



## Bruno “Bytes”

January, 2018

### Bits and Tidbits from Richard L. Bruno, HD., PhD.

from the Post-Polio Coffee House

Available through a “link” from Dr. Bruno’s website: [www.postpolioinfo.com](http://www.postpolioinfo.com)  
(or) directly through <http://www.papolionetwork.org/bruno-bytes.html>

#### Sleep – Is it Necessary? (1/5/2018)

Dr. Bruno’s Original Post: Sleep is GOOD !

#### **People Who Sleep Less Than 8 Hours a Night are More Likely to Suffer From Depression, Anxiety**

Article ID: 687496

Released: 4-Jan-2018 1:55 PM EST

Source Newsroom: Binghamton University, State University of New York

Newswise — BINGHAMTON, NY- Sleeping less than the recommended eight hours a night is associated with intrusive, repetitive thoughts like those seen in anxiety or depression, according to new research from Binghamton University, State University of New York.

Binghamton University Professor of Psychology Meredith Coles and former graduate student Jacob Nota assessed the timing and duration of sleep in individuals with moderate to high levels of repetitive negative thoughts (e.g., worry and rumination). The research participants were exposed to different pictures intended to trigger an emotional response, and researchers tracked their attention through their eye movements. The researchers discovered that regular sleep disruptions are associated with difficulty in shifting one’s attention away from negative information. This may mean that inadequate sleep is part of what makes negative intrusive thoughts stick around and interfere with people’s lives.

“We found that people in this study have some tendencies to have thoughts get stuck in their heads, and their elevated negative thinking makes it difficult for them to disengage with the negative stimuli that we exposed them to,” said Coles. “While other people may be able to receive negative information and move on, the participants had trouble ignoring it.” These negative thoughts are believed to leave people vulnerable to different types of psychological disorders, such as anxiety or depression, said Coles.

“We realized over time that this might be important — this repetitive negative thinking is relevant to several different disorders like anxiety, depression and many other things,” said Coles. “This is novel in that we’re exploring the overlap between sleep disruptions and the way they affect these basic processes that help in ignoring those obsessive negative thoughts.” The researchers are further exploring this discovery, evaluating how the timing and duration of sleep may also contribute to the development or maintenance of psychological disorders. If their theories are correct, their research could potentially allow psychologists to treat anxiety and depression by shifting patients’ sleep cycles to a healthier time or making it more likely a patient will sleep when they get in bed.

The paper, “Shorter sleep duration and longer sleep onset latency are related to difficulty disengaging attention from negative emotional images in individuals with elevated trans diagnostic repetitive negative thinking” was published in ScienceDirect.

<https://www.sciencedirect.com/science/article/pii/S0005791617300629#!>

Full article containing video - <http://www.newswise.com/articles/view/687496/?sc=mwhn>

#### Caution. Supplements – Do they Help? (1/9/2018)

Dr. Bruno’s Original Post: Here’s another “caution” about taking supplements.

This time, Magnesium.

#### **Does Magnesium Help You Sleep?**

From the NY Times: Ask Well

By Roni Caryn Rabin JAN. 5, 2018

Question. Does magnesium help you sleep?

Answer. Studies have found a link between low levels of magnesium, an essential mineral that plays a crucial role in a wide range of bodily processes, and sleep disorders. But if you are concerned you aren’t getting enough magnesium, changing your diet may be a better



option than taking a supplement, as “there is really sparse evidence that taking super-therapeutic doses of magnesium will give you a benefit,” said Dr. Raj Dasgupta, a professor of pulmonary and sleep medicine at the University of Southern California.

The mineral is widely available in both plant and animal-based foods, and the kidneys limit urinary excretion of magnesium, so deficiencies are rare in healthy people. Leafy green vegetables, nuts, legumes and whole grains are good sources of magnesium; fish, chicken and beef also contain magnesium. Older adults and people with certain disorders, such as Type 2 diabetes, gastrointestinal diseases and alcoholism, however, may have inadequate amounts.

