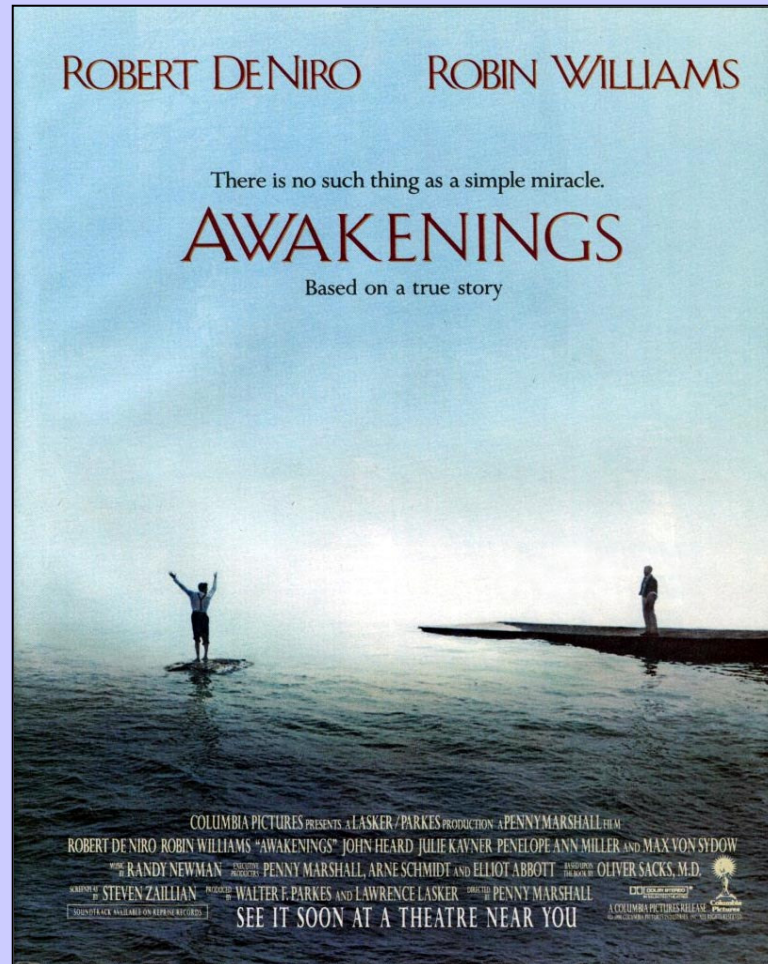


ROBERT DE NIRO ROBIN WILLIAMS

There is no such thing as a simple miracle.

# AWAKENINGS

Based on a true story



COLUMBIA PICTURES PRESENTS A LASKER/PARKES PRODUCTION A PENNY MARSHALL FILM  
ROBERT DE NIRO ROBIN WILLIAMS "AWAKENINGS" JOHN HEARD JULIE KAYNER PENELOPE ANN MILLER AND MAX VON SYDOW  
MUSIC BY RANDY NEWMAN EXECUTIVE PRODUCERS PENNY MARSHALL ARNE SCHMIDT AND ELLIOT ABBOTT BASED UPON THE BOOK BY OLIVER SACKS, M.D.  
SCREENPLAY BY STEVEN ZAILLIAN PRODUCED BY WALTER F. PARKES AND LAWRENCE LASKER DIRECTED BY PENNY MARSHALL  
SEE IT SOON AT A THEATRE NEAR YOU  
A COLUMBIA PICTURES RELEASE

[www.imdb.com](http://www.imdb.com)

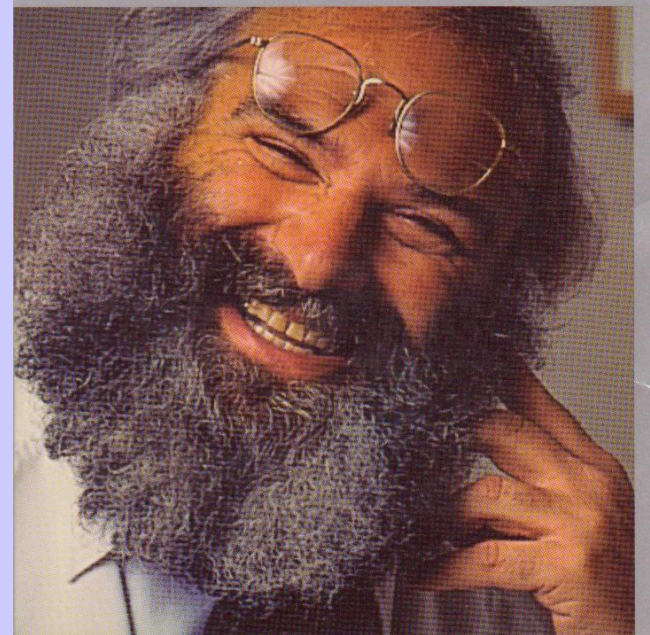
# Introducing Ch. 2, Biological Psychology

- 1. How changes in the brain or body affect our thinking and behavior
- 2. How changes in thinking and/or behavior influence changes in the body or brain.

