

Meet The

# SCIENTISTS



Module 2





• NIDA •

# MODULE 2: MEET THE SCIENTISTS

## Introduction

In Module 1, students discussed their ideas about scientists and the kind of work that they do. The students also became aware of their misconceptions about scientists and realized that scientists work in a wide range of specialties and come from all walks of life.

In today's lesson, students will watch a video introducing them to specific scientists. The scientists will explain their research by identifying what problems they set out to solve, how they solved—or attempted to solve—the problems, and what conclusions they were able to draw from their experiments. Students will then develop posters explaining each scientist's work in terms of the four steps of inquiry:

-  **Observe**—Check out the problem.
-  **Predict**—Time to make a good guess.
-  **Experiment**—Is your guess right? Find out by doing an experiment.
-  **Conclude**—Put the pieces together to figure out what's really going on.

After completing their posters, students will discover that all these scientists have one thing in common: They are all studying the brain and how it works.

## Learning Objectives

- ★ Students learn about specific scientists and the work that they do.
- ★ Students develop posters explaining the work of each scientist in terms of the steps of scientific inquiry.
- ★ Students discover that all the scientists they learned about are studying the brain.

## Relationship to the National Science Education Standards

The activities in this lesson align with two standards identified in the NSES: history and nature of science and science as inquiry.



## History and Nature of Science

Levels K-4	How Mission is Aligned
Science as a human endeavor	Students begin to understand that science encompasses many disciplines. They also start to realize that scientists ask questions and try to find the answers to these questions to do their jobs.

## Science as Inquiry

Levels K-4	How Mission is Aligned
Abilities necessary to do scientific inquiry	Students learn how scientists use the steps of scientific inquiry to solve a problem.

## Background

The scientists discussed below are doing research on the brain. Students will have an opportunity to hear from these scientists by watching the video accompanying this module. Following the description of each scientist's work is a brief explanation of how each uses the steps of scientific inquiry to solve problems.

### Eric Chudler, Ph.D.

A neurophysiologist from the University of Washington in Seattle, Washington, Dr. Chudler is currently studying why people with an illness called Parkinson's disease experience significant pain. Parkinson's disease affects a small area of neurons in a certain part of the brain. These neurons are responsible for coordinating smooth and balanced muscle movement. Parkinson's disease causes these nerve cells to die, and, as a result, body movements are affected. The person becomes shaky and finds it hard to speak. Dr. Chudler is conducting his research with rats and trying to understand the activity of neurons, or nerve cells, in the area of the brain affected by Parkinson's disease.

### Understanding Dr. Chudler's Research in Terms of the Steps of Scientific Inquiry

**Observe:** Dr. Chudler observed that people with Parkinson's disease also experience a lot of pain. He was puzzled by this because Parkinson's is a disease of movement and not typically associated with pain. He wanted to find out what was causing the pain in people with Parkinson's disease.



**Predict:** Dr. Chudler believes that a specific part of the brain is involved in both Parkinson's disease and pain. When this part of the brain is affected, people get the movement problems of Parkinson's disease, as well as the pain they experience.

**Experiment:** Using rats, Dr. Chudler measures the activity of neurons in the part of the brain responsible for Parkinson's disease to see if the pain is originating in the brain. If he can find where the pain is coming from, it will be easier to develop a treatment for this problem.

**Conclude:** From his research, Dr. Chudler hopes to find the area or pathways in the brain that cause pain in people with Parkinson's disease. Once this area or pathway is discovered, new treatments can be developed.

### **Michael Byas-Smith, M.D.**

Dr. Byas-Smith is an anesthesiologist at Emory University School of Medicine in Atlanta, Georgia. He is working with other scientists to determine whether chemical changes that take place in the brain make certain individuals more likely to become addicted to drugs. To answer this question, Dr. Byas-Smith and his team are working with rats, monkeys, and humans.

#### **Understanding Dr. Byas-Smith's Research in Terms of the Steps of Scientific Inquiry**

**Observe:** Dr. Byas-Smith wondered how specific chemicals in the brain behave when drugs or medications are given to people. These special chemicals are important because they help create habits in people. Some habits are good, like keeping your room neat or getting a good night's sleep. Other habits can be bad, like eating too much food even when you are not hungry.

**Predict:** Dr. Byas-Smith predicts that these chemicals act as a "switch" for addictive behavior. He wants to find the switch and figure out how to turn it off.

**Experiment:** Different experiments are being conducted on various systems in the brain to see whether there is an "addiction switch." Dr. Byas-Smith uses a Positron Emission Tomograph or "PET" scanner to take a picture of the brain while it's working.

