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Why Are We Drugging Our Soldiers?

By RICHARD A. FRIEDMAN

SINCE the start of the wars in Iraq and Afghanistan, there has been a large and steady rise in the prevalence of post-traumatic stress disorder among our troops. One recent study of 289,000 Americans who served in those countries found that the rates of the disorder jumped to 22 percent in 2008 from just 0.2 percent in 2002.

Given the duration of these wars and the length and frequency of deployments, when compared with other wars, perhaps such high rates of PTSD are not so surprising. Prolonged exposure to a perilous and uncertain combat environment might make trauma common.

But there is another factor that might be playing a role in the increasing rates of the disorder, one that has escaped attention: the military's use of stimulant medications, like Ritalin and Adderall, in our troops.

There has been a significant increase in the use of stimulant medication. Documents that I obtained in late 2010 through the Freedom of Information Act, and have recently analyzed, show that annual spending on stimulants jumped to $39 million in 2010 from $7.5 million in 2001 — more than a fivefold increase. Additional data provided by Tricare Management Activity, the arm of the Department of Defense that manages health care services for the military, reveals that the number of Ritalin and Adderall prescriptions written for active-duty service members increased by nearly 1,000 percent in five years, to 32,000 from 3,000.

Stimulants are widely used in the civilian population to treat attention deficit hyperactivity disorder because they increase focus and attention. Short of an unlikely epidemic of that disorder among our soldiers, the military almost certainly uses the stimulants to help fatigued and sleep-deprived troops stay alert and awake. (A spokesman for Tricare attributed the sharp rise to "the increased recognition and diagnosis of A.D.H.D. by medical providers." However, while there is greater recognition of the disorder, the diagnoses are concentrated in children and adolescents.)

Stimulants do much more than keep troops awake. They can also strengthen learning. By causing the direct release of norepinephrine — a close chemical relative of adrenaline — in the brain, stimulants facilitate memory formation. Not surprisingly, emotionally arousing experiences — both positive and negative — also cause a surge of norepinephrine, which helps to create vivid, long-lasting memories. That's why we tend to remember events that stir our feelings and learn best when we are a little anxious.

Since PTSD is basically a pathological form of learning known as fear conditioning, stimulants could plausibly increase the risk of getting the disorder.

The role of norepinephrine in the enhancement of memory was demonstrated in an elegant experiment led by Larry Cahill at the University of California, Irvine. He randomly gave a group of subjects either propranolol, a drug that blocks the effect of norepinephrine, or a placebo just before they heard one of two stories: an emotionally arousing one or a neutral one. He then tested their memory of the stories a week later and found that propranolol selectively impaired recall of the emotionally arousing story but not the neutral story. The clear implication of this study is that emotion raises norepinephrine, which then enhances memory. Block norepinephrine and you can impair emotional memory. With PTSD, a shocking combat situation elicits a hard-wired fear response — the flight-or-fight reaction — with intense emotional arousal and a surge of norepinephrine in the brain. This burns in the memory of the traumatic experience. It also promotes fear conditioning, a form of learning in which previously neutral stimuli in the environment — sights, sounds and smells, for example — become linked with a trauma. So, for a soldier injured in a bomb blast, anything like the sound of an explosion or the odor of burning is now a potent conditioned stimulus that can evoke the trauma and trigger symptoms of PTSD, like a flashback or startle reaction.

Because norepinephrine enhances emotional memory, a soldier taking a stimulant medication, which releases norepinephrine in the brain, could be at higher risk of becoming fear-conditioned and getting PTSD in the setting of trauma.

This possibility is supported by both animal and human studies. In rats, tiny injections of norepinephrine into the amygdala, a region of the brain that encodes fear, can enhance fear conditioning. And Marieke Soeter at the University of Amsterdam recently conducted an experiment in which college students were shown a picture paired with a small electric shock. Before viewing the pictures, subjects were randomly given yohimbine, a drug that releases norepinephrine in the brain, or a placebo. When students were tested 48 hours later, those who had received yohimbine had greater fear-associated learning and had a harder time “unlearning” the fear — when presented with the picture in the absence of a shock — than those students who had taken the placebo.

The study implies that soldiers exposed to elevated norepinephrine levels from taking stimulants are also at risk of relapse when re-exposed to the initial stressor. And because the treatment of PTSD involves unlearning fear responses, soldiers exposed to stimulants during trauma could well be more resistant to treatment.

And in fact, blocking the effects of norepinephrine with beta blockers can stop fear-conditioning and possibly even prevent post-traumatic stress disorder.

Roger Pittman, a psychiatrist at Harvard Medical School, led a small study in 2002 in which he randomly assigned emergency-room patients to either the beta blocker propranolol or a placebo within six hours of their experiencing a traumatic event. After one month, subjects who took the propranolol had significantly fewer symptoms of PTSD than subjects who took the placebo.

Does all of this prove that stimulants promote the development of post-traumatic stress disorder?

No. Because two things are correlated doesn't mean there is a causal link. There are other factors that might play an important role, like incurring a traumatic brain injury, which is a known risk factor for the disorder, and growing steadily during these wars.

Still, it is an open question whether the use of stimulants in combat does more good than harm. The next step should be a rigorous epidemiologic study of a possible link between stimulants and PTSD in our troops.

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