[Medical Research]

Unlocking the Mysteries of the Brain that Stand in the Way of Treatment and Prevention

Photo by Juanita James

From left to right: Dr. O'Brien, Dr. Karp, Dr. Childress, Director Walters, Dr. Brandenstein

Good reasons to smile at dedication of new PET camera, University of Pennsylvania, Philadelphia, April 4, 2002.

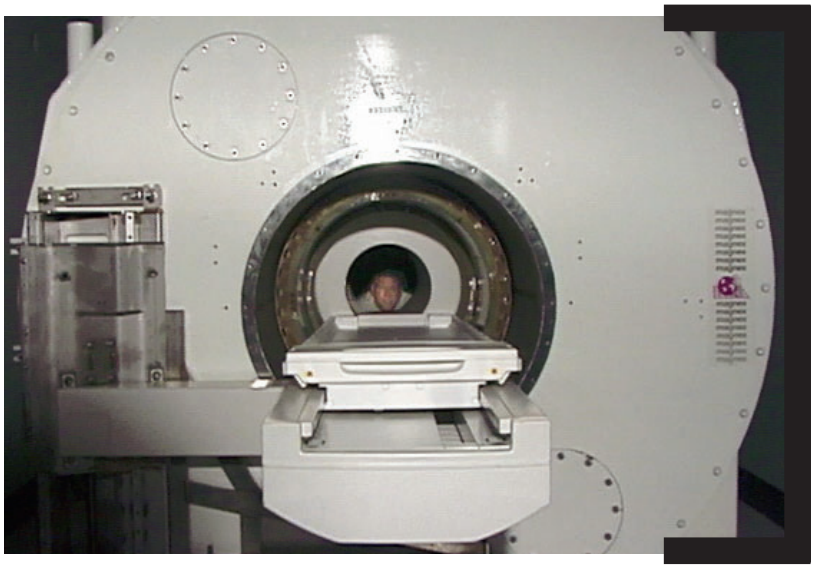
Prominent neuroscientists Dr. Anna Rose Childress and Dr. Charles O'Brien, now have the specialized brain scanner they need to develop medications to control craving in cocaine addicts. This new PET camera developed by Dr. Joel Karp's UPENN design team has a highly innovative array of 18500 detectors that can localize human brain activity to within 3.5 millimeters. With the accuracy available from the new PET camera, Dr. Childress can determine exactly where in the brain a therapeutic medicine is having its effect. Developing medications to alleviate the harmful effects of drugs of abuse is a top priority for White House Drug Czar John Walters and is supported by the National Institute on Drug Abuse (NIDA). CTAC Director Dr. Al Brandenstein runs Walters' program providing technologically innovative, state-of-the-art brain scanners to major US research institutions specifically to work on drugs of abuse.

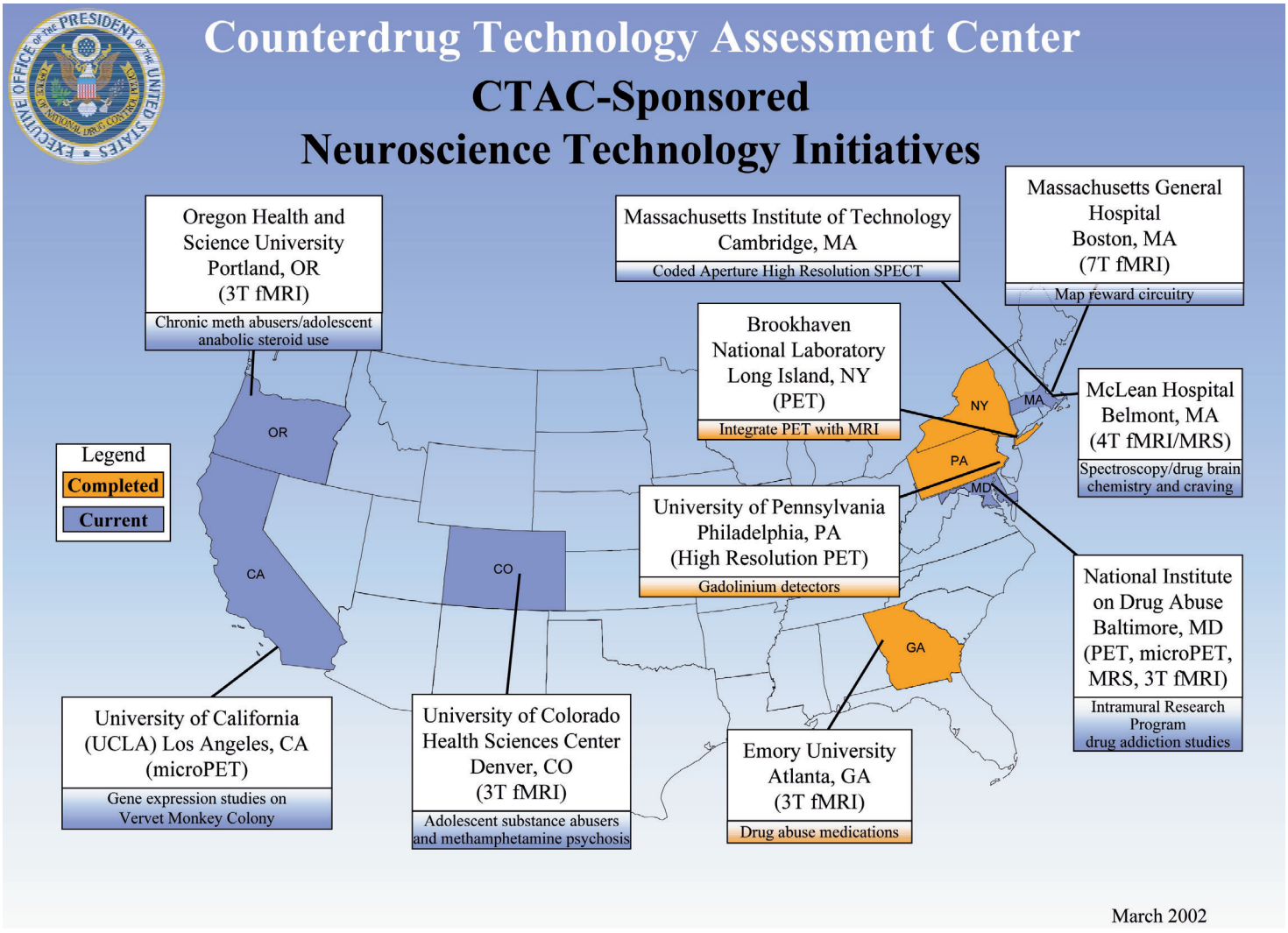
Edward, (photo below), a paraplegic and a cocaine addict, reported to Dr. Childress that Baclofen, the drug he takes to control muscle spasms, also lets him control his cocaine craving. Dr. Childress is pursuing that lead vigorously and her work with Edward was featured on the recent PBS series on the human brain. Dr. Childress' new, CTAC-sponsored PET camera was specifically designed to facilitate her NIDA-funded craving studies.