**Conclude:** If Dr. Byas-Smith and his staff are able to find out how the brain chemicals work, they may be able to make medications that can help people stop bad habits and help those who might be more likely to develop bad habits.

### **Denise Jackson, Ph.D.**

Dr. Jackson is the Director of the Undergraduate Behavioral Neuroscience Program at Northeastern University in Boston, Massachusetts. She studies rats to look at the effects of cocaine on how the brain grows even before the rat is born.



### Understanding Dr. Jackson's Research in Terms of the Steps of Scientific Inquiry

**Observe:** Dr. Jackson wonders how cocaine affects the growth of the rats' brains at different times before they are born.

**Predict:** She predicts that giving a mother rat cocaine will have a different effect on the brains of her baby rats than on the mother rat herself. Different amounts of cocaine will also produce different effects.

**Experiment:** She uses specific tools and instruments to see how the brains of unborn rats are affected by cocaine. She is trying to learn if the neurons are where they are supposed to be in the developing brain.

**Conclude:** By testing these predictions on rats, Dr. Jackson is able to further understand brain development in humans. She hopes that as this begins to be understood, we may be able to make discoveries and develop ways to correct the problems in babies whose mothers take drugs like cocaine before they are born.

### Alane Kimes, Ph.D.

Dr. Kimes is a drug abuse researcher. She works at the NIDA Research Program in Baltimore, Maryland. She is interested in finding out how drug abuse changes the way the brain works. From her research with animals and people, she hopes to find ways to help people stop using drugs.

### Understanding Dr. Kimes' Research in Terms of the Steps of Scientific Inquiry

**Observe:** The purpose of Dr. Kimes' research is to study how the brain functions in normal people in comparison to how the brain functions in drug abusers or smokers.

**Predict:** Dr. Kimes believes that if she is able to find out what is different about the way drug abusers' brains work, she may be able to find out ways to help their brains and make them work more like the brains of people who don't abuse drugs.

**Experiment:** Dr. Kimes uses a scanner to see what parts of the brain are working harder than other parts when people play special games or take little tests. The brains of people who have taken drugs like cocaine, heroin, or marijuana or who smoke cigarettes sometimes work differently than people who don't take these drugs.

**Conclude:** So far, Dr. Kimes has found that the parts of the brain involved in making risky decisions don't work as well in drug abusers when compared to people who don't abuse drugs. She hopes to find out more so she can change the way the brain works and help people make better decisions to not use drugs.



## Materials

- ✓ Videotape and VCR
- ✓ Markers
- ✓ Poster board
- ✓ Paper and pencils
- ✓ Resume form





## Preparation

- ★ Preview the videotape so that you are familiar with the scientists.
- ★ Write the steps of scientific inquiry (Observe, Predict, Experiment, and Conclude) on pieces of poster board in preparation for the discussion on the work of the scientists showcased in the video.
- ★ Make copies of the black-and-white trading cards found at the back of the Module 2 Teacher's Guide so that each student has a copy of each card.

## Procedure

1. Begin the lesson by reviewing with students their ideas about scientists, which they discussed during Module 1. Take a second look at the pictures they drew in Module 1 and go over the list of characteristics of scientists that they developed.
2. To learn more about scientists and the work they do, tell the students that they are going to watch a video about the research of a few scientists. After watching the video, they will work on their first mission with the *Brain Power!* Club. The goal of the mission is to help students understand the work of these scientists and the process of scientific inquiry.
3. As a class, watch the section of the video about scientists, then turn off the tape and show students the pieces of poster board you prepared with the steps of scientific inquiry. Then, go over with the class what these steps mean; they are defined on the next page.



-  **Observe**—Take note of a particular situation and check key aspects of it, such as what something looks like, feels like, smells like, and other salient characteristics. For a researcher, this might be studying problems in the world.
-  **Predict**—Develop an idea about why a problem exists or an explanation of a particular phenomenon.
-  **Experiment**—Conduct investigations to try to solve the problem or explain the phenomenon.
-  **Conclude**—Summarize what was learned from the experiment.

4. Make a chart that lists the scientists in the video and the work they do. Discuss with your students how the scientists in the video used the different steps of scientific inquiry. How are the scientists' research programs similar? How are they different?
5. If time allows, have each child in the class fill out the resume form (included in the back of this module of the Teacher's Guide) as though he or she wants to be a scientist. Have them answer each of the questions on the form, in pictures or in words, about what kind of research he or she would like to do.
6. To conclude the mission, ask students what one thing all the researchers in the video have in common. Help them realize that all the scientists are studying the brain. Then, tell students that during the next mission, they, too, will be learning about the brain and how it works.
7. Tell students to give themselves a round of applause. They have just completed the second mission of the NIDA *Brain Power!* Program.