“Magnesium deficiency has been associated with higher levels of stress, anxiety and difficulty relaxing, which are key ingredients to getting good sleep at night,” Dr. Dasgupta said. He noted that magnesium interacts with an important neurotransmitter that favors sleep.

One small double-blinded clinical trial of 43 elderly people in Tehran who were randomly assigned to receive either 500 milligrams of magnesium or a placebo for eight weeks found that those who received the supplement fell asleep faster and spent more of their time in bed asleep, but their total sleep time was not necessarily longer. An even smaller study of 10 people done nearly 20 years ago found that taking a magnesium supplement helped people with restless leg syndrome get more sleep.

If you suspect you’re deficient in magnesium or want to take magnesium supplements, talk to your doctor first. Magnesium can interact poorly with other drugs, and taking excessive amounts in the form of supplements can cause stomach cramps, diarrhea and nausea. Including more leafy green vegetables, legumes, nuts, seeds and whole grains in your diet may be a better option, doctors say.

<https://www.nytimes.com/2018/01/05/well/mind/does-magnesium-help-you-sleep.html?ref=todayspaper>

## [The Poliovirus – It just Won’t Go Away](#) (1/12/2018)

[Dr. Bruno’s Original Post](#): What’s going on?

### **What is going on? Polio cases are vanishing in Pakistan, yet the virus won't go away.**

Science Magazine,

By Leslie Roberts Jan. 11, 2018

Just a year ago, poliovirus seemed on its last legs in Pakistan, one of its final strongholds. Polio cases were steadily falling, from 306 in 2014 to 54 in 2015, 20 in 2016,

and, by last count, eight in 2017. Blood tests showed that, overall, immunity to the virus had never been higher, even among children aged 6 to 11 months, thanks to years of tireless vaccination campaigns. Surely, there were not enough susceptible kids to sustain transmission, and the virus would burn itself out within a year.

Unsettling new findings, however, show it is far from gone. In the most extensive effort in any country to scour the environment for traces of the virus, polio workers are finding it widely across Pakistan, in places they thought it had disappeared. They are wondering “just what the hell is going on” and how worried they should be, says epidemiologist Chris Maher of the World Health Organization (WHO) in Geneva, Switzerland, who runs polio operations in the eastern Mediterranean region. Does this mean the virus is more entrenched than anyone realized and is poised to resurge? Or is this how a virus behaves in its final days—persisting in the environment but not causing disease until it fades out?

“We have never had this level of environmental sampling anywhere else. We have nothing to compare it to,” Maher says. “We don’t understand the dynamic,” agrees Michel Zaffran, who leads the Global Polio Eradication Initiative at WHO. “But we take it very seriously.” In response to the sampling data, he and his colleagues are already changing their tactics—and their definition of success. Along with Afghanistan and Nigeria, Pakistan is one of just three endemic countries—places where indigenous wild poliovirus has never been vanquished. With its dysfunctional government, unceasing violence, poverty, and huge numbers of people on the move, it may well be the toughest challenge for eradication. The border with Afghanistan is so porous that the two countries are considered one epidemiologic block in which the virus circulates freely. Conventional wisdom is that if Pakistan defeats polio, Afghanistan will soon follow. That could be the key to global eradication, as no virus has been detected in Nigeria for the past 15 months.

Since the eradication effort began in 1988, the gold standard for detecting poliovirus has been surveillance for acute flaccid paralysis (AFP)—finding and testing every child with a sudden weakness or floppiness in the arms or legs. The yearly case count has been the benchmark for success: After 12 months without a polio case, WHO has historically removed a country from the endemic list. But as case numbers fell to today’s low levels, AFP surveillance is no longer the only meaningful indicator. Only about one in 200 or 300 people infected with the virus becomes paralyzed; the rest show no symptoms but can still shed the virus in their stool and infect others. Environmental surveillance can detect that hidden virus.



Extensive Sampling Shows that poliovirus lurks in many open sewers... © NEOC/PAK2017

Polio workers collect sewage samples, usually from open drainage ditches, and test them for virus. If the test is positive, that means someone in the catchment area is infected and actively excreting it. Pakistan now has 53 sampling sites, more than any other country. And at a time when cases are the lowest on record, 16% of samples from across the country are testing positive.