# *Awakenings* and Dr. Oliver Sacks

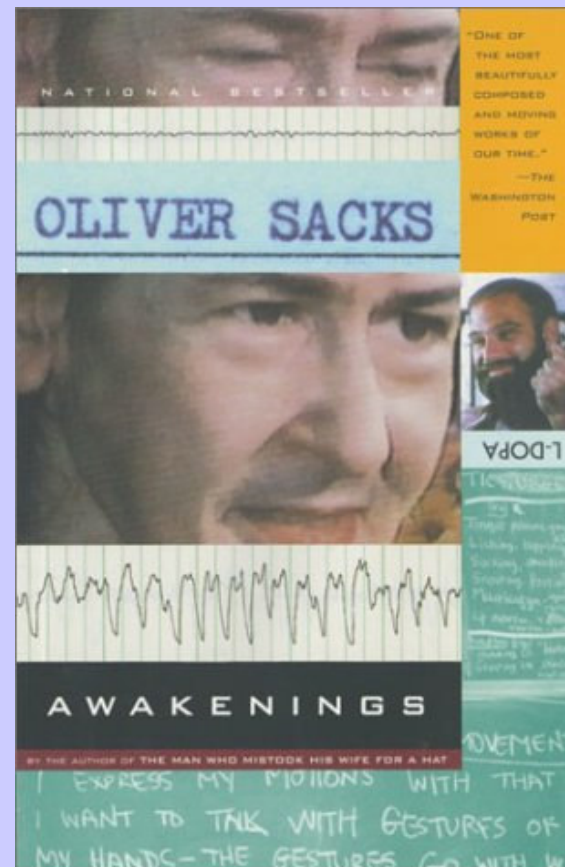
In 1966 Dr. Sacks began as a consulting neurologist for a chronic care facility in the Bronx, New York.

Dr. Sacks encountered an extraordinary group of patients who had spent decades in strange, frozen states, like human statues, unable to initiate movement.



# The Book

In his 1973 book, *Awakenings*, Dr. Sacks describes his efforts to bring patients at a Bronx hospital out of their sleep-like state.



# The Movie

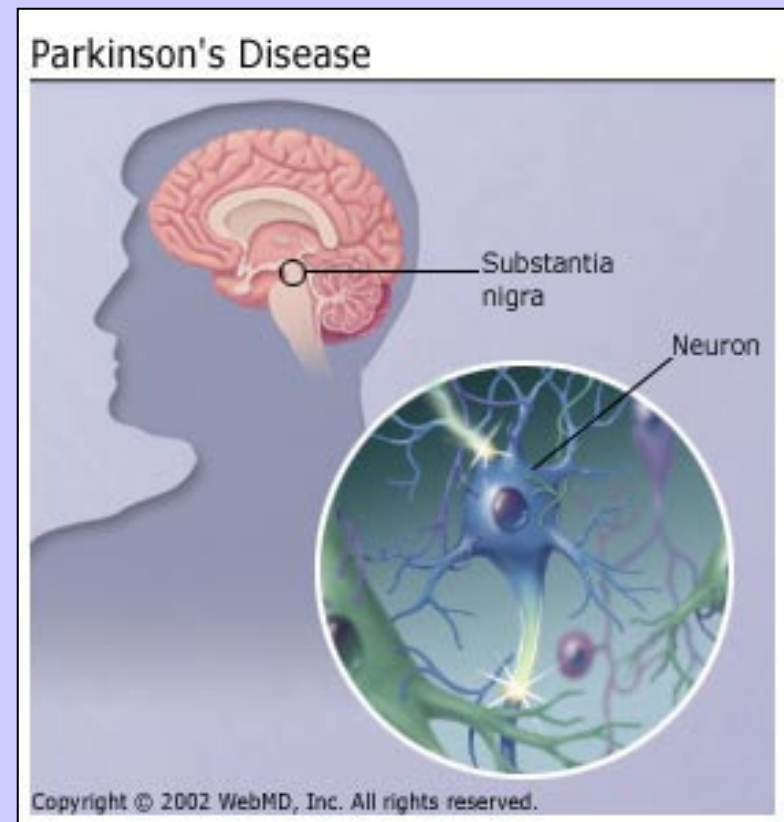
The 1990 Hollywood version of the book refers to Dr. Sacks as “Dr. Sayer” who is played by Robin Williams.