## Discussion Questions

- ? Go over the work of the scientists shown in the video. Make sure students understand what field the scientists are in, what they study, how they are solving their research problems, and that research is an ongoing venture that continually yields new questions and solutions.
- ? Ask students what they know about the brain and what it does. Write down their ideas on a piece of newsprint. You may want to refer to it during the next module, when students focus on the brain.



## Extensions

The activities listed below provide a link to other areas of the curriculum.



Language arts



Math



Drama



Art





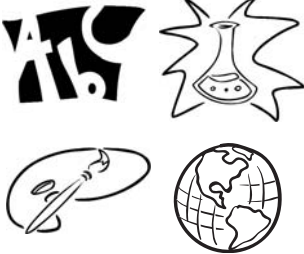


Science



Social Studies



Reading

	<p>Make a class mural showing different places where a scientist can work. Students can divide the mural into different sections to show a range of scientists, including laboratory scientists, behavioral scientists, and those who work with people in schools, day care centers, or other facilities.</p>
	<p>Develop a class poem about science and scientists. Possible kinds of poems include ABC poetry, quatrains, or basic rhyming poems.</p>
	<p>Look in newspapers or on Web sites for articles about recent scientific discoveries. Cut out the articles and make a scrapbook of new advances in science. You can add to the scrapbook throughout the school year. Go to the National Institutes of Health Web site at <a href="http://science-education.nih.gov">http://science-education.nih.gov</a> to find information on science in the news and other health-related issues. Also, check out The Why? Files at <a href="http://www.whyfiles.org">www.whyfiles.org</a>. This site demonstrates a real-life approach to science that can be very useful to teachers and students.</p>
	<p>Read a biography of a famous scientist to the class. Possible scientists include Sally Ride, Ben Carson, Marie Curie, Camillo Golgi, and Louis Pasteur. Biographies are included at the end of the Teacher's Guide.</p>
	<p>Discuss how the work of at least one of the scientists highlighted in the video is benefiting society. How is their scientific research improving the quality of our lives?</p>





## Assessment

As students work on the activity, look for the following:

- Have students grasped the concept that there are many different kinds of scientists who work in many different fields? For example, do students understand that some scientists work in a laboratory, while others work with people in a natural setting?
- Did students understand the steps of scientific inquiry?
- Were students able to figure out how the scientists in the videotape used these steps as a framework for their own research programs?

## Notes:



## Resources for Teachers

National Institute on Drug Abuse (NIDA)

[www.drugabuse.gov](http://www.drugabuse.gov)

301-443-1124

This Web site contains information about drug abuse and a section designed specifically for parents, teachers, and students. Publications and other materials are available free of charge.

National Clearinghouse for Alcohol and Drug Information (NCADI)

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

1-800-729-6686

NCADI is the world's largest resource for information and materials concerning substance abuse. Many free publications are available here.

Eisenhower National Clearinghouse (ENC)

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

This Web site provides useful information and products to improve mathematics and science teaching and learning.



## Resources for Students

The Why? Files

<http://whyfiles.org>

Explanations for scientific phenomena discussed in the news.

Tiner, J. *100 Scientists Who Shaped World History*. San Mateo, CA: Bluewood Books, 2000.

This book talks about great men and women of science who significantly contributed to our understanding of the physical world around us.

Kramer, S. *How to Think Like a Scientist: Answering Questions by the Scientific Method*. New York, NY: HarperCollins Children's Books, 1987.

This book shows how scientists use questions to learn about things. It teaches how the scientific method can help find answers to many questions people are curious about.

Kramer, S. *Hidden Worlds: Looking Through a Scientist's Microscope (Scientists in the Field)*. Boston, MA: Houghton Mifflin Co., 2003.

This book shows how scientists study the world and includes many behind-the-scenes pictures of the life of a scientist.



## Biographies



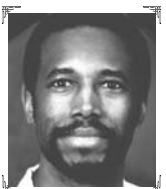
Marie Curie (1867-1934) was a chemist who studied radioactivity. Radioactivity is what makes x-rays work. Marie Curie invented the first x-ray. She was the first woman to win a Nobel Prize. She won the Nobel Prize in 1911.

Camillo Golgi (1843-1926) was an Italian doctor. He studied the brain and how messages travel around the body. Dr Golgi was a professor who taught science classes at two different universities. He was the first person to show how nerves work. He won a Nobel Prize in 1906, the highest honor in science.



Louis Pasteur (1822-1895) was a chemist and biologist. He proved that germs from outside of the body cause disease, invented the process of pasteurization (this is a process that milk must go through to destroy harmful germs), and developed vaccines for several diseases, including rabies. A vaccine is a shot that a person gets to prevent them from catching certain diseases. Louis Pasteur started his career as an assistant to one of his teachers.

