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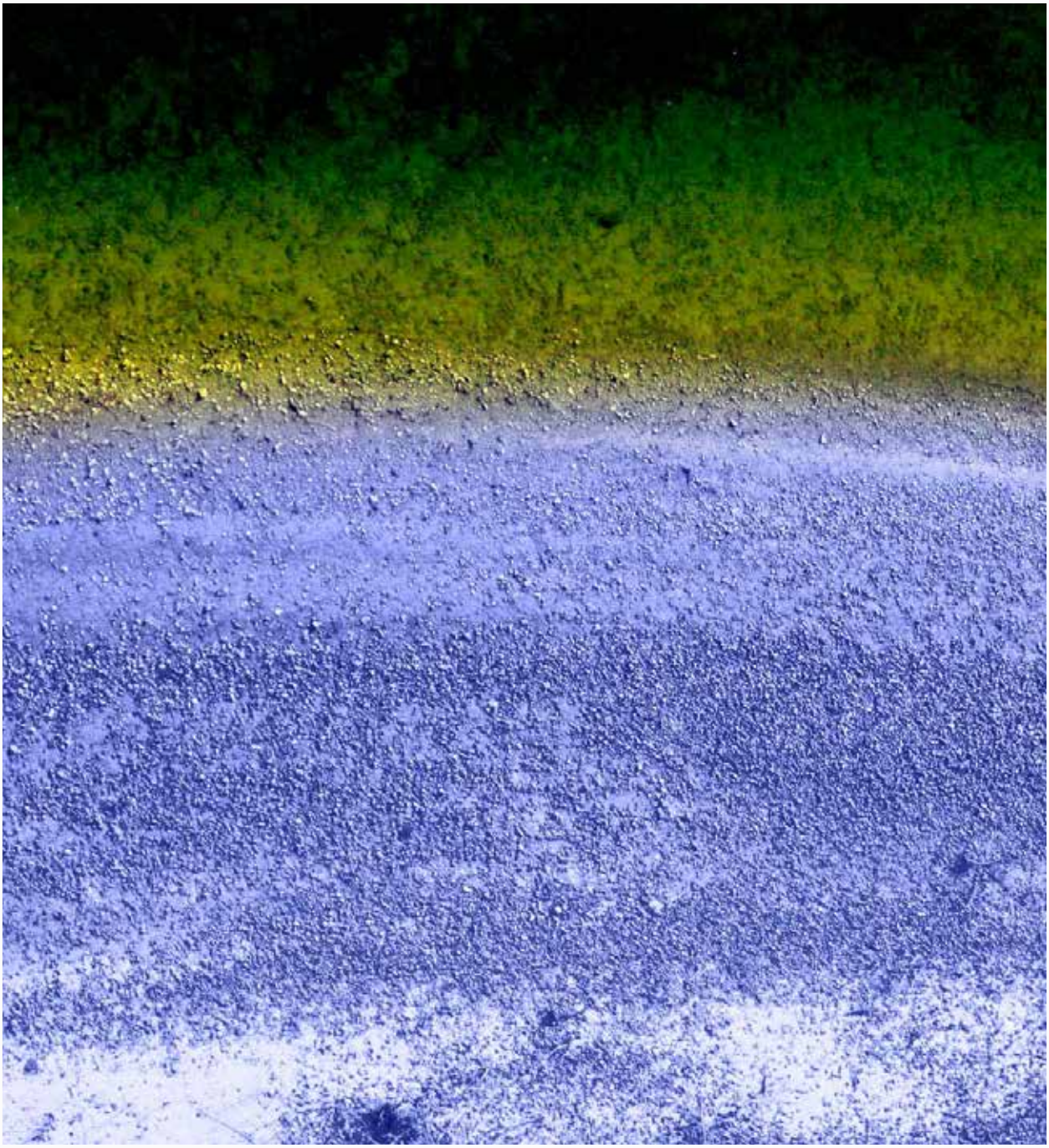

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Does Chronic Consumption of Stimulants Induce Vagal Bias?