A major patient, Leonard, is played by Robert DeNiro



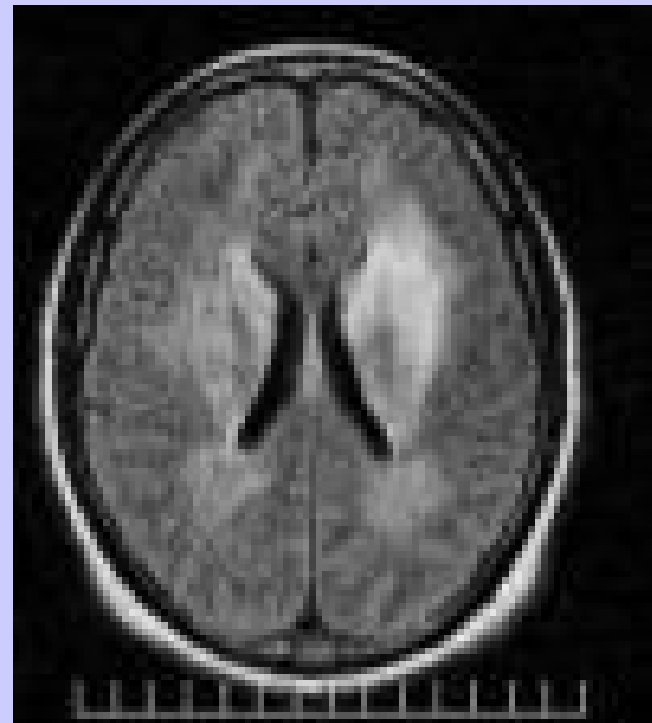
# Neurotransmitter deficiency

1. When the *dopamine* level drops below 80%, symptoms of Parkinson's disease begin to emerge.
2. The loss of dopamine causes the nerve cells of the basal ganglia to fire out of control, leaving patients unable to direct or control their movements in a normal manner.



# Sleeping Sickness

Dr. Sacks recognized these patients as survivors of the great pandemic of sleepy sickness of 1916 to 1927. These patients had encephalitis.

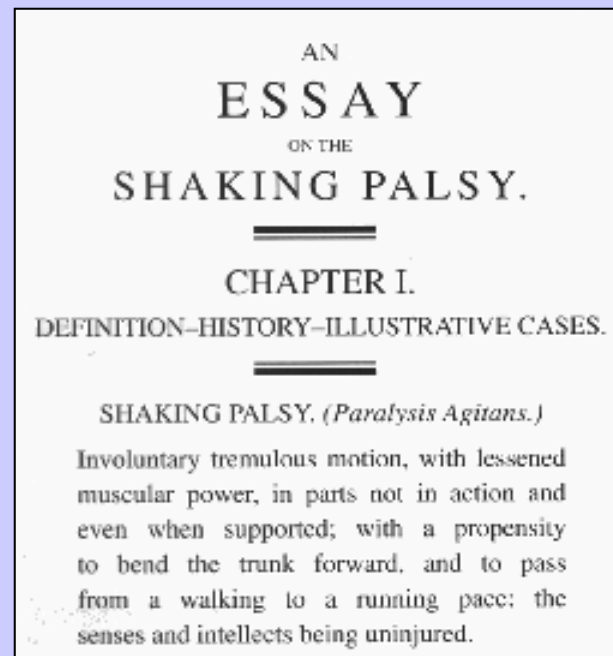


source: [www.oliversacks.com](http://www.oliversacks.com)



# Parkinson's origin and treatments

- A London physician, James Parkinson first described the disease in 1817.
- 100 years later it was thought to involve a chemical deficiency
- In the 1960s, scientists traced the problem to nerve cells failing to produce dopamine