“It is extraordinary to have so much virus in sewage and so few cases,” Zaffran says.

What makes the environmental samples so hard to interpret is that a catchment area may contain the combined feces of 50,000 or 100,000 people. “If you isolate a virus from a child, you know who is infected. When you find it in an environmental sample, you don’t know if three people are infected or 3000,” Maher explains.

One possible explanation for the disconnect is that AFP surveillance is missing cases. Maher doubts that the number is significant, but others suspect that too many children among the mobile populations, including the marginalized Pashtun minority, still aren’t being vaccinated despite ramped up efforts to reach them. “I don’t think polio is entrenched across Pakistan, but this last reservoir of ‘people on the move’ is sustaining the virus,” says Steve Cochi, a polio expert at the U.S. Centers for Disease Control and Prevention in Atlanta.

Maher has another view. “My own suspicion is this is part of what we see at the end,” he says. “The lack of cases means immunity is high, but because of the very difficult circumstance in Pakistan,” the virus still has a tenuous hold. Ultimately, he says, “The virus will die out because it is not getting enough purchase.”

The program is not taking any chances. The response to each positive environmental test is now as aggressive as to a case of paralysis. And the program is hammering the virus with repeated vaccination campaigns throughout the “low season,” between December and May, when cold weather makes it tougher for the virus to survive. Whether the strategy works will become clear later this year when the weather turns warm. But one thing is certain: The absence of cases is no longer enough to declare victory over polio. Going forward, a country will not be considered polio-free until 12 months have passed without a case—or a positive environmental sample.

<http://www.sciencemag.org/news/2018/01/what-hell-going-polio-cases-are-vanishing-pakistan-yet-virus-wont-go-away>

## **Befriending other Polio Survivors** (1/16/2018)

Dr. Bruno’s Original Post: If the Supporters are Supportive, this is good !

From Psychology Today - “DeStressing Disability” by Elizabeth Mazur, Ph.D.



### **The Importance of Friends with Similar Disabilities**

I was surprised when my niece Sophia told me that she had applied for a summer staff position at Landmark College, which she had attended for three weeks the summer between 11th and 12th grades. At the time, she, who at that time knew everything, had grumbled about how unhelpful the program was, how she hadn’t learned a thing, and that her favorite memories were trips to Brattleboro and the fresh produce and cucumber water available at almost every meal. So I was happy to read her letter of application. She explained that her summer at Landmark was the first time she knowingly had friends with learning disabilities like hers and, also, unlike hers, as she also had enjoyed meeting the students with Asperger’s in the social pragmatics program. At my niece’s public high school, teachers never shared what other students had disabilities; it was only through noting who else was assigned to the disability resource room during the same class period as her was she able to identify some other teens with disabilities- and for Sophia, those tended to be highly active boys she considered annoying (she was sure that foot tappers contributed to her inability to focus) or students on the autism spectrum appearing more disabled than she. Though the Family Educational Rights and Privacy Act (FERPA) is likely well-intentioned, it makes difficult the ability of students to find friends who share one’s disability experiences; its enforced secrecy also perpetuates disability stigma.

Thus, I was struck by the research described in the recently published November 2017 article in Rehabilitation Psychology, “Solace in Solidarity: Disability Friendship Networks Buffer Well-Being” authored by Arielle Silverman, Ivan Molton, Amanda Smith, and Mark Jensen, of the University of Washington, and Geoffrey Cohen, of Stanford University. Although the two studies they conducted were with adults with legal blindness, muscular dystrophy, multiple sclerosis, post-polio syndrome, or spinal cord injury, there is little reason why the results, succinctly summarized in the article title, would not generalize to adolescents or to those with learning disabilities or mental health issues. In fact, results of American and European studies comparing adolescents’ relationships with parents and friends suggest that not only are friends highly important in young people’s lives but in many ways, they are even more important than parents. Classic studies by Reed Larson and colleagues using the Experience Sampling Method indicate that adolescents report that their happiest moments are when they are with friends, and they are generally much happier with friends than with family. Imagine the emotional support and nurturance students might receive from having friends who can laugh about positive disability-related events and commiserate about bad ones as well as, or in conjunction with, the more common friendship topics of budding romantic relationships, school, and sex (Youniss and Smollar, 1985).

