Medical School Hotline

Comments on Planning and the 3 Tesla MRI

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On February 18, 2004, faculty members of the John A. Burns School of Medicine and staff of Queen's Medical Center, Drs. Linda Chang, Thomas Ernst, Christine Cloak, Andrew Stender, Cecilia Shikuma, and Napapon Sailasuta held a neuroimaging conference at Queen's Medical Center. The meeting was to initiate plans for a new, functional magnetic resonance imaging (fMRI) research facility. Almost exactly a year later, February 25, 2005, the 3Tesla MRI was dedicated and open for service.

It's all very strange, this planning business. At some point in human history, somebody deviated from the usual stimulus-response mode of, "I'm hungry, it's time to kill a wooly mammoth," and started sketching out a plan. Probably humble designs, like deciding whether to hunt for an antelope tomorrow, or maybe a 200-pound prehistoric rabbit. But some impulse toward variety--some bridging of a neural arch took place that *projected* a possibility and *anticipated* an outcome. What leap of faith was that, that impelled a series of evolutions?

Planning is one of those peculiarly human activities that keep endless numbers of committees all a-twitter, harassed secretaries and aides consuming antidepressants, and the Franklin Covey people rich. It may be the antithesis of happiness. I have never seen a Golden Retriever jotting in her Palm Pilot, nor even any of the subtler signs, such as restlessness or inattention while in the middle of playing with other dogs, or abrupt awakening soaked in doggie sweat. Sadly, this is stuff that *humans* do all the time when they have incomplete planning in their heads.

When my dog becomes agitated, it is generally in response to some item on *my* schedule, such as opening a can of dog food. Even if planning isn't the antithesis of happiness, it certainly doesn't seem clearly correlated. People do not speak with joyful anticipation of their involvement in a new planning committee, and it is rare that we gleefully set a dinner date with our insurance agents. Or, take Planned Parenthood—you can talk about planning a child all you want, but the kid is or she isn't. Try to convince a newborn that she is the successful outcome of a lengthy planning process and that you are overjoyed at her arrival. Her view is that she is hungry and you have just interrupted the longest nap of her life.

Intriguingly, that same bridging of a neural arch that took place a few million years ago may be responsible for the pathology that has driven this research initiative. Consider that the ability to plan and the ability to recall constitute two features of human intelligence that are most profoundly affected in addiction or in the sub-cortical dementia that can accompany advancing HIV disease. My patients with addictions have false anticipations upon which they predicate their use of drugs, and certainly have put aside any pretenses of planning, delaying gratification, or setting about an orderly process of character development. Some of Dr. Cecilia Shikuma's patients and subjects will seek a pattern of conduct that is no longer accessible, a memory that eludes them. And at the root of both behaviors may be a similar process. A possibility that Dr. Chang proposes is inflammation of the brain tissues.

The strangeness of this business of planning is emphasized when how much that is planned is not realized. If there was ever a better demonstration of the persistence of human will in spite of adversity or common sense, I do not know it. Reinforcement is, in almost all cases, not merely intermittent, but rare. Paul Ehrlich's magic bullet Salvarsan 606, arsphenamine, was compound #1914 in the series of planned candidates. In a terrible perversion of planning, my alcoholic patients daily plan great events; they then engage in a simple uncontrolled clinical trial with n = 1, slug back 250 ml. of grain alcohol or equivalent, and experience the same old outcome: inebriation and disappointment. Yet, they gamely persist, expect different outcomes, or seek reminiscently an outcome that was briefly realized, years or decades ago: a romantic moment, an idyll, an ecstasy.

We are almost equally astonished when things planned come to pass, but we don't recognize them. In 1914, a series of friendly alliances, the industrial development of Europe, and the enormous armament of every small country of the time required intensive and highly sophisticated planning. Combined, they had a reasonably predictable outcome as World War I, yet everybody was astonished when it happened. We thought that it was peace and prosperity that we were planning, not war. Most of human planned endeavor doesn't come about, yet astonishingly we carry on, like Sisyphus. Why?

Occasionally it generates some wonderful results, that have great and happy, if subtle or distant consequences. The "planned" 3 Tesla MRI is now a reality. Dr. Linda Chang, Dr. Thomas Ernst, and colleagues get to plan some possibilities such as:

a. Clarifications of the time course of brain adaptation and recovery in addiction
b. Identification of loci of injury in the dementias and in addiction;

c. Quantification and location of other organ damage, such as to the heart, in methamphetamine use;
d. Identification of neurological functional deficits in addictions and in HIV disease;
e. Effects of various drugs, from marijuana to alcohol to methamphetamine, upon the brain and body of the developing fetus.

As a practical implement, the 3 Tesla MRI promises the capability to see what works and doesn't work to improve function, pharmacologically, and to see when in the pathophysiology of addiction recovery certain therapies are most likely to yield benefit. When will certain forms of learning be practical, again? When might it be reasonable to isolate the addict from a drug-using environment, and when might it be safer to reintegrate that same addict? What is the "switch point" in the adolescent's brain at puberty that signals rapid and reliable susceptibility to nicotine, caffeine, alcohol and other dependencies? What really is "craving" in the context of brain architecture and functional neural pathways, and thus what class of medication could hold the best promise for its remedy?

Among the most frustrating challenges in medicine are the management of addictions and the management of dementias. The resignation that many physicians bring to these challenges could be replaced by rational treatment initiatives, and soon, as a result of the promise of this line of research. Notably, this is research advocated by Dean Ed Cadman, predicated on the trust of government and community, and required the labors of The Queen's Medical Center and the medical school.

The salient point of this article is to acknowledge and pay respect to the foresight, tenacity, commitment, cooperation, and professionalism of all those who first met in 2002 to plan for this state-of-the-art functional MRI service that seeks new knowledge through research. They have made good on their plan. Special recognition goes to Drs. Linda Chang and Thomas Ernst, whose initiative this was and who will provide the continuing leadership.

NOTE: This speech was presented by Dr. Haning at the 3 Tesla MRI dedication and blessing at the Queen's Medical Center on February 25, 2005.