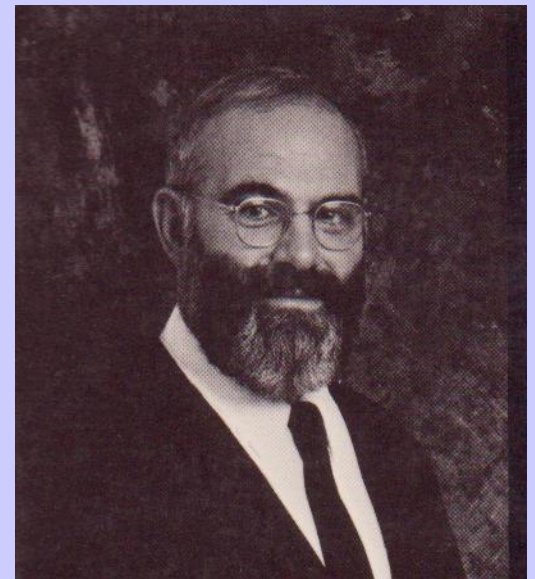




# Dopamine neurotransmitter

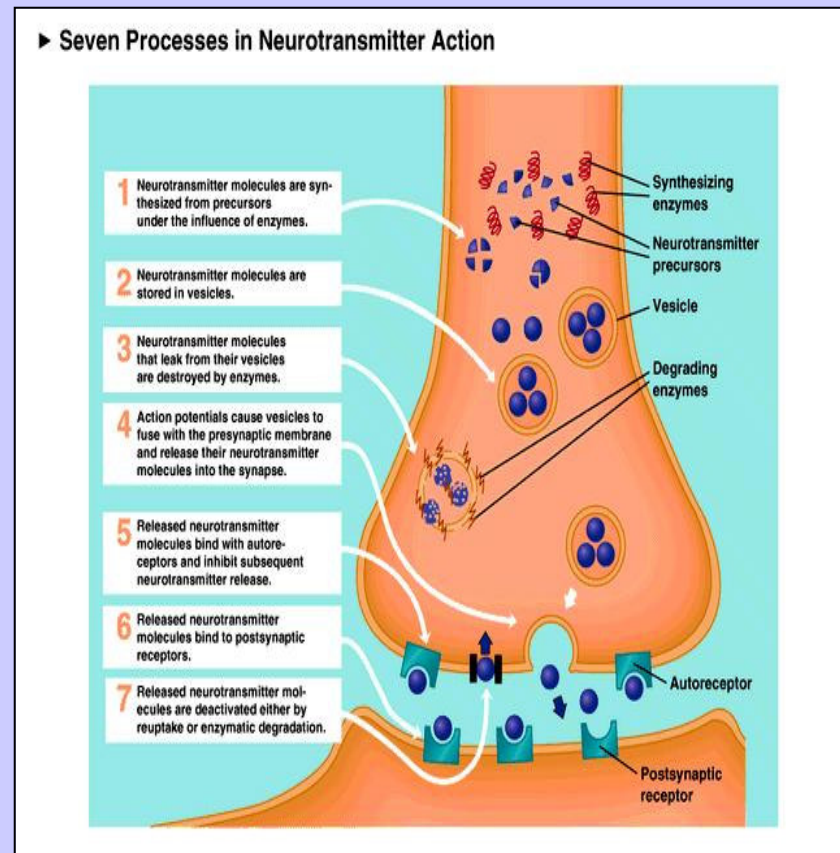
Chemical messenger responsible for transmitting signals between the substantia nigra and several clusters of neurons that together comprise the "basal ganglia"

Dr. Sacks focused his research on improving the communication of this network in the brain.



# How neurotransmitters work

- When an action potential reaches the end of the axon, it triggers sacs in the terminal buttons to release neurotransmitter chemicals
- They activate receptors in the postsynaptic membrane
- They may be inhibitory or excitatory depending on the receptor they attach to.

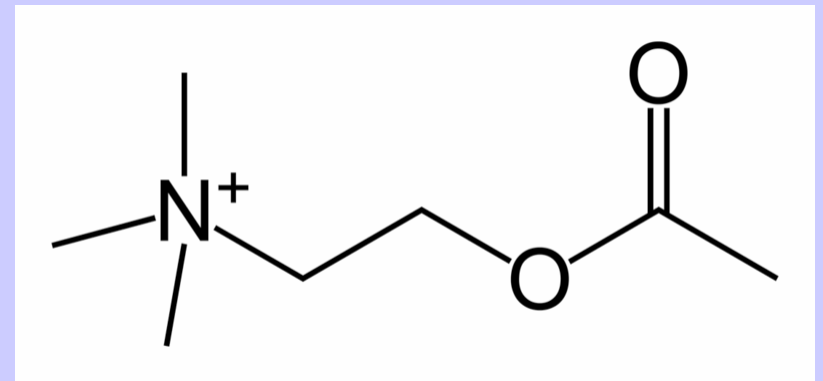


# Neurotransmitters you need to know

- These are the subject of several quiz and test questions as well as the Ch. 2 essay.

# Acetylcholine (Ach)

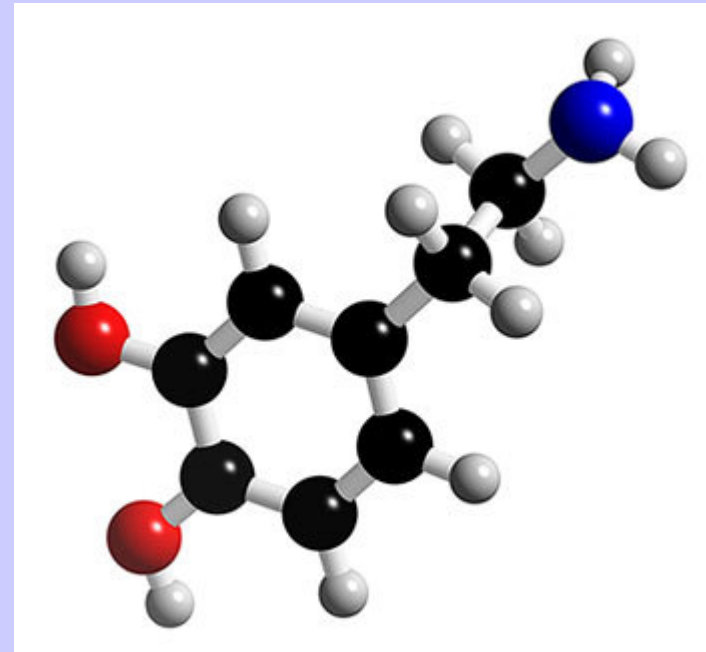
- Acetylcholine [ah-seat-el-KO-leen]
  - a neurotransmitter that, among its functions, triggers muscle contraction
  - Loss of production can lead to Alzheimer's
- Also affects learning and memory