However, as Silverman and her co-authors note, “social support” is not always beneficial and may sometimes have detrimental effects, especially if friends are coping poorly or are feeling quite distressed. For adolescents, too, friends can also be the source of negative emotions such as anger, sadness, frustration, and anxiety, and their attachments to friends leave them emotionally vulnerable (Larson and Richards, 1994). However, connecting with peers who experience disability may help normalize disability-

related challenges. As Silverman and colleagues explain, friends with disabilities can offer invaluable emotional support as well as tangible help and information on how to cope with disability-related stressors. And certainly, there is a greater likelihood that a friend with similar disabilities might “get” you in a way that those without disabilities do not.

Thus, school counselors and school psychologists might want to consider introducing students, with their permission, to peers who share their disabilities and maturity level, not necessarily with the expectation that the kids will become best friends but rather as peer to peer support. One exemplary program is Eye to Eye, which matches college mentors with middle school mentees who participate in group programs that encourage not only mentoring relationships but also those between peers; all students have voluntarily self-identified as learning disabled by just participating in the program. Another model is Active Minds, which aims to empower college students to speak openly about their mental health in order to educate others and encourage help-seeking. Whatever the mechanism, it is important for those who work with students to encourage friendship building between those who share similar disabilities. As Sophia, in hindsight now strongly endorsing the Landmark high school summer program, summarized it, “That was the summer I finally fit in!”

<https://www.psychologytoday.com/blog/de-stressing-disability/201801/the-importance-friends-similar-disabilities>

## Drugs . . . Their names sounds the same, but ARE they the same? (1/13/2018)

Original Post: Dr. Bruno - is there a difference in how a polio brain/body process Xanax vs Diazepam? My PCP switched out my longtime use of 0.5 mg clonazepam with 0.5 mg Xanax. I just finished my 2nd night using diazepam, and it definitely addressed the twitching/spasm, but my sleep is fitful (a bit freaky for me)...I keep waking up. Could I still have clonazepam in my system?

Dr. Bruno’s Response: Your post is incredibly important and asks vital questions. Yes as Xanax is the short acting medication and it could be interacting with the clonazepam. But let's look at the issue of these drugs from 35,000 feet.

Let's talk about Valium–like drugs and GABA. Neurons in the brain and spinal cord produce a chemical called GABA. GABA is the chief inhibitory or "sedative/calm you down" neurochemical. GABA is released by a neuron, floats across the gap between one neuron and several others and plugs into a GABA receptor on the neurons, like a key in lock. However there are at least 19 different GABA receptors! So when you plug the GABA key into the GABA receptor locks it can have a powerful effect, a mild effect, cause you to be sleepy or calm or, if the receptors are on your motor neurons, stop muscle spasm.

The drugs that are manufactured to plug into GABA receptors are the benzodiazepines, of which Valium is the grandfather. Our research has shown that Valium (diazepam) is the best medication for treating spasm in large muscles, especially in the back and neck. We found that Klonopin (clonazepam) is effective in treating spasms of the esophagus that prevent food from going down; Valium doesn't relax the esophagus and Klonopin doesn't relax back muscles. Finally Xanax (alprazolam) is effective in turning off spinal cord motor neurons that cause your legs to twitch and jump during sleep, where neither Valium nor Klonopin is effective; however Xanax does not stop back muscle spasms or relax the esophagus.

There are a number of other oral benzodiazepines that have different effects such as decreasing anxiety (clorazepate (Tranxene), chlordiazepoxide (Librium), lorazepam (Ativan)) and promoting sleep (temazepam (Restoril) and triazolam (Halcion)).

