of cryo induced fight/flight, an intentional and safe treatment, that the ‘bio-psycho-hack,’ as I’m suggesting, might be found in PTSD cases and their treatment.

The biological application of cryo for PTSD cases may seem odd at first, however one of the evidenced based interventions for PTSD is re-exposure therapies, where controlled exposure to trauma is key (“Prolonged exposure therapy...,” n.d; “Exposure therapy...,” 2003). It is the psychological replay and recall of the fight and flight system, in behavioral health, at work in repetition that seems to aid in PTSD resolution, using the re-exposure approach. Some literature and research also points out that re-exposure therapies may not be necessary in all PTSD interventions (Eftekhari, Stines & Zoellner, 2006). Eftekhari, Stines & Zoellner (2006) say that the literature on cognitive behavioral interventions and other combined therapies have mixed results where an SSRI with talk therapies appears to be more effective in PTSD treatment. Here too the researchers point out a “stepped care approach” in developing PTSD treatments, for chronic PTSD, particularly as many variables appear to be at play when re-exposure does work and when it does not work (noteworthy to mention, for many PE does work). Other literature indicates re-exposure interventions may actually be harmful.

This variability in the literature regarding PTSD treatment and treatment options, adds to my hypothesis, that a completely non-trauma based intervention, a bio-psycho-hack such as cryogenics, *could be* credible with or without any traditional talk therapy methods, and particularly with the more complex cases.

Fight and flight occurs in both trauma and cryogenics. Under one scenario, trauma, fight and flight is environmentally, involuntarily, due to safety violations, induced. Under the other scenario, cryogenics, fight and flight is biologically, voluntarily and safely induced. Both fight/flight inductions are functional then, in protecting the body, and sadly in harming it (freezing is harmful indeed to a living body, and trauma is harmful indeed to a psyche and to a brain).

The induction of fight / flight is a cross over consideration (moving from impact to curatives), where a shift from negative effects in trauma to positive effects in cryo might just be rooted in intentional induction, and then thawing! To understand better my suggestion of a cross over consideration, I’d like to look a bit more at how PTSD emerges and how it “works.”

Trauma alters the brain and the body through many intense processes that occur when life-threatening events are underway. In PTSD, dissociation, loss of memory, and a myriad of other trauma responses, can also be life-saving during a traumatic event. The brain and body are affected somewhat differently for different people, varied by developmental stages and by types of trauma. Sexual trauma may affect the pleasure center more significantly where physical violence might affect the pain center more so. Younger brains may be more affected than an older brains based upon pathway development and plasticity. Arguably, the older less pliable brain, while affected too by trauma, has a greater number of established pathways, where more resilience *may* appear. In younger brains, learning *may* be hindered; in older brains, memory and focus can be hindered. Either way, both young and old brains are impacted by trauma, and the most common impact, regardless of development and types of trauma, is that which occurs in the fight/flight state.

The hypothalamus-pituitary-adrenaline (HPA) process is one factor in what potentially injures (or alters) the brain during a traumatic event; here the hippocampus (the memory center) is splashed with the fight/flight hormones (and likely the blood flow process is oriented to the location of the trauma too – but this is only an ‘educated guess). As the overload of adrenaline, cortisol, and epinephrine, (what I like to think of as the ACE effect) hits the brain and body trauma symptoms are activated. The impact on short-term, tertiary, and long-term memory (a potential consideration in looking at the imprinting of trauma) is altered. The HPA trauma induced “splash” if you will, impacts things such as memory - with data loss and/or data enhancement taking place.

The cross over? *It is possible that the same blood flow patterns that take place with cryogenics also take place in acute stress/PTSD inductions.* However, because cryo is intentionally induced the safe use of cryo, likely will remove the trauma stress hormone (ACE) effect – even as the blood flow cycle continues. What’s left then, in the use of cryo – is the restorative and regenerative process when the body is warmed, in the latter stages of cryogenics. Here is where a curative outcome with more difficult PTSD cases is postulated.

So here’s a few questions to consider:

What if the blood flow induction of PTSD, along with stress hormone induction, were both applied to PTSD patient psychoed and neuro-biological information dissemination? What if, the induction of blood flow fight/flight, with PTSD patients, in the absence of fight/flight stress hormone production were curative? Can this biological fight/flight impactful process, as naturally as it occurs in the midst of horrible events, be reversed or improved – by its non-traumatic induction using

cryogenics? As a bio-psycho-hack, the jury is still out. In a nutshell that's the question I'd like to answer and one of the goals in generating this summary.

My suggestion is that if the biological alteration of brain occurs in trauma, then the biological alteration of brain can also occur in other induced states, like cryogenics. Similar to what experts and evidenced based practice shows in re-exposure therapies, inducing a fight/flight response on purpose – and where in cryo the blood flow induction is activated (without the ACE production in trauma) - recovery benefits may potentially be realized for PTSD patients.