Mapping CTAC's plan to arm American brain researchers with state-of-the-art technology to develop counterdrug medications and new knowledge leading to better prevention and treatment ▶

World's Most Powerful Brain Scanner for Use in Human Beings Provided by CTAC to Massachusetts General Hospital is on Historic Mission

Principal Investigator Prof. Hans Breiter, MD, (inside machine during its installation), plans to use the giant 7-Tesla fMRI to undertake a project of epic proportions, "Mapping the Circuitry of Human Motivation and Reward." Dr. Breiter hopes to get answers to questions about treatment and prevention that require unprecedented access to the innermost workings of the human brain. Until this machine was created (under the guidance of MGH's Dr. Bruce Rosen), such access was theoretical, only.





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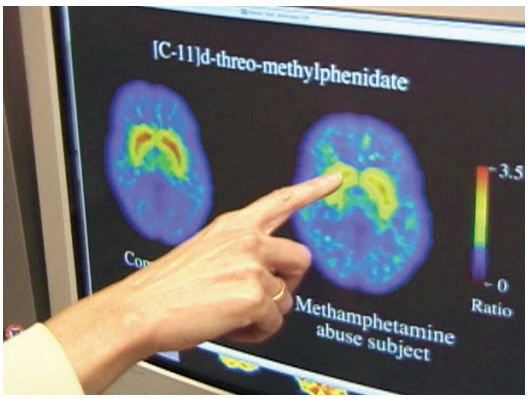
"Amped up! Angry!

Misunderstanding people!

Them misunderstanding me!"

That is how this young methamphetamine addict described some of the changes in her brain that she believes the drug has induced. What she did not know was while she was taking the drug in the streets, researchers at Brookhaven National Laboratory led by Dr. Nora Volkow were making an important and chilling discovery. Working with Dr. Linda Chang and using a CTAC sponsored PET camera, Dr. Volkow documented long-term brain damage in methamphetamine users and suggested that this drug-induced brain damage may lead to early onset of the symptoms of Parkinson's disease.



Dr. Volkow's discoveries with the PET camera include the observation that differences in individuals' natural brain chemistry may lead to addiction in some people who try drugs once, while sparing others the horrors of being addicted. She used her PET scanner at Brookhaven to test the brain response of 23 healthy young men to the legal stimulant, Ritalin. About half of those men had lower D2 dopamine receptors in their brains. They were the same subjects who said the Ritalin experience was pleasurable, suggesting, said Dr. Volkow that, "people with fewer dopamine receptors may take drugs to activate pleasure circuits in the brain which could be one of the factors that predisposes a person to drug abuse."

The CTAC sponsored Primate Micro PET brain scanner was built by Dr. Simon Cherry (looking through the bore of the machine) to meet the research requirements of UCLA Prof. Edythe London, a pioneer in the neuroscience of addiction.

She will use the brain scanner, “to explore gene expression in monkey brain regions crucial to the reward effects of cocaine and other drugs. For the first time, the links between drug abuse and brain function will be linked to the expression of certain genes that can then be monitored externally. The implications for the development of counterdrug medications could be very significant.”