Bottom line: There are different “key” drugs for different receptors that cause different effects in the body. You can't just substitute one Valium-like drug for another and expect it to have the same effect. Without even considering interactions with other medications that you may be taking, the dose of the benzodiazepine you take or how quickly your liver gets rid of the drug, just the 19 GABA receptors and the drugs we mentioned above can have 10,888,869 trillion, trillion different effects!

To paraphrase an old car commercial - Benzodiazepines: Accept no substitution

Bruno Bytes, Continued . . . .

## Are Opioids the Solution? (1/18/2018)

Original Post: I had Polio at the age of 6 weeks and was paralyzed from the neck down. I was diagnosed with post-polio syndrome in 1994 and was placed on a ventilator due to respiratory insufficiency. Lately I have been having a great deal of left hip pain. My Legs have become very weak and I am almost totally unable to ambulate. The doctors solution to my pain is opioid prescriptions. Is there anything else that could ease my pain without becoming addicted? I did not realize that muscle pain was going to be such a big part of my life.

Dr. Bruno's Response: In our experience, you need to treat the cause of your pain, not be drugged into oblivion. You and all polio survivors need to see a physiatrist (a phys-EYE-a-trist), a rehabilitation doc who does a medical residency learning to help people thrive with their disabilities. Physiatrists are nerve, muscle, and bone experts who treat injuries or illnesses that affect how you move and who have completed training to diagnose and treat pain, restore maximum function lost through injury, illness or disabling conditions and treat the whole person, not just "symptoms." They lead a team of medical professionals to provide non-surgical treatments for your medical problems and provide treatment/prevention plans that can be carried out by the patients themselves or with the help of the rehab medical team. This team might include other physicians and health professionals, such as neurologists, orthopedic surgeons and always physical and occupational therapists.

## Flu Symptoms (1/18/2018)

Dr. Bruno's Original Post: Don't Ignore Flu Prevention or Symptoms in your Chest

### **Flu Season: How to Stay Healthy**

A Rutgers medical expert explains why this year's flu season is so fierce and how you can protect yourself. Common flu symptoms include fever, chills, cough, sore throat, runny or stuffy nose, muscle or body aches, headaches, fatigue, vomiting and diarrhea. (The last two are more common in children than adults).

Article ID: 688055

Released: 17-Jan-2018 12:05 PM EST

Source Newsroom: Rutgers University

Newswise — This year's influenza outbreak is already the most widespread on record since health officials began keeping track about a dozen years ago, with millions of Americans being infected by emerging and current strains such as the dominant H3N2. In recent years, the Centers for Disease Control and Prevention have reported that influenza-related deaths in the United States have ranged from a low of 12,000 in 2011–12 to 56,000 in 2012–13.

Alfred Tallia, chair of the Department of Family Medicine and Community Health at Rutgers Robert Wood Johnson Medical School, discusses this year's flu season and how you can protect yourself. How is New Jersey faring against the rest of the country in influenza cases? New Jersey is one of the 26 U.S. states, districts and territories experiencing high rates of influenza-like illness. The past three weeks have seen a spike in positive laboratory tests for flu throughout the state – particularly in northern and central New Jersey, and in reports of absences in schools and employee workplaces. Emergency department visits for influenza-like illnesses also have risen during this time period.

What strains are prevalent this year? This year, we are seeing the H3N2 influenza virus – one of three predominate subtypes of the Influenza A RNA virus that causes disease in humans – as the predominant cause of influenza virus-caused illness. Influenza RNA viruses have the capacity to mutate rapidly, and each year we tend to see a different variant or group of variants that predominate. Influenza B virus and its variants also can cause illness, but this year the A virus is causing most of the outbreaks. Does H3N2 cause more severe symptoms than other flu strains? Influenza A strains such H3N2 and other subtypes causing this year's illnesses tend to be the strains that cause more severe illness. Most epidemics are due to Influenza A strains. Many influenza A strains originate in other animals, mutate and infect humans. Influenza B strains mostly affect and reside in humans and are generally less severe.