An ideal PTSD patient must be considered for an experiment of this kind. I suggest that the ideal candidate might be someone who is still suffering PTSD symptoms after unsuccessful interventions have been applied. The ideal patient, particularly very early in an experiment of this kind, would be well versed in the emotive, cognitive, rational, experiential, psychoeducational, triggering/dissociation, emotional presence, self-care, relational, re-exposure and pharmacological methods, without success. Being 'well versed' means that the patient is likely able to see the connection and differences between unintentional trauma induced states and intentional ones – such that trust and control are not prohibitive. Additionally, the 'well versed' otherwise unsuccessfully treated PTSD patient, would be able to see the crossover of blood flow cycles in trauma, blood flow cycles in cryo, with the curative aspects to both, knowing that the ACE impact would not occur in cryo. The patient also collaboratively (with cryo and mental health experts) controls and trusts the intervention as non-invasive and voluntary; here the psychological open mindedness serves to free up the biological inquiry, applying cryogenics to PTSD – as an experimental intervention.

The patient would then enter the cryogenics chamber to purposefully have their entire body jolted into fight / flight, via freezing (what Paturel describes as cool air flowing in minutes, causing freezing less than a millimeter deep into the skin). The patient's body is willingly and purposefully being induced to perform its extreme protective capacities (blood leaving the extremities, moving to coat/protect vital organs - including the brain, without the ACE effect). As the fight/flight of an extreme proportion occurs in minutes, the patient is experiencing ONLY biological fight/flight processes in blood flow, not in adrenaline, cortisol and epinephrine productions. Then, almost just as quickly, the next phase of cryogenics is the warming up phase. And again, within a few minutes of leaving the cryo chamber, the blood moves back into the extremities - where in the TBI/Muscle/Bone processes, it is said to create a regeneration process with curative outcomes.

The freezing process mimics trauma, yet ACE is not likely to be evident. The warming process mimics healing. The mimics, in these regards, are literal, however.

The psychological parallels are that the body process is understood in trauma symptom formation; similarly the body process in healing could/would be explainable in cryogenics.

The idea here is that just as it serves to be a bio hack in muscles, bones, and TBI's, cryogenics could be similarly a hack in PTSD treatment. But, because mental health intrinsically is a psychological process, the psychological must be built into any cryogenics approach customized to PTSD. Too, this kind of an intervention for PTSD treatment, would more affirmative since the cryo emphasis is on the biological process, the naturally occurring curative one – letting the body do what it does (again without the ACE effect).

Such an experiment would require a well thought out and comprehensive literature review involving trauma, PTSD onset, neuro-biological processes in normality and in negative impact, with a decent amount of reference material explaining the biological process in the cryogenics approach.

Another key to formalizing cryo as a viable and evidenced-based approach to treating PTSD, is that such work would require the collaboration and cooperation of at least three professional levels of expertise in treatment trials: the master level professional, the clinical psychologist (a PhD or PsyD) and the psychiatrist (an MD). The cryogenics expert, of course, must be a part of the interventionist team.

The setting where such experiments would occur would need consideration too. A chiropractor office, a massage therapist office, and maybe even a sports related injury clinic may have and already use cryogenics equipment. The question is, since these settings are often more oriented to the decorum fitting of hospitals, would/should the cryogenics equipment be in a more aesthetically designed mental health practice setting? Would these other fields and their facilities be fitting for PTSD clients coming from the mental health sector? The logistics for a cryo-ptsd-bio-psycho-hack would necessitate some planning, to reduce the stress response as much as possible.

Along with the experiment there would be need to be some protocol of the cryo based interventions. For a control, a non-interventions/failed interventions group may be sufficient, especially since the formerly failed interventions are criteria for 'an ideal candidate.' Assuming it were acceptable to exclude certain PTSD patients from the cryogenics intervention, during an experiment, this too might be a consideration. My argument is that withholding the trial, to simply establish a 'control group' is potentially unethical, particularly if there is little to no risk in undergoing the brief freeze and thaw cycles involved with cryogenics and given that other interventions for the PTSD have already failed.