Sally Ride (1951- ) studied physics in college. Physics is the study of movement and energy. Sally went to NASA (the National Aeronautics and Space Administration) to learn how to become an astronaut. She was the first woman astronaut to go around the Earth in space. Her first flight into space was made June 18-24, 1983.



Dr. Ben Carson (1951- ) has helped people his whole life as a medical doctor. He works with children at the Johns Hopkins Medical Institution in Baltimore, MD. Dr. Carson is known all over the world for separating twins that were attached to each other at birth. He has also improved a form of brain surgery that stops seizures. He holds many honors and awards.



## Resume Form

Use this form to write about your job as if you were a scientist.  
Cut pictures out of magazines to describe your job.

Your Name: \_\_\_\_\_

Where Do You Work? \_\_\_\_\_

What Do You Work With? \_\_\_\_\_

## Introductory Story for Module 2

"Hey, kids! How doodle-dee-doo?" asks Corty. "Have you got some time to help me out with something?"

"We always have time for you, Corty!" smiles Julia.

"Great! Because I just got four emails from four different scientists. Each email has a word with a description, and I'm not sure what to do with them," says Corty. "The words are Observe, Predict, Experiment, and Conclude."

Julia and Max look at the words to try to figure out what they mean. They write each word on a different piece of poster board.

"Maybe they are in the wrong order or something. Let's try moving them around," Max suggests.

The kids start moving the pieces of poster board and rearranging them in different combinations. Finally, they stop, lean the boards against the wall, and slump down in their chairs.

"I'm more confused now than when we started," sighs Julia.

Just then, Beth and Juan come into the club house. "What's wrong with you two? You look exhausted," says Beth.

"Corty gave us these definitions in some emails, and we're trying to figure out what they mean," says Max.

"Let's look them up on the computer. You can find just about anything on the Internet," suggests Juan.

The kids all crowd around the computer screen, and Beth starts typing. Corty immediately pops up.

"Hi, Junior Scientists!" says Corty. "I know this is a tough challenge, so I'm going to introduce you to some of my friends—they're scientists. They study different drugs and how they affect our brains and bodies."

"What does that have to do with the definitions of those words?" asks Julia.



"Let's sign on and find out!" says Corty. "One of the first things scientists do is OBSERVE. Dr. Chudler does this when he begins solving any problem. He looks at the problem very carefully and writes down what he sees. Dr. Chudler is trying to help people with Parkinson's disease, which affects the nerves and the brain. He is doing research to try and help these people get better and not feel pain."

Corty continues, "Another one of the words is PREDICT. When Dr. Byas-Smith has a problem, he has to make guesses about how to solve it. Predicting is like making a good guess. Dr. Byas-Smith studies certain chemicals in the brain and tries to figure out how we can avoid developing bad habits or stop bad habits when they develop."

Corty then introduces them to Dr. Jackson. "Another word is EXPERIMENT. Dr. Jackson experiments in her lab to find out if her guesses are right. She studies the effects of cocaine on unborn rats. Dr. Jackson is trying to find out how the drug affects the way the brain grows."

"And the last word we have is CONCLUDE," says Corty. "Dr. Kimes has spent a lot of time working on a problem and experimenting. She uses all of the information she's collected to CONCLUDE—to come up with an answer. Dr. Kimes works with a PET scanner. This is a machine that takes pictures of the brain. She studies the pictures to look for ways to help people stop using drugs."

"Have you figured out what order the words should be in?" asks Corty.

"When you're a scientist, the first thing you do is observe. You check out a problem. Just like we did when we had the problem of finding out what these definitions were," explains Beth.

"Then, we predicted—we made a good guess at what the answer was. We guessed that the words maybe had something to do with science," says Max.

Julia chimes in, "Next, we experimented. The experiment tells you if your guess is right. We experimented by checking in with some scientists."

"And finally, we concluded—we put the pieces together to figure out what they meant. And then we had the answer to the question we started out with. Ta-da!" shouts Juan.

Julia admits, "I didn't realize that scientists did so many things."

"Yeah, or that science could be so much fun!" says Max.







# BRAIN POWER NEWS

PARENT NEWSLETTER

VOLUME 1, NUMBER 2

## Meet the Scientists

Your child has been learning all about scientists. He or she watched a video highlighting the work of four prominent scientists. Each scientist explained his or her work by focusing on the steps of scientific inquiry. These steps are a systematic way of approaching a problem and include the following:

-  Observe—Check out the problem.
-  Predict—Time to make a good guess.
-  Experiment—Is your guess right? Find out by doing an experiment.
-  Conclude—Put the pieces together to figure out what's really going on.

These steps are recommended for problem solving and scientific experimentation in the National Science Education Standards.