What is the effectiveness of this year's flu vaccination? For the 2017–2018 season, there are three-component vaccines that contain an H1N1 component, an H3N2 component and a B/Victoria lineage component, and four-component vaccines that protect against these strains and a second Influenza B strain. This year's vaccination is estimated to be between 10 percent to 30 percent effective. The method for developing vaccinations, which are currently manufactured using fertilized chicken eggs, explains why it's difficult to match vaccinations to a particular season's strains: First, scientists must predict how the virus will change from one year to the next, then the vaccine needs to be manufactured, which can take six to nine months. So, if the predictions on the prevalent

strains are wrong, there is insufficient time to modify the vaccine. Vaccine producers are proposing changing the methodology of production from chicken eggs to cell cultures, which would shorten the production process.

Should people still get vaccinated? It is recommended that people still get the flu vaccination if they have not already. Even though it is not as effective as it has been in previous years, the vaccination can reduce symptoms and duration even if people get the flu. Most family physicians, pediatrician offices, primary care clinics and pharmacies offer the influenza vaccine. You cannot get the flu from the flu shot, but immunity usually takes about two weeks to develop. People should also continue to practice good hygiene, like washing your hands, coughing into your sleeve, disposing used tissues and staying home if you're sick. If you are sick, avoiding people who are hospitalized, undergoing cancer treatment or who have diabetes or other chronic illnesses is a good idea.

What complications can accompany the flu? Common symptoms include fever, chills, cough, sore throat, runny or stuffy nose, muscle or body aches, headaches, fatigue, vomiting and diarrhea. The last two are more common in children than adults. Sinus and ear infections are examples of moderate complications of flu, but a frequent serious complication, particularly in people with chronic lung disease, is pneumonia. In addition to pneumonia, serious complications include inflammation of the heart, brain or muscle tissues, and multi-organ failure, such as respiratory and kidney failure.

When should you call your doctor? Call your physician if you have persistent fever, weakness, diarrhea, difficulty breathing or chest pain, persistent muscle or body aches, or if you have an underlying chronic illness like diabetes or heart disease. If your child experiences an inability or failure to feed, fever, rapid breathing or persistent diarrhea, call your doctor immediately. Elderly people with the flu who experience confusion or weakness likewise require medical attention. If you are in good underlying health, your symptoms are limited, fever and body aches are well controlled with antipyretics like acetaminophen and you are maintaining adequate hydration and nutrition, you can choose to ride it out. However, when sick and in doubt, it is always reasonable to call and seek medical attention.

Who is most vulnerable to the flu? While children and people over 65 are most vulnerable, the flu can have complications or be fatal to people of all ages. Women who are pregnant and people with diabetes and other chronic illnesses are also as vulnerable as children and the elderly. Fortunately, with vaccination, many people can be spared the misery associated with this disease, and vaccination is recommended for all ages.

How long is the flu season and when will it peak? Flu afflicts people worldwide year-round, but is most prevalent in locations during winter seasons. This means if you are travelling to southern hemisphere countries during their winter months, you will find yourself in the middle of peak flu season there. Our season (NE USA) peaks between December and the end of February.

<http://www.newswise.com/articles/view/688055/?sc=mwhn>

### Fatigue and Memory (1/21/2018)

Original Post: Does anyone else suffer with cognition issues such as memory issues, concentration and focus problems? Could post-polio could be contributing to these problems?

Additional Post: I thought I had early dementia, now am told that memory, word finding and concentration loss are common symptoms of PPS.

Additional Post: I have problems with word retrieval and a bit of forgetfulness especially when tired.

Additional Post: Dr. Bruno, I wonder if it has to do with the fatigue we get from not pacing ourselves? The more tired I am, the less my brain copes. I call it 'Brain Fog'.

Dr. Bruno's Response: Our research has shown that word finding difficulty is NOT a symptom of dementia in polio survivors. And, yes, fatigue contributes to problems with thinking, memory and word finding.

ARTICLES...

Word Finding Difficulty.

