



POSTER NO 16

Honey, Mental Fatigue (Neurasthenia) and Physical Fatigue (Myasthenia)

Professor Anson Rabinach, in *The Human Motor*¹, describes how, in the late 19th century, there developed a wide academic movement interested in physical fatigue and what was then described as neurasthenia (mental fatigue). Physicians, physiologists, researchers and scholars, from a variety of scientific disciplines, studied physical and mental fatigue, from differing perspectives. There was much concern from teachers, employers, government and magistrates, about the increasing intellectual burden imposed on the new generations of students, resulting from the leap forward in all the sciences, and the vast accumulation in knowledge, required by students to keep pace with rapid developments in science and technology. It was considered that this explosion of knowledge would overwhelm students, and that this may threaten the ability of the state to find politicians, bureaucrats, officials, technicians, teachers, lecturers, lawyers and other professional workers, who would be able to absorb, master and use this exponentially increasing body of knowledge, to maintain and administer the growing urban and advanced society, without suffering breakdown from mental exhaustion (neurasthenia).

In modern times we may call this stress, but the mental and physical physiology studied by these pioneers, is the broadly similar. The overall theory is not radically different from our approach today and learning/memory consolidation and retrieval are known to be intimately correlated with, and modulated by, stress physiology.

In Oxford in the 1640's, an English physician, Thomas Willis² wrote about what he termed the *incorporeal* aspect of humans, as opposed to the *corporeal*. By *incorporeal* he referred to the mind, as opposed to the body. Not only did he separate the two, he described them as in *conflict*. Modern physiology agrees with this. **During exercise, contracting muscles extract glucose from the circulation, and this glucose, which is released from the liver, is actually fuel required by the brain. It is therefore perfectly correct to state that during exercise, brain and muscles compete for the same fuel source, liver glycogen (glucose), and as muscles increase this extraction, the brain is placed at risk.** As the liver store depletes and glucose is increasingly used by contracting muscles, there is a very real danger of blood glucose falling to below normal levels. This indeed does occur when athletes collapse.

APPLICATION AND CONCLUSION

There is a common link in the "liver-brain axis" to both exercise and sleep. During exercise, contracting muscles extract glucose from the circulation and blood sugar levels fall. During a typical 8 hour night fast, blood sugar levels may drop below normal if the small liver glycogen store is not restocked just prior to bedtime. **Both situations result in excess production and release of adrenal stress hormones, with negative impacts on health.**

It seems that both athletes/coaches and the general population appear to be 'liver blind' with respect to the importance of maintaining an adequate liver glycogen store. Athletes must fuel their liver before, during and after exercise, and prior to overnight recovery or *pay a heavy price in terms of performance, recovery and general health*. The general population must resist the notion of "not eating before bedtime" which risks having a depleted liver and **results in poor recovery, poor sleep quality, and a negative metabolic profile which when repeated over several years may contribute to hypertension, cardiovascular disease, obesity and diabetes.**

Honey, with its powerful metabolic profile and potential, is an excellent fuel for both exercise and restorative sleep. Honey, because of its rapid incorporation into liver glycogen, provides a simple, natural solution for neurasthenia and myasthenia, a fatigued mind and body.

Rabinach, Anson, *The Human Motor*, University of California Press 1992, © 1990 by Basic Books Inc.

Willis, Thomas, *Bodies/Minds*, Edited by Iwan Rhys Morus in 'A Great and Difficult Thing': Understanding and Explaining the Human Machine in Restoration England', Chapter 2; Michael Hawkins, 2002, Berg Oxford