



IT'S ALL IN YOUR HEAD Brain scans show that many forms of addiction—including compulsive behaviors like gluttony—have the same roots in the brain.

ADDICTION ON THE BRAIN

From vaccines to versatile drugs, new cures are all about chemistry

IT'S A GREAT time to be an addict. Long viewed as a moral failing, addiction is increasingly being redefined by scientists and physicians as a chronic, relapsing disease—one that can be treated chemically.

This year, we will find out whether an entirely new solution fulfills its early potential: vaccination. Anti-addiction vaccines produce antibodies that detect molecules from abused drugs and bind to them, keeping them out of the brain and blocking their pleasurable effects.

First up is an anti-nicotine vaccine with a promising past. In early studies, 40 percent of

those receiving the vaccine (called NicVAX) quit smoking without suffering withdrawal symptoms. More trials will be carried out this year, and the government is likely to fast-track approval if the vaccine does well.

The major momentum, though, remains with finding drugs to help people stop using drugs. Fifty clinical trials of drugs for alcohol dependence are going on right now. One high-profile example is Rimonabant, approved in Europe for weight control. Researchers are studying it not only for its anti-alcohol properties but also as a smoking-cessation drug.

How can a single drug work against different types of substance abuse? Because addictions of many kinds often make use of the same brain pathways. Although there is no *single* "addiction gene," research has shown that various forms of addiction may share genes as well as brain circuits.

By early this year, studies will reveal gene variants that increase vulnerability to nicotine and alcohol addiction. Those same genetic variations will likely appear in future studies of cocaine and opiate abuse—and lead to still more versatile treatments.—TABITHA

WANT TO WIN IN 2007? GET INNOVATING

BUILD A FLYING CAR

In early August, competitors will put their small craft through a series of challenges in the NASA-sponsored Personal Air Vehicle Challenge. The battle to develop tomorrow's flying car will be held in Santa Rosa, California. cafefoundation.org
WIN: \$100,000

RUN A SPACE ELEVATOR

To win a piece of the purse

in October's third annual Space Elevator Competition, your light-beam-powered "elevator" must climb 328 feet up a vertical cable at a speed of at least 6.6 feet per second—twice as fast and twice as high as in last year's competition. spaceward.org
PRIZE: \$500,000

INVENT A ROBO-VEHICLE

Darpa has upped the stakes in its third annual Grand

Challenge, to be held on November 3. Autonomous robot cars have only six hours to negotiate 60 miles of traffic-ridden mock city streets and carry out a simulated military supply mission. darpa.mil/grandchallenge
PRIZE: \$2 MILLION

TRACK AN ASTEROID

The Apophis Mission Design Challenge awards the team with the best plan for a mis-



BIG HIT? A workable plan to stop an asteroid would be.

sion to put a tracking device on or near the asteroid Apophis, which has a small probability of smashing into Earth in 2036. planetary.org
PRIZE: \$50,000

OCTOBER

BUY YOUR TICKET!



RACING ROCKETS

The Rocket Racing League goes full throttle in Las Cruces, New Mexico, as the first

10 daredevil pilots push their rocket-powered craft to 300 mph around a mile-high virtual track. Fans can watch as the speedsters take 500-foot plunges over the grandstands, or follow the planes on six 50-foot video screens, each with the 3-D track superimposed over the race. \$tk; rocketracingleague.com

WILL IT EVER HAPPEN?

DRUGGING OUR DIET

French company Sanofi-Aventis's highly anticipated diet pill, Rimonabant, which cuts cravings and improves fat metabolism, became available to Europeans under the name Acomplia in 2006. Many expect the drug to pass muster with the FDA before the end of the year—and be prescribed to the ample market of overweight Americans in vast quantities by 2008.

NOVEMBER

MANTLE MUNCHER

Japan's *Chikyu*, a floating scientific lab which doubles as the world's largest deep-sea drill, sets sail for its first scientific mission this fall. The ship will bore TK feet into the sea floor off the coast of Japan



to study earthquake-generated tsunamis. Its ultimate goal: pierce Earth's mantle.