The following chart describes the scientists that were featured in the video.

<b>Alane Kimes, Ph.D.</b>	Dr. Kimes works at the National Institute on Drug Abuse Research Program in Baltimore, Maryland. Her research focuses on the effects of drugs on the brain. She is interested in finding out how drug abuse changes the way the brain works, so she can find ways to help people stop using drugs.
<b>Michael Byas-Smith, M.D.</b>	Dr. Byas-Smith is an anesthesiologist at Emory University School of Medicine in Atlanta, Georgia. He is working with other scientists to determine whether chemical changes that take place in the brain make certain individuals more likely to become addicted to drugs.
<b>Eric Chudler, Ph.D.</b>	Dr. Chudler is a neurophysiologist from the University of Washington in Seattle, Washington. He is currently studying why people with Parkinson's disease experience significant pain. Dr. Chudler is conducting his research with rats and trying to understand the activity of neurons, or nerve cells, in the area of the brain affected by Parkinson's disease.
<b>Denise Jackson, Ph.D.</b>	Dr. Jackson is the Director of the Undergraduate Behavioral Neuroscience Program at Northeastern University in Boston, Massachusetts. She studies the effects of cocaine on unborn rats. Dr. Jackson is trying to find out how the drug affects the way the brain grows.





## Science at Home

Ask your child which scientist he or she thought was working on the most interesting project in the video. Discuss with your child all the interesting things these scientists do. You can also talk about the wide variety of places where they work. If there are scientists in your family, talk about the work they do.

## What Does Your Child Think?

Help your child write one sentence about the value of the work of scientists. Try to include something new that he or she has learned about scientists.

## Additional Resources

National Institute on Drug Abuse (NIDA) — [www.drugabuse.gov](http://www.drugabuse.gov)  
301-443-1124

This Web site contains information about drug abuse and a section designed specifically for parents, teachers, and students. Publications and other materials are available free of charge.

National Clearinghouse for Alcohol and Drug Information (NCADI) — [www.health.org](http://www.health.org)  
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Kramer, S. *How to Think Like a Scientist: Answering Questions by the Scientific Method*. New York, NY: HarperCollins Children's Books, 1987. This book shows how scientists use questions to learn about things. It teaches how the scientific method can help find answers to many questions people are curious about.

Kramer, S. *Hidden Worlds: Looking Through a Scientist's Microscope (Scientists in the Field)*. Boston, MA: Houghton Mifflin Co., 2003. This book shows how scientists study the world and includes many behind-the-scenes pictures of the life of a scientist.







# NOTICIAS SOBRE EL PODER DEL CEREBRO

BOLETÍN INFORMATIVO PARA PADRES

VOLUMEN 1, NÚMERO 2

## Conozca a los científicos

Su hijo ha estado aprendiendo sobre los científicos. Vio un video que destaca el trabajo de cuatro científicos prominentes. Cada científico explicó su trabajo, concentrándose en las etapas de la investigación científica. Estas etapas constituyen un modo sistemático de enfocar un problema e incluyen lo siguiente:

-  Observe - Examine el problema.
-  Pronostique - Es el momento para hacer una buena conjetura.
-  Experimente - ¿Es correcta su conjetura? Averíguelo realizando un experimento.
-  Concluya - Junte las piezas para averiguar qué es lo que realmente está sucediendo.

Los Estándares Nacionales de Educación Científica (*National Science Education Standards*) recomiendan estos pasos para la resolución de problemas y la experimentación científica.

El siguiente cuadro describe a los científicos que fueron presentados en el video.

<b>Alane Kimes, Ph.D.</b>	La Dra. Kimes trabaja en el Programa de Investigaciones del Instituto Nacional Sobre el Abuso de Drogas ( <i>National Institute on Drug Abuse Research Program</i> ) en Baltimore, Maryland. Su investigación se concentra en los efectos de las drogas en el cerebro. Está interesada en descubrir cómo el abuso de drogas cambia el modo en que funciona el cerebro, a fin de encontrar la forma de ayudar a que la gente deje de consumir las drogas.
<b>Michael Byas-Smith, M.D.</b>	El Dr. Byas-Smith es anestesiólogo de la Escuela de Medicina de la <i>Universidad de Emory</i> en Atlanta, Georgia. Está trabajando con otros científicos para determinar si los cambios químicos que ocurren en el cerebro hacen que determinadas personas sean más propensas a convertirse en adictos a las drogas.
<b>Eric Chudler, Ph.D.</b>	El Dr. Chudler es neurofisiólogo de la <i>Universidad de Washington</i> en Seattle, Washington. Actualmente está estudiando la razón por la cual las personas con la enfermedad de Parkinson sienten mucho dolor. El Dr. Chudler lleva a cabo su investigación con ratas e intenta entender la actividad de las neuronas o células nerviosas en el área del cerebro afectada por la enfermedad de Parkinson.
<b>Denise Jackson, Ph.D.</b>	La Dra. Jackson es la Directora del Programa Universitario de Neurociencia de la Conducta ( <i>Undergraduate Behavioral Neuroscience Program</i> ) de la <i>Universidad Northeastern</i> en Boston, Massachusetts. Estudia los efectos de la cocaína en ratas que están por nacer. La Dra. Jackson está tratando de descubrir cómo la droga afecta la forma en que se desarrolla el cerebro.