[http://www.papolionetwork.org/uploads/9/9/7/0/99704804/word\\_finding\\_difficulty\\_and\\_pps\\_abbrev\\_11-2017.pdf](http://www.papolionetwork.org/uploads/9/9/7/0/99704804/word_finding_difficulty_and_pps_abbrev_11-2017.pdf)

Post-Polio Brain Fatigue: A Little Spot Means A Lot.

[http://www.papolionetwork.org/uploads/9/9/7/0/99704804/brain\\_fatigue.pdf](http://www.papolionetwork.org/uploads/9/9/7/0/99704804/brain_fatigue.pdf)

Neuropsychology of PPS.

<http://www.postpolioinfo.com/library/neuropsych.pdf>

Dopamine and WFD.

<http://www.postpolioinfo.com/library/DRUG.pdf>

## Is Sweating a Post-Polio “thing” ? (1/22/2018)

Original Post (edited): I've developed a problem where I sweat so much, even in winter, that I can soak my clothes. Sweating make me even colder than my usually cold, purple feet. Is my sweating a post-polio thing?

Dr. Bruno's Response: The poliovirus damaged the brain stem nerves that control body temperature – those of the sympathetic nervous system - the part of the autonomic (i.e., “automatic”) system that should cause veins and arteries to constrict when you're too cold and open when you're too hot to radiate heat away from your skin. The sympathetic nerves also control sweating, which cools your body down by evaporation when opening up arteries doesn't “dump” enough heat by radiation.

The reason polio survivors have cold and purple “polio feet” is that there isn't a signal from the brain stem to tell blood vessels to constrict. So hot blood flows to the arteries near the surface of the skin, heat in the blood radiates away from your body and your skin gets cold, passively making the veins clamp down, trapping purple blood in the little veins and, voilà, “polio feet.”

The mechanism of sweating was one that I studied fairly extensively (for example in Parkinson's patients) before ever seeing a polio survivor with PPS.

Given the inability of arteries to constrict, I would have expected poliovirus damage to the sympathetic nervous system to cause polio survivors to sweat too little. Over the course of 35 years I have not seen a polio survivor sweat too little and, for example, be overcome by the heat, let alone see one who was sweating too much. So while I studied blood flow and the effects of cold on polio survivors a lot, I didn't study sweating at all! I should say that in our first National Post-Polio Survey in 1985, about 1/3 of polio survivors said that they were adversely affected by the heat. But that would be caused by too little sweating, not too much.

Excessive sweating (called “hyperhydrosis”) is genetic in as much as 3% of the population, is seen under your arms, on the palm of your hands or soles of your feet, and can be caused by anxiety or by some medications. However, if you're sweating too much in one large area (like your chest or back) or all over your body there could be an underlying treatable cause: Diabetes, an overactive thyroid, gout, rheumatoid arthritis, lymphoma an infection (e.g., Tuberculosis) or my old friend, Parkinson's disease.

As always, don't assume too much (or too little) sweating is a PPS symptom. Tell your doctor and look for a treatable cause.

## Fatigue. Is it Always PPS? (1/25/2018)

Dr. Bruno's Original Post: **FATIGUE: Is it Anemia or PPS?**

**Rule #1: PPS is ALWAYS a diagnosis of exclusion.**

### Anemia Discovery Offers New Targets to Treat Fatigue That Affects Millions

Article ID: 688336

Released: 23-Jan-2018 12:05 PM EST

Source Newsroom: University of Virginia Health System

Newswise — A new discovery from the University of Virginia School of Medicine has revealed an unknown clockwork mechanism within the body that controls the creation of oxygen-carrying red blood cells. The finding sheds light on iron-restricted anemias that leave millions of people weak, tired and unable to concentrate – and it may point the way to better treatments as well.

#### Understanding Anemia

Adam Goldfarb, MD, and his colleagues made the discovery while seeking to better understand why iron-restricted anemias cause the body to create insufficient numbers of vital red blood cells. Members of the research team were working independently on what would prove to be key pieces of the puzzle, but it was only when they put them together that they could see the big picture.



