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Brain Wash

Consider how much emphasis most human beings place on cleanliness. Fruits and vegetables are washed before consumption. Dishes, utensils, and beverage containers are washed after eating. Most homes are regularly cleaned. Clothes get washed. People much prefer to use a clean rather than a dirty bathroom.

Attention is also regularly given to body cleanliness. Most people bathe or shower regularly. Most people brush and/or floss their teeth. Most people wash their hands, although perhaps not frequently enough.

Cleanliness is largely about health. Otherwise, why would so much time and effort (and often expense) be devoted to cleanliness? Physiologically, many of the systems in the human body function to cleanse the body of waste or harmful products. These include the digestive system, the urinary system, the lymphatic system, and the immune system.

What about the brain? How is the brain cleansed? Last fall in the journal *Science*, a group of investigators from the University of Rochester reported data that strongly suggest that a major function of sleep is to clean the brain. Their study, done with mice, found that during sleep, both functional changes as well as changes in the physical size of certain spaces in the brain serve to effectively remove waste products associated with brain metabolism. Included among the waste materials being flushed out of the brain are proteins that form the kind of plaques that are associated with Alzheimer's disease. The lack of sleep allows waste products to build up. Both acutely and

chronically, these toxic materials can adversely affect brain function.

While the study was conducted with mice, all animal species need sleep, and have a drive to sleep. Sleep, therefore, must have an essential purpose. The authors of the aforementioned study do not imply that brain washing is the only function of sleep, but do suggest that brain washing is one of the critical functions of sleep.

Cognitive effectiveness and many health benefits are associated with sleep, whereas a number of health problems are associated with sleep deprivation. Imagine eating off of dirty dishes, not having good personal hygiene, or rarely cleaning the bathroom. Sleep deprivation can perhaps be characterized as trying to function with a dirty brain. To the extent that brain cleansing is one of the important functions of sleep, the importance of this function is underscored by the need for human beings to spend nearly one-third of their lives sleeping.

Apparently Dr. David Johnson of the Eastern Virginia Medical School was appropriately “brain washed” (i.e., having gotten appropriate sleep) when he recently and insightfully noted: “We need to open up our eyes to the value of closing them.”

Paul J. Hershberger, Ph.D.

... is a clinical health psychologist. He is Professor of Family Medicine and Director of Behavioral Science for the Family Medicine Residency Program, Wright State University Boonshoft School of Medicine. His clinical practice includes psychotherapy, consultation, and coaching.

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To contact Dr. Hershberger:

e-mail: paul.hershberger@wright.edu

phone: (937) 734-2021