## La ciencia en el hogar

Pregúntele a su hijo cuál de los científicos del video, en su opinión, trabaja en el proyecto más interesante. Comente con su hijo todas las cosas interesantes que hacen estos científicos. También puede hablar acerca de la gran variedad de lugares en los que trabajan. Si hay científicos en su familia, conversen sobre lo que hacen.

## ¿Qué piensa su hijo?

Ayude a su hijo a escribir una oración acerca del valor del trabajo de los científicos. Trate de incluir algo nuevo que haya aprendido acerca de los científicos.

## Recursos adicionales

*National Institute on Drug Abuse (NIDA)* — [www.drugabuse.gov](http://www.drugabuse.gov)  
301-443-1124

Este sitio Web tiene información acerca del abuso de drogas y una sección destinada específicamente a padres, maestros y estudiantes.

*National Clearinghouse for Alcohol and Drug Information (NCADI)* — [www.health.org](http://www.health.org)  
1-800-729-6686

El NCADI es el recurso mundial más grande para información y materiales relacionados con el abuso de sustancias. Aquí se pueden obtener muchas publicaciones gratuitas.

*The Why? Files* — <http://whyfiles.org>

Explicaciones de fenómenos científicos reportados en los medios de comunicación.

Tiner, J. *100 Scientists Who Shaped World History*. San Mateo, CA: Bluewood Books, 2000. Este libro habla de los grandes hombres y mujeres de ciencia que contribuyeron de modo significativo a nuestra comprensión del mundo físico que nos rodea.

Kramer, S. *How to Think Like a Scientist: Answering Questions by the Scientific Method*. New York, NY: HarperCollins Children's Books, 1987. Este libro muestra cómo los científicos usan las preguntas para aprender sobre las cosas. Enseña cómo el método científico puede ayudar a encontrar respuestas a muchas de las preguntas que se hacen las personas.

Kramer, S. *Hidden Worlds: Looking through a Scientist's Microscope (Scientists in the Field)*. Boston, MA: Houghton Mifflin Co., 2003. Este libro muestra cómo los científicos estudian el mundo e incluye muchas imágenes de la vida cotidiana de un científico.



Brain Power



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**Dr. Denise Jackson**



**Dr. Denise Jackson is a neuroscientist. She studies the effects of cocaine on unborn rats. Dr. Jackson is trying to find out how the drug affects the way the brain grows. Some day this information will help human babies.**

**Dr. Eric Chudler**



**Dr. Eric Chudler tries to help people with Parkinson's disease, which affects the nerves and the brain. He is trying to figure out why people with this disease have pain. He would like to be able to help these people.**

Brain Power



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Brain Power



JUNIOR SCIENTISTS

• NIDA •

Dr. Michael Byas-Smith 



**Dr. Michael Byas-Smith is an anesthesiologist. This is a doctor who gives medicine to people so they sleep and feel no pain during surgery. Dr. Byas-Smith also studies certain chemicals in the brain and tries to figure out how we can avoid developing bad habits or stop bad habits when they develop.**

Dr. Alane Kimes 



**Dr. Alane Kimes is a scientist who studies the brain. She works with a PET scanner. A PET scanner is a machine that takes pictures of people's brains. After the pictures are taken, Dr. Kimes studies them to look for ways to help people stop using drugs.**