[www.commonswikipedia.org](http://www.commonswikipedia.org)

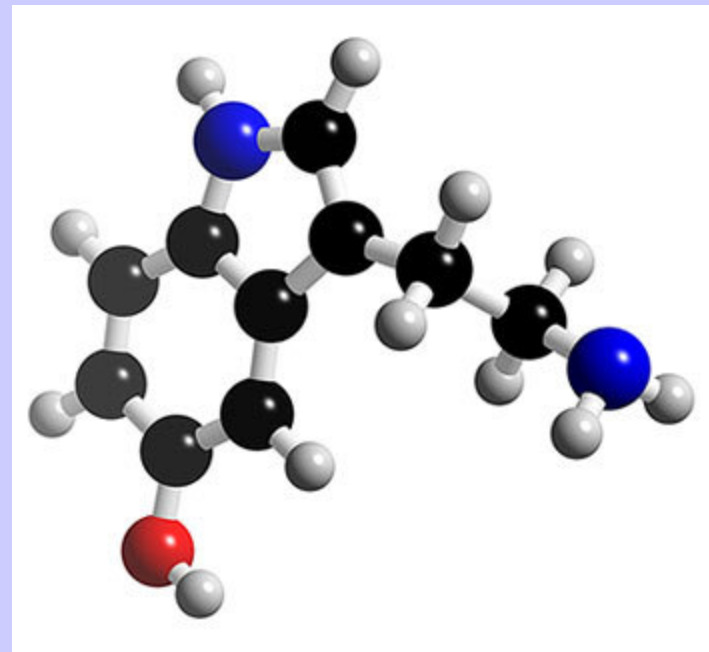
# Dopamine

- Inhibits other actions' effects
- Dampens and smoothes out neural messages
- Influences movement, learning, attention, and emotion
- Too much can lead to *schizophrenia*
- Too little can lead to *Parkinson's disease*



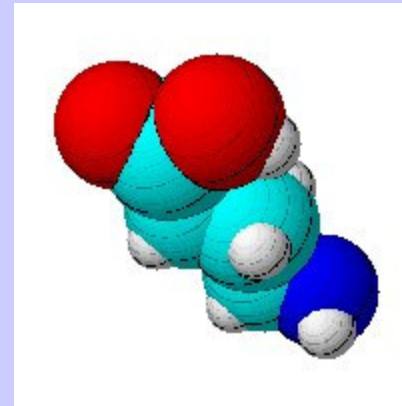
# Serotonin

- Involved in sleep and dreaming
- Also mood, hunger and arousal
- Low amounts may lead to *depression*



# GABA

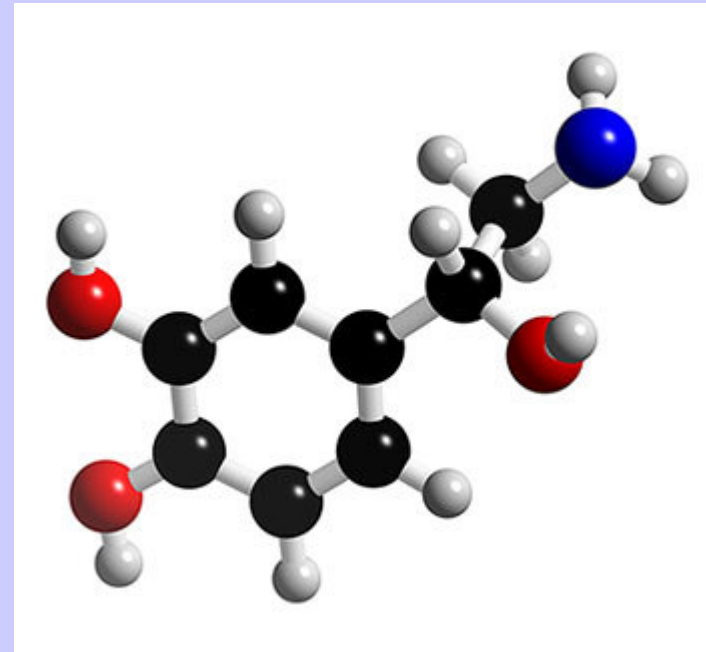
- Involved in regulating anxiety
- May be related to eating disorders or sleep difficulties and disorders





