Sure, exercise is good for your waistline, your heart, your bones - but might it also help prevent addiction to drugs or alcohol?

There are some tantalizing clues that physical activity might spur changes in the brain to do just that. Now the government is beginning a push for hard research to prove it.

This is not about getting average people to achieve the so-called runner's high, a feat of pretty intense athletics.

Instead, the question is just how regular physical activity of varying intensity - dancing, bicycling, swimming, tae kwon do - might affect mood, academic performance, even the very reward systems in the brain that can get hijacked by substance abuse.

What first caught the attention of National Institute on Drug Abuse chief Dr. Nora Volkow: A study found tweens and teens who reported exercising daily were half as likely to smoke as their sedentary counterparts, and 40 percent less likely to experiment with marijuana.

Volkow knows - from her own 6-mile daily runs and from her scientific experiments - that the brain literally likes physical activity. Exercise seems to invigorate neurochemicals that sense and reinforce pleasure.

"In children, it's innate," she notes. "Children want to move."

But the nation's children are becoming more sedentary, as illustrated by the obesity epidemic, "screen time" replacing outdoor play and a drop in school P.E. And as youngsters approach adolescence, the run around the yard that used to be fun too often
becomes a chore - the dreaded jog around the school track or the nagging to get off the couch. The sedentary teen turns into the sedentary adult.

"Why do we lose the ability to experience pleasure from physical activity?" asks Volkow.

Recently she brought more than 100 specialists in exercise and neurobiology to a two-day conference to explore physical activity's potential in fighting substance abuse, and announced $4 million in new research grants to help.

Drug treatment programs often include exercise, partly to keep people distracted from their cravings, but there's been little formal research on the effects.

The best evidence: Brown University took smokers to the gym three times a week and found adding the exercise to a smoking-cessation program doubled women's chances of successfully kicking the habit. The quitters who worked out got an extra benefit: They gained half as much weight as women who managed to quit without exercising, says lead researcher Dr. Bess Marcus.

She now is working with the YMCA on a larger, NIDA-funded study to prove the benefit.

Marcus cautions that people trying to kick an addiction have a powerful incentive to exercise. Could that possibly translate into prevention? Among the clues:

Rats were less likely to ingest amphetamines if their cages had running wheels, suggesting exercise stimulated a reward pathway in the brain to leave them less vulnerable to the drug's rush.

In people, exercise acts as a mild antidepressant and relieves stress. Depression, anxiety and stress increase risk of alcoholism, smoking or drug abuse.

Volkow is intrigued that attention deficit disorder and obesity both involve problems with the brain chemical dopamine, one system that drugs hijack to create addiction.
Baby monkeys who don’t play enough in childhood have problems controlling aggression when they’re older. The most aggressive tend to have defects involving the feel-good brain chemical serotonin - and binge-drink when researchers offer them alcohol.

Back to rats, physical activity increases production of growth factors and stem cells in key brain regions important for learning and mood: increases formation of blood vessels; and strengthens communication networks between brain cells.

Together, that’s far too little research to know if exercise really matters for substance abuse, scientists at the National Institutes of Health meeting cautioned.

But, a few studies of school-age children suggest physical activity predicts better performance on math, verbal and other tests - and better school performance in turn is linked to lower risk for substance abuse.

And getting sedentary seniors moving improves brain function - research aimed at preventing dementia, not drug abuse, although the improvement is in an area that in younger people is linked to risky decision-making.

A major study that tracks adolescent risk behaviors found that by 12th grade, exercise offers no protection against binge-drinking.

“Now the kids who exercise the most actually drink the most,” says Dr. Lloyd Johnston of the University of Michigan. It may have to do with the celebratory nature of team sports, or getting revved for college - or, other researchers suggested, even that competition is to blame.
Questions 11

Answer the following questions in the space provided. Use complete sentences and accurate spelling.

1. What study first caught the attention of Dr. Volkow?

2. What reaction does the brain tend to have to exercise?

3. What tends to happen to a sedentary teen?

4. What did the Brown University study show for smokers (who were in a smoking cessation program) when exercise was added to the treatment?

5. What have studies shown with rats and drug use when exercise is introduced?

6. Why do kids who exercise the most actually drink the most?