Brain Power



JUNIOR SCIENTISTS

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Brain Power

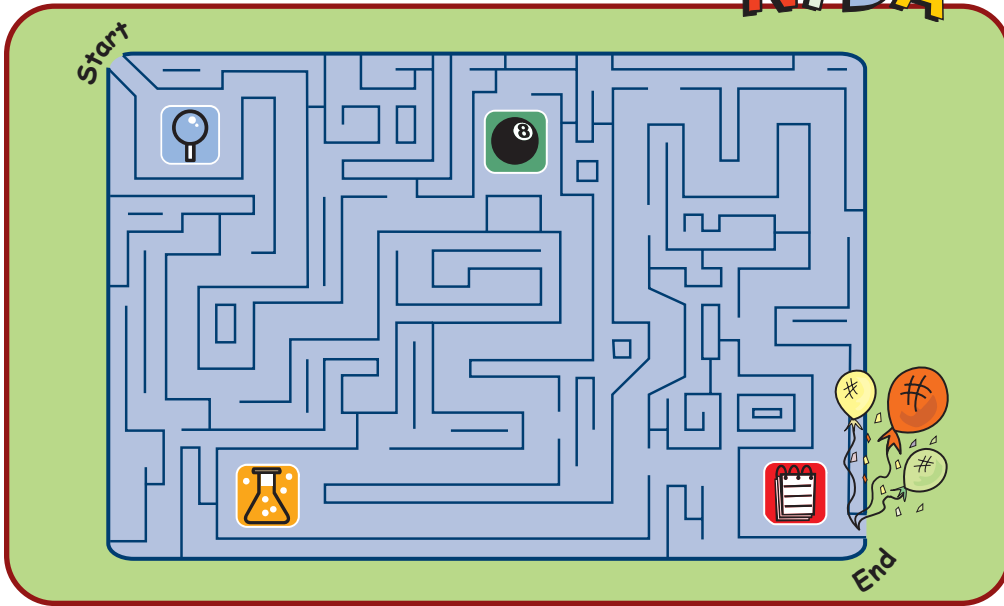


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## Scientific Inquiry



***Observe:*** Check out the problem.



***Predict:*** Time to make a good guess.

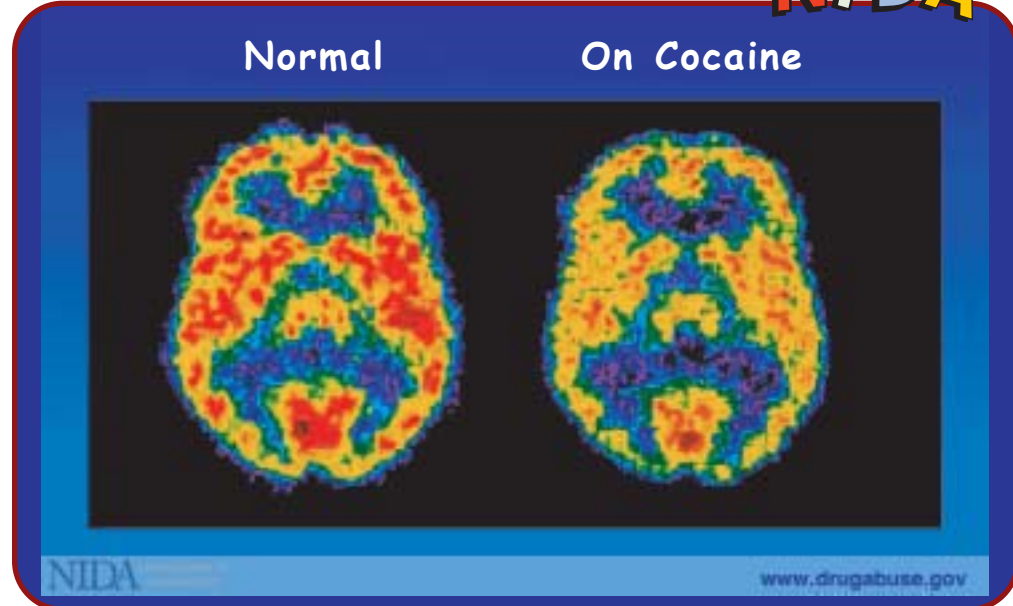


***Experiment:*** Is your prediction right? Find out by doing an experiment.



***Conclude:*** Put the pieces together to figure out what's really going on.

## PET Scan



A PET scan is a picture of the brain. The colors in the picture show the activity in the brain. Bright colors, like red and yellow, show a lot of activity. Dark colors, like black and blue, show little or no activity.

**Dr. Denise Jackson**

**NIDA**



**Dr. Denise Jackson is a neuroscientist. She studies the effects of cocaine on unborn rats. Dr. Jackson is trying to find out how the drug affects the way the brain grows. Some day this information will help human babies.**

**Dr. Eric Chudler**

**NIDA**



**Dr. Eric Chudler tries to help people with Parkinson's disease, which affects the nerves and the brain. He is trying to figure out why people with this disease have pain. He would like to be able to help these people.**

**Dr. Michael Byas-Smith** **NIDA**



**Dr. Michael Byas-Smith is an anesthesiologist. This is a doctor who gives medicine to people so they sleep and feel no pain during surgery. Dr. Byas-Smith also studies certain chemicals in the brain and tries to figure out how we can avoid developing bad habits or stop bad habits when they develop.**