Shadi Khalil, an MD/PhD student who worked in Goldfarb's lab, was examining bone marrow cells when he noticed something intriguing about them. "I thought it was beautiful," he recalled. "I just stood there at the microscope looking at these cells."

What caught his eye was that the cells contained large pools of the receptor for erythropoietin, a hormone that directs the bone marrow to make red blood cells. (The hormone has been used by Lance Armstrong and other athletes as a performance-enhancing drug.) To do its job receiving the instruction to make blood cells, the receptor must be on the outside of the marrow cells. Yet so much was stored up inside them.

Perhaps, Khalil thought, this might explain why some people's bone marrow cells fail to follow the hormone's instructions. And it did, partly. But there was still a piece missing, and, it would turn out, a colleague in the lab had already found it.

#### Parallel Research

Researcher Lorrie Delehanty was studying anemia using a model the lab developed – "anemia in a dish," the scientists call it. "If you drop the iron level way down, these cells act like anemic cells," Delehanty explained. "They basically become anemic cells – they even look very pale." Something else happens, too, she noticed: A particular protein disappeared.

The Scribble protein (named after the SCRIB gene that produces it) proved to be a key piece of the clockwork mechanism. Basically, it works like this: The amount of iron in the blood affects the amount of the Scribble protein available, and Scribble controls whether the hormone receptor is welled up inside the bone marrow cells or doing its job on the outside. "We realized that this was kind of a complicated symphony that starts with iron and ultimately controls how much and what kind of messages the cells get," Khalil said.

The researchers used this knowledge to fix EPO resistance in their model, and they hope the discovery will eventually be useful for treating anemias in people, too. "We've got the key components, and we want to move up the hierarchy to the master regulatory element that's controlling this," said Goldfarb, of UVA's Department of Pathology. "When we do that, that will get us that much closer to alternative treatments for anemia."

<http://www.newswise.com/articles/view/688336/?sc=mwhn>

#### Exercise and PPS – A New Study (1/31/2018)

Dr. Bruno's Original Post: We have often talked about the failure of exercise to increase muscle strength or provide cardiac conditioning in polio survivors. Here is a brand new study that once again documents the failure of exercise to increase muscle strength or provide cardiac conditioning.

Keep in mind that anyone who was physically able to participate in this study had mild PPS leg muscle weakness since they were able to ride a bicycle. As to the recommendations for further study: If the large muscles of the legs cannot condition the heart, there are no other large muscle groups left.

#### **Aerobic Exercise Training in Post-Polio Syndrome: Process Evaluation of a Randomized Controlled Trial**

Voorn EL, et al PLOS ONE 13(1): e0192338. Published: January 30, 2018. <https://doi.org/10.1371/journal.pone.0192338>

#### Objective

To explore reasons for the lack of efficacy of a high intensity aerobic exercise program in post-polio syndrome (PPS) on cardiorespiratory fitness by evaluating adherence to the training program and effects on muscle function.

#### Patients

Forty-four severely fatigued individuals with PPS were randomized to exercise therapy (n = 22) or usual care (n = 22).

#### Methods

Participants in the exercise group were instructed to exercise 3 times weekly for 4 months on a bicycle ergometer (60–70% heart rate reserve).

#### Results

The attendance rate was high (median 89%). None of the participants trained within the target heart rate range during >75% of the designated time. Instead, participants exercised at lower intensities, though still around the anaerobic threshold (AT) most of the time. Muscle function did not improve in the exercise group.

#### Conclusion

Our results suggest that severely fatigued individuals with PPS cannot adhere to a high intensity aerobic exercise program on a bicycle ergometer. Despite exercise intensities around the AT, lower extremity muscle function nor cardiorespiratory fitness improved. Improving the aerobic capacity in PPS is difficult through exercise primarily focusing on the lower extremities, and may

require a more individualized approach, including the use of other large muscle groups instead.

Dr. Bruno's Additional Response: Do not do anything that feels wrong, causes pain or discomfort that lasts for *any* length of time. Your body will tell you what you can and can't do, so listen to it and do less to start!

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