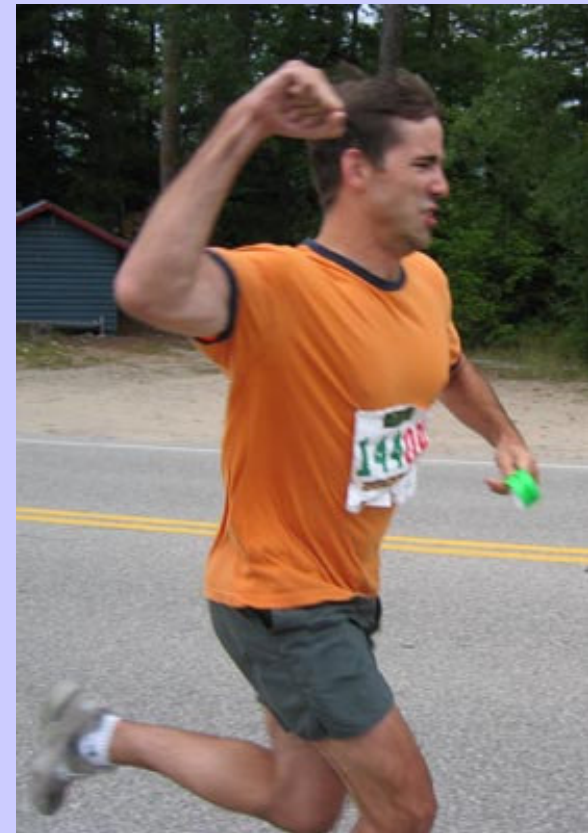
# Norepinephrine

- Increases arousal and alertness
- Boosts mood
- Too much can cause *mania*
- Too little leads to *depression*
- A *hormone* released by the adrenal system



# Endorphins

- Endorphins [en-DOR-fins]
  - “morphine within”; short for endogenous morphine
  - natural, opiate-like neurotransmitters
  - These compounds are produced in the pituitary gland and hypothalamus
  - linked to pain control and to pleasure



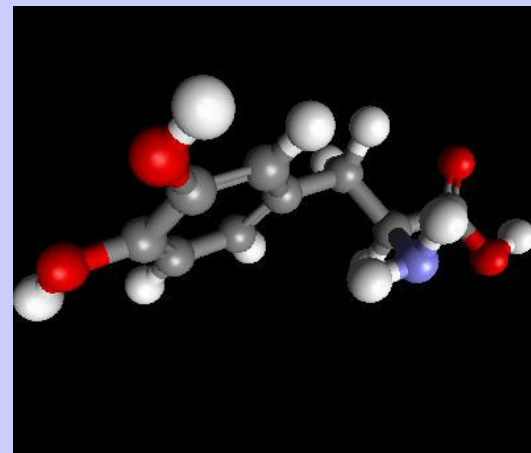
[http://www.dskendall.com/images/rtb\\_dave\\_smith.jpg](http://www.dskendall.com/images/rtb_dave_smith.jpg)

# L Dopa

Dr. Sacks treated his patients with the then-experimental drug, L-dopa

L-Dopa is an *amino acid* and absorbed by the digestive system

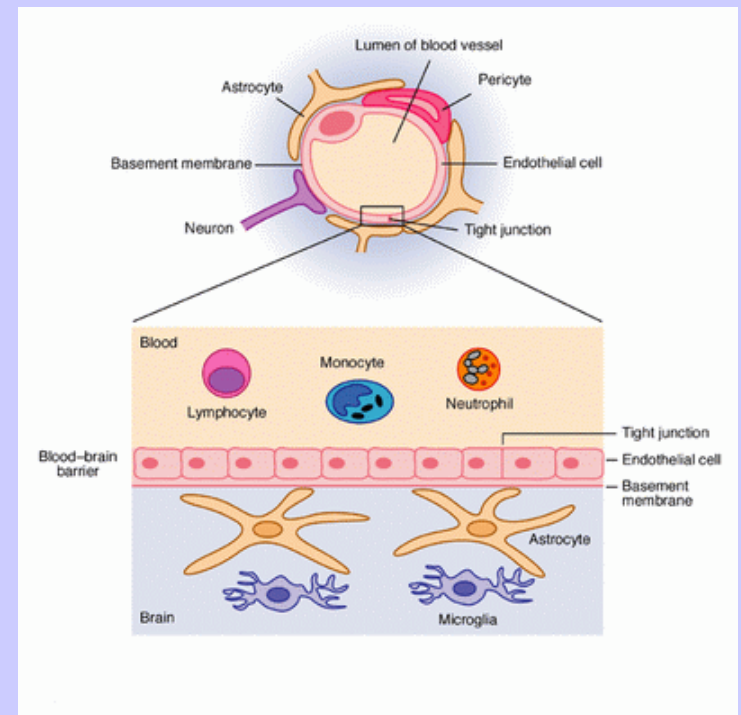
Pharmacologists found that L-dopa could cross the blood- brain barrier, whereas, *dopamine* treatments could not.