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When seen through the lens of the autonomic nervous system, symptoms of the common cold represent temporary vagal bias: nausea, vomiting, cough, fatigue, itchiness, wheezing, diarrhea, sneezing, and congestion. Sympathomimetics are the mainstay of medicines that relieve symptoms of the common cold.

We recently discovered that patients with a history of food allergy, seasonal allergies, and asthma has baseline vagal bias (or sympathetic insufficiency) based on autonomic testing. In each case, the vagal bias can account for the acute manifestations of these diseases, and the drugs used to treat these conditions are typically epinephrine and its close cousins (B2 agonists).

It is noteworthy that many episode of asthma are triggered initially by a viral infection. Asthma can also be triggered by cold weather or exercise, both of which initially promote sympathetic response, followed by vagal counter-response.

The issue with over-use or chronic use of these sympathomimetic drugs to counter the symptoms of vagal bias is that the drugs can induce tachyphylaxis and paradoxically cause chronic vagal bias, or worsen baseline vagal bias.

This brings up another issue. There are many agents consume broadly and in significant quantities by humans such as caffeine, energy drinks, stimulants, drugs of abuse, Ritalin and analogues that may paradoxically induce chronic vagal bias. Is it possible that

chronic consumption of these agents is an under-appreciated cause of predisposition to acute episodes of asthma and allergic attacks or chronic conditions such as chronic rhinosinusitis?

The role of caffeine is particularly interesting. It is broadly consumed globally and in increasing doses (partly due to tachyphylaxis-induced addiction). Caffeine is thought to be helpful in resolving acute asthma attacks, presumably due to its sympathomimetic effects and the effects of one of its metabolites, theophylline. However, chronic caffeine use may be a cause of future sensitivity to asthma attacks by setting up chronic vagal bias.

Chronic exercise is another promoter of vagal activity. The role of chronic exercise is setting up an autonomic environment that predisposes hosts to chronic allergies and asthma warrants further inquiry.

Hard-Wired for a High-Stakes Past, but Now Living in a Low-Stakes World

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Every few seconds on the rush hour freeway I see a driver make an aggressive cut in front of another car. More than likely, the improved position and one second gained had no meaningful benefit on the cutters' lives. The potential downside of such behavior is violent death and dismemberment. Like many other aspects of the modern rat race, it sure doesn't see worth it in the grand scheme. So why do we make such irrational choices sometimes?

Evolutionarily speaking, our brains were wired for scarcity. In nature the early bird gets the worm. Arriving ahead of others could mean the difference between eating and not eating. When someone cuts in line, the cutter experiences a primal emotional reward — a sense of self-satisfaction. Such proximate behaviors were ingrained presumably because it promoted ultimate fitness among our evolutionary ancestors.

In modern times, however, no matter in what order the drivers arrive at their destination, everyone gets to eat. Even the late bird gets the worm. The line-cutting-at-high-speed instinct even at the risk of death is a Darwinian maladaptation.

More generally, people today have a tendency to display aggressive, competitive behaviors that are out of whack with the risk-reward in wide variety of situations. The degree of aggressive play observed in recreational sports today is an example. Sports can unmask primal emotional instincts that are often kept in check in civilized society. The risk-reward of aggressive play in recreational sports is clearly negative, as the stakes could not be more low. Yet as anyone who

has watched weekend warriors subject each other to potentially life-altering flagrant fouls can attest, the low stakes does not prevent behaviors that were hard-wired during our high stakes past.

Less blatant examples are everywhere in every day life. Pay closer attention to the behaviors of those around you and your own behaviors. Do the aggressive, competitive behaviors justify that perceived risk-reward payoff? Does the extreme, gunner approach to rearing children, at the risk of stress, alienation, and, most importantly the opportunity cost of a good childhood actually pay off to justify the costs? Most people realize too late that the payoff of such competitive behavior was little if any in the long run.

As Richard Carlson once said, "Don't sweat the small stuff — and it's all small stuff." In Darwinian terms, we are hard-wired for a high-stakes past, but are now living in a low-stakes world.

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