Am I relying a bit too heavily on the possibility of a placebo effect? Is there some other explanation that is more complex in the very difficult to treat cases of PTSD, such as psychosomatic factors? Yes it the answer to both questions. However, in regards to the placebo effect, what's to say all of those clients who report they are doing better are not reporting a placebo? Conversely, it could also be that the client is not reporting "better" due to a nocebo affect (Stromberg, 2012). Besides, therapists have an interest in the illnesses of clients and the bias toward treatment needs is likely an implicit one for the profession, which *could* serve to maintain ongoing symptomology, and collusion. Dr. Joel Paris writes, in the early pages of his book, *The Intelligent Clinician's Guide to the DSM5*, of psychiatric biases in developing DSM criteria, where the MD's who prescribe and benefit, are the same professionals who make up the stakeholder groups formulating what indicators make up diagnoses' (2013). In the context of implicit biases, these are generally hard to change, or hard to validly test by some reports (White, 2017) and by others it is measureable and observable in brain scans (Luskin, 2016). In the psychosomatic paradigm, increasingly there is biological science indicating that activity in the brain is unique to psychosomaticism (where it occurs in specific areas of brain, unlike faking and unlike illnesses such as epilepsy; O'Sullivan, 2017). O'Sullivan, a neurologist from the UK, also suggests that neurons are potentially misfiring impacting nerve endings which create the psychosomatic symptoms, a process that may be related to what she discusses as having "no cure for unhappiness" (2017).

Another complexity in treating long-term PTSD cases is the issue of co-morbidity and variable diagnostics. Many PTSD clients are misdiagnosed a number of times before the PTSD label is even realized. It is not uncommon for the PTSD client to also be dealing with anxiety (PTSD was once an anxiety related disorder in the DSM-IV-TR), maladaptive stress responses (PTSD is, in the DSM-5 a stress related disorder), major depression (here TMS is showing great promise), addiction, eating disorders and a number of other diagnoses'. In the complex trajectory of PTSD care and referrals, diagnosis is often clouded by the implicit bias of the treating provider (the area of specialty is often the primary diagnosis, allowing secondary labels to be subsequently treated); this could in and of itself elongate treatment outcomes. Diagnostics, particularly those done without psychometric testing involving a clinical psychologist, is a risky business, even as master level clinicians are able to make formal diagnoses'.

Psychosomatic considerations, the placebo and nocebo effects, co-morbidity, and bias, are potential suspects of doubt to any experiment, and to any past or future interventions. As the literature continues to emerge, the biological brain is showing physiological evidence for psychological symptoms and hopefully soon enough, cures. All of these factors (placebo, nocebo, psychosomatics, bias), could/would be

expected at some level to play a role in any experimental outcomes where cryogenics are assessed in curative possibilities for PTSD treatment. Here is where possibly, multi-variate analysis may be needed for an experiment of this kind.

Are there populations who could be potentially harmed or triggered in a cryogenics PTSD experiment? Absolutely. Cryogenics would be a difficult proposition for anyone who experienced trauma where freezing dynamics were a factor and where being restrained in very small spaces, was a factor. However, even those whose trauma included freezing and imprisonment, these trigger-based symptoms may well long be resolved with the ‘ideal candidate,’ by the time a cryogenic approach/experiment were deemed appropriate.

Summary:

If traditional PTSD treatments fail, to tell a patient that biologically they've been permanently damaged by their trauma (often after years and years of very costly multi-modal multi-paradigm variations and therapies) while NOT having a biological corrective tool in the handbag of tricks to heal - seems misguided. And while cryogenics would be very experimental if used in the psychological realm, for those who have not benefitted from more traditional and non-traditional therapies – isn't such an experiment worth considering?

Will this work? Who knows. What it would require is a set of patients willing to undergo experimental cryogenics, justified as reasonably qualified to take on such a task and it would require the collaboration of a multi-disciplinary team, from talk therapy, the testing and prescribing experts, and facilities flexible enough to use cryo for psychological options. Data gathering would be key as well.

If cryogenics were successful in the more complex PTSD cases, where non-traditional and experimental interventions are most realistically justified, cryo may be useful in treating PTSD at any number of stages as patients enter talk and medication management markets. Further, the implications in treating other stress related disorders cannot be overlooked, if cryogenics for PTSD shows promise.

As of this writing, there does not appear to be any literature discussing cryogenics in the treatment of psychological disorders, and specifically PTSD. My guess is that this discussion is not in the literature, as of yet, because many mental health experts are not trained sufficiently in the biological sciences, the brain structure processes – and that is especially true for many of the masters level mental health experts. Time will likely force this educational deficient trend to change, when adding more neurologically based coursework will be competitively necessary.

In treating PTSD, from behavioral, to cognitive, to cognitive/behavioral, to emotive, to hypnosis, psychoanalytic, stage theories, it appears there is a great deal more to be learned about how the mind works in both normal and abnormal scenarios. The psychological paradigm, the neurobiological factors, and curative bio-only factors, along with those seemingly impossible to treat PTSD cases, may demand a dramatic procedure, in helping long-term PTSD clients potentially heal. Out of treatment biases, treatment goals, and the injuries clients report, these each bring to the forefront the biological processes of the brain, as that which must increasingly be factored into the psychological *and* physiological healing of it.

Cryogenics just might be the next real solution in getting there.

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