# Crossing the blood-brain barrier

- The blood-brain barrier prevents many low-life forms, such as toxins, that make it into the blood stream from tainting the brain's pristine nerve cell habitat.

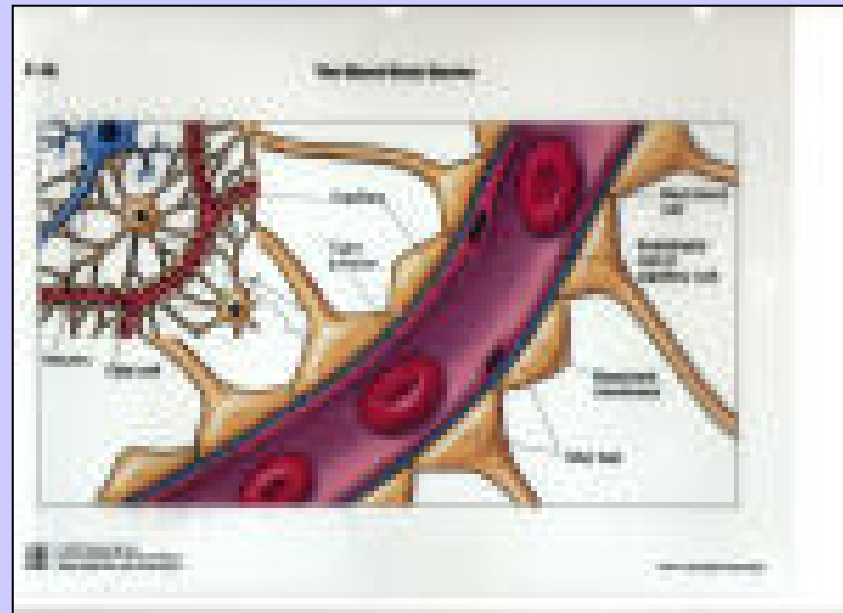
<http://apu.sfn.org/content/Publications/BrainBriefings/blood-brain.html>



[http://www.medicallook.com/systems\\_images/Blood\\_Brain\\_Barrier.gif](http://www.medicallook.com/systems_images/Blood_Brain_Barrier.gif)

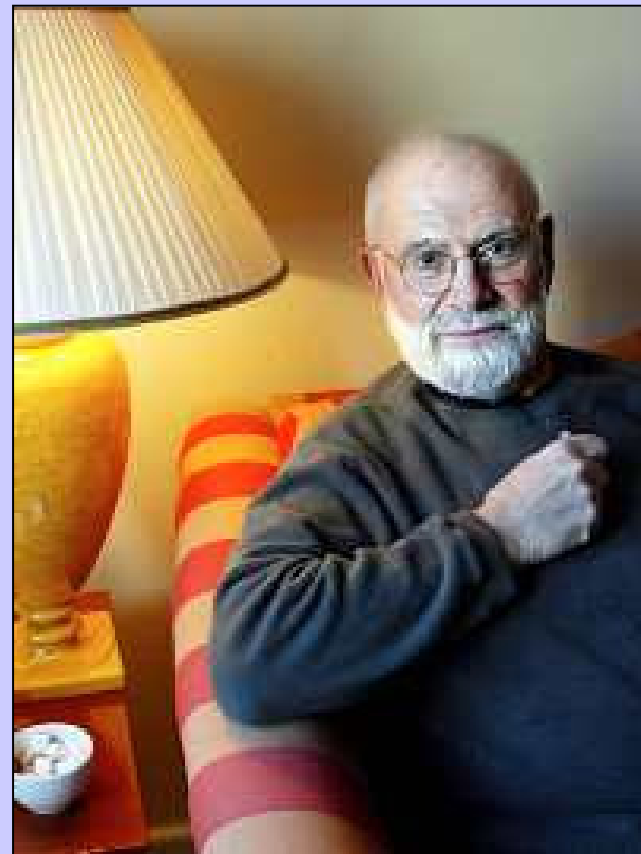
# L-Dopa

L-DOPA is able to pass the bloodbrain barrier. In this way, L-DOPA can replace the some of the deficit in dopamine seen in parkinsonism.



# Importance of Sacks' research

- Demonstrates how it might be possible to treat a brain disorder by replenishing the supply of a missing neurotransmitter
- His work demonstrates how our behavior has a substantial basis in our biology
- More info: [www.oliversacks.com](http://www.oliversacks.com)



# Unpredictable side effects

- Dr. Sacks: “Yo-yo reactions began occurring in a majority of my patients; and along with these, there increasingly occurred an extreme and ever-increasing sensitivity to L-dopa...”
- Symptoms included nausea, anxiety, irritability, hyperactivity, clumsiness, hallucinations, and uncontrollable movement
- Patients who had “awakened” in response to the drug, were taken off it, and returned to their original state.





