



SMART

COULD A PILL MAKE YOU
A BETTER PILOT?

MEDICINE

By Melissa Brandzel



Smart drugs can revolutionize how pilots operate in the cockpit. They're touted to improve memory loss and hone concentration—handy tools for emergencies and final approaches.

You're flying the final leg of your cross country and feeling more than a little tired. There's no copilot to relieve you and, inexplicably, there's no Starbucks in sight. You're desperate to stay alert. What if you could pop a pill that would not only revive you, but actually sharpen your concentration and improve your performance in the cockpit?

Straighten Up And Fly Right

Dr. Jerome Yesavage of Stanford University sought an answer to this question. In 2002, he and a team of researchers studied the effect of donepezil—an FDA-approved drug that slows the progress of dementia in Alzheimer's patients—on aircraft-pilot performance. The group was comprised of 18 licensed pilots with an average age of 52. The pilots flew seven 75-minute practice flights in a Cessna 172 flight simulator, in which they performed several series of complicated maneuvers. In addition to being confronted with three emergencies per flight, such as a drop in oil pressure, the pilots were given new air-traffic-control commands every three minutes, with a new heading, altitude, radio frequency and, on half the legs, a new transponder code to remember and dial into the panel.

For 30 days following the simulator testing, half the group took a daily dose of five milligrams of donepezil (less than the routine dose for Alzheimer's), and the other half took a placebo. Then, both groups were tested in the simulator twice more to see how well they remembered their instruction. The result: The pilots on donepezil retained their training better than the placebo group, with significantly improved performance on the landing approach and in handling emergency situations.

The "Smart Drug" Revolution

Yesavage's study and others have been exploring the incredible potential of a new class of pharmaceuticals known as "smart drugs." In the last two decades, scientists have made giant strides in comprehending memory formation and loss, as well as identifying the genes and proteins in the brain responsible for such actions. Their research is being used to formulate drugs to help restore cognition in patients suffering from memory-loss conditions, like Alzheimer's, mild cognitive impairment and age-associated memory impairment. Those whose memories have been affected by neurodegenerative disease, stroke, head trauma or mental retardation—perhaps even those

having frequent "senior moments"—could soon find their lives greatly changed for the better. Drugs such as modafinil (used to treat narcolepsy) and donepezil are already available, and more are currently in development.

The market for such medicine is enormous, motivating pharmaceutical and biotech companies, large and small, to deliver them to the public. Helicon Therapeutics in Farmingdale, N.Y., has been using mice to test a drug known as a CREB (c-AMP response element binding protein) enhancer, which increases the ability to remember tasks. Cortex Pharmaceuticals in Irvine, Calif., has developed memory-enhancing drugs called ampakines, designed to help treat Alzheimer's, mild cognitive impairment and schizophrenia. Memory Pharmaceuticals, Merck & Co., Axonyx, Johnson & Johnson, Eureka! Pharmaceuticals, Pfizer and GlaxoSmithKline are developing and testing their own smart pills. Some of these drugs are already being tested on humans; some are being tested on animals and will be entering human trials in the next few years.

Matter Over Mind

The rise of these memory enhancers poses an important question: What would happen if these drugs were used by healthy individuals seeking increased alertness and performance? Would they actually help people be more productive, sleep less or, say, learn a new language faster—even those who aren't truly memory-impaired?

If so, they're likely to join the growing ranks of drugs—donepezil and modafinil among them—that are being used "off-label" by people other than those for whom the medication was intended. Another example, Ritalin (usually prescribed to treat children with attention-deficit hyperactivity disorder), is reported to be popular as a study aid among high-school and college students looking to enhance sharpness and retention.

Combating Fatigue

Such off-label use is not uncommon to the U.S. military, which has been

administering “go pills” (dextroamphetamine) since World War II to help pilots on long-range missions. The Air Force and Navy have determined the pills to be safe and effective, distributing the drugs on a limited basis for particular circumstances, such as operational fatigue. This usually means three to four days or more of an overloaded work schedule, in which pilots are unable to get a good night’s sleep and are suffering from mental and physical exhaustion. But several

officials must first approve the use of the pills, a few of which will then be given to pilots. Unused pills must be returned. “The use of medication by aviators is tightly controlled by flight surgeons and squadron commanders,” says Lt. Mike Kafka, a spokesman for the Navy Bureau of Medicine in Washington, D.C.

The Air Force has extensively tested other drugs that increase alertness, too, including modafinil. Its recent head-to-head test of dextroampheta-

mines versus modafinil on severely fatigued pilots showed that, despite the side effects of the latter drug in some individuals, both medications worked effectively to overcome sleepiness and enhance performance.

Popular Pick-Me-Ups

Some research indicates that the new smart drugs are no more effective than that perky over-the-counter favorite, caffeine. Nancy Jo Wesensten of the Walter Reed Army Institute of Research’s sleep center conducts tests on sleep-deprived soldiers, looking for ways to improve their abilities on the battlefield. In a test of modafinil versus caffeine, the results were very similar: In high doses, both were successful at reversing the effects of sleep deprivation and restoring performance to normal levels.

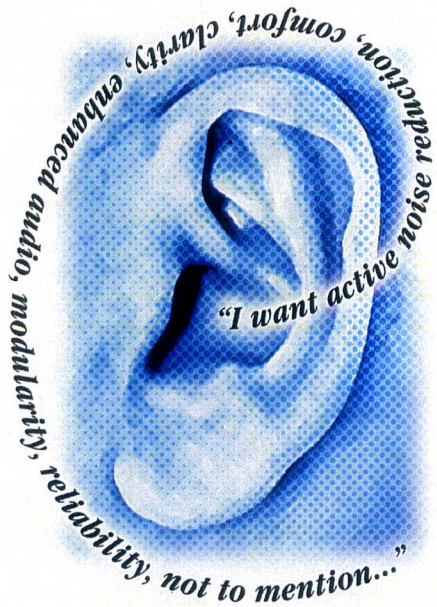
Another omnipresent, low-priced stimulant is the herbal medicine ginkgo biloba, touted as a memory enhancer. Sales exceed \$1 billion a year in the U.S., despite a lack of FDA approval. Little marginal scientific evidence exists to support the herb’s effectiveness; nevertheless, many people believe that it works.

Thinking Ahead

The appeal of a memory booster is undeniable—even to those of us who simply would love to remember where we keep leaving our sunglasses. For pilots, it could be a much-needed aid to fight fatigue and hone concentration. And consider the impact that smart pills could have on the FAA’s age-60 retirement rule. Why force retirement on aging airline pilots who can prove they’re still tack-sharp?

Despite the race to get these smart drugs ready, it will likely be five to 10 years or more before they hit the market. They’re still in clinical trials, and the extent to which they can fulfill their promises remains to be seen. Testing has been conducted on relatively small groups for relatively short durations; the effects they may have on the average person, either short- or long-term, are still inconclusive. But maybe, just maybe, our performance in the cockpit will be enhanced not only by training, but also by the pills we take.

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