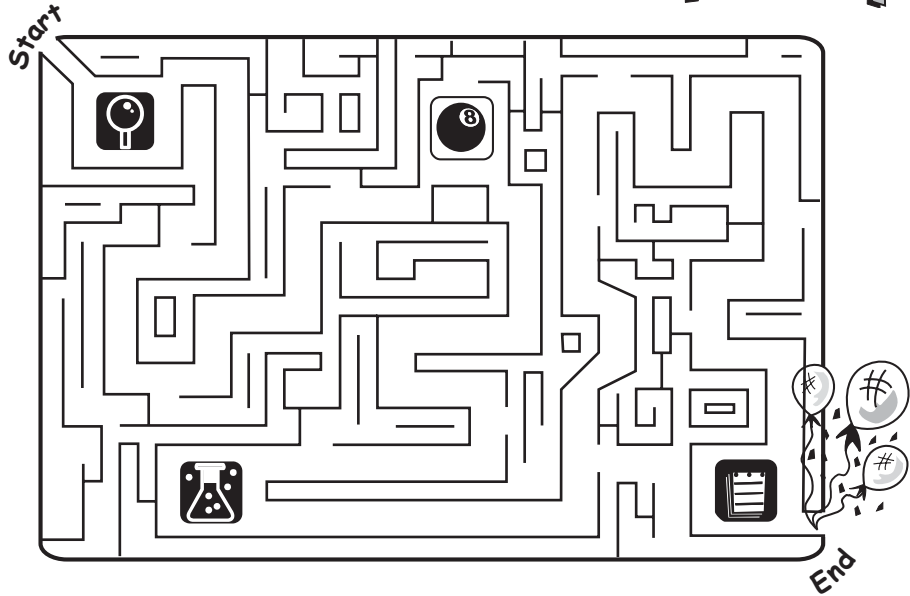
**Dr. Alane Kimes** **NIDA**



**Dr. Alane Kimes is a scientist who studies the brain. She works with a PET scanner. A PET scanner is a machine that takes pictures of people's brains. After the pictures are taken, Dr. Kimes studies them to look for ways to help people stop using drugs.**

## Scientific Inquiry

◊ N/DA ◊



***Observe:*** Check out the problem.



***Predict:*** Time to make a good guess.



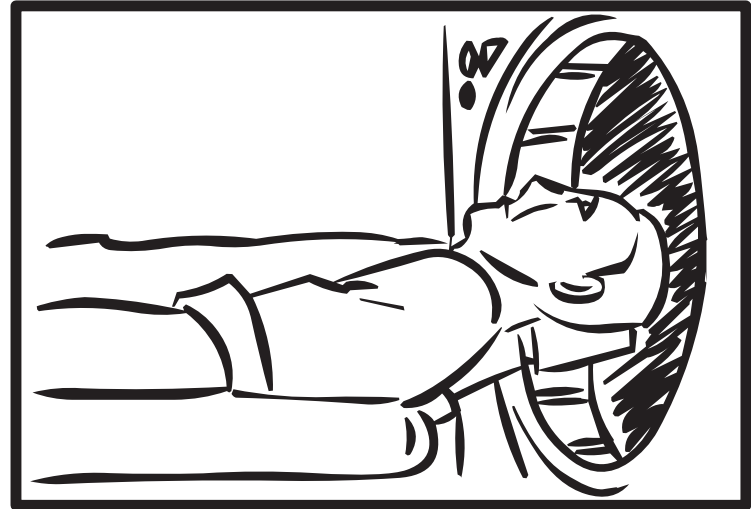
***Experiment:*** Is your prediction right? Find out by doing an experiment.



***Conclude:*** Put the pieces together to figure out what's really going on.

## PET Scan

◊ N/DA ◊



A PET scan is a picture of the brain. These pictures have different colors that show the activity in the brain. Bright colors, like red and yellow, show a lot of activity. Dark colors, like black and blue, show little or no activity.

Why, It's a

# SCIENTIST

(Skip to My Lou)



Who learns about the human race?  
Names an element from a trace?  
Rockets off to outer space?  
Why, it's a scientist!



Who studies the amazing brain?  
Tells us when it's gonna rain?  
Helps us when we're feeling pain?  
Why, it's a scientist!

Who names the stars up in the sky?  
Knows what makes an airplane fly?  
Always seems to wonder why?  
Why, it's a scientist!



Who explores below the sea?  
Knows a hornet from a bee?  
Makes a great discovery?  
Why, it's a scientist!



Who works to help keep people well?  
Studies animals where they dwell?  
Can name a snail by its shell?  
Why, it's a scientist!

I hope this song has helped you see,  
What science does for you and me,  
And just how much fun it would be,  
To be a scientist!

**NIDA**