# Awakenings Trivia

1. Prior to filming, the actors portraying patients studied films of Dr. Sack's actual post-encephalitis patients, and actors Robert De Niro and Robin Williams spent time with Dr. Sacks in the hospital observing him and his patients.
2. For the movie DeNiro filmed a scene with "Lillian T.," the only surviving patient from Oliver Sacks' book, "Awakenings." She was also said to have been the most outspoken patient in the 1973 documentary about the patients, also called "Awakenings."

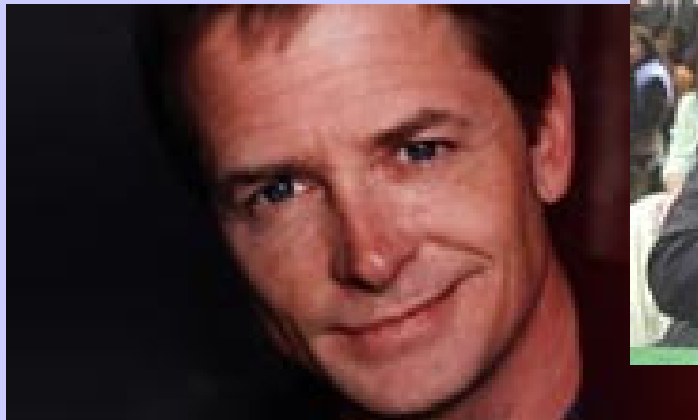
Source: <http://www.imdb.com/title/tt0099077/trivia>



<http://www.timeout.com/film/img/dvd/54392/cover.w200.jpg>

# Famous Celebrities with Parkinson's

- Muhammad Ali
- Michael J. Fox



Photos: Michaeljfox.org, [http://www.btbf.com/news/michaeljfox\\_muhammadali\\_congress2002.jpg](http://www.btbf.com/news/michaeljfox_muhammadali_congress2002.jpg),  
[http://news.bbc.co.uk/olmedia/220000/images/\\_222396\\_ali\\_300\\_\(23-10-98\)\\_elvis.jpg](http://news.bbc.co.uk/olmedia/220000/images/_222396_ali_300_(23-10-98)_elvis.jpg)

# The Fate of Leonard

The patient "Leonard" died, as have all the *AWAKENINGS* patients--but many lived long and relatively rewarding lives.

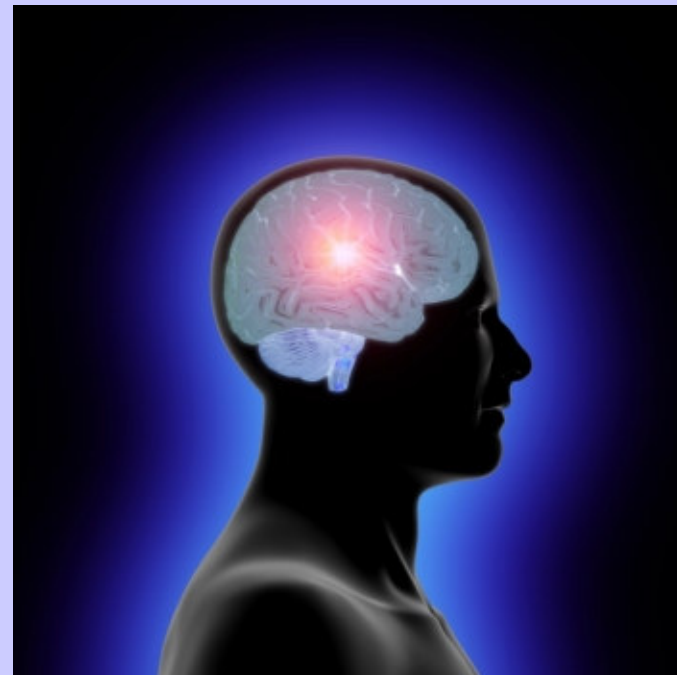


# Parkinson treatments

- The FDA approved three new drug treatments in 1998.
- 1997: device approved that is surgically implanted in the brain to lessen the violent shaking experienced by some Parkinson's patients.
- 1996: discovery of a gene believed responsible for a form of Parkinson's may result in future innovative treatments.
- Treatments now on the market can neither replace the faulty nerve cells that cause the disease nor stop Parkinson's from progressing.
- [http://www.fda.gov/fdac/features/1998/498\\_pd.html](http://www.fda.gov/fdac/features/1998/498_pd.html)

# No cure

- Currently, there is no cure for Parkinson's disease. The goals of treatment are:
  - 1) to minimize disability
  - 2) reduce the possible side effects of drug therapy
  - 3) help the patient maintain the highest possible quality of life.
- <http://www.drugdigest.org/DD/HC/Treatment/0,4047,550186,00.html>



<http://www.parkinsons-treatment.com/Parkinsons-Disease.jpg>