NATIONAL INSTITUTE ON AGING

NATIONAL INSTITUTES OF HEALTH
Department of Health and Human Services

Understanding Risk: What Do Those Headlines Really Mean?

Tips from the National Institute on Aging

Every day in the newspaper or on television we see stories about new medical findings. Perhaps we hear that a certain drug causes a 300% or three-fold increase in strokes. That's a large increase—it sounds scary. But, if you know that in every 10,000 people not taking the drug, there are two strokes, then a three-fold increase really only means six more strokes. Maybe that's not quite so frightening. It's also confusing that sometimes stories seem to report opposite results—a new vaccine prevents a devastating infection, or it doesn't. How are we to make sense of such stories? How do we know what to believe?

This fact sheet provides some background to help you understand these news reports. It might also help you judge which results are really important and which are simply interesting but not a reason to change how you take care of yourself.

How does a research study begin?

First, you should know that there are different types of research studies. Often a scientist starts with a question and sets up a controlled experiment to get the answer. Maybe a new drug needs to be tested to see if it cures a bacterial infection. In this kind of experiment the scientist grows the bacteria in the laboratory and then adds the new drug to see what happens. Usually, there is also a *control*—that is, the same bacteria is grown but not exposed to the new drug. The scientist then looks to see how the new drug affected the treated bacteria compared with the untreated bacteria. Perhaps the treated bacteria are dying while the control ones are still growing. That could mean the drug is effective. If so, the scientist might move on to testing the drug in animals and then in people.

Which studies involve people?

When studying people, scientists often use *observational* studies. In these, researchers keep track of a group of people for several years without trying to change their lives or provide special treatment. This can help scientists find out who develops a disease, what those people have in common, and how they differ from the group that did not get sick. What they learn can suggest a path for more research. However, observational studies have certain weaknesses. Sometimes differences between groups are caused by

something the investigators are not aware of. For any observational study, only further research can prove for sure whether their finding is the actual cause of illness or not.

What comes next?

The results of laboratory experiments and observational studies often interrelate. For example, perhaps a new drug for lowering cholesterol has already been tested for safety in a controlled experiment. Scientists know from observational studies that eating a lot of high-fat foods can raise cholesterol levels and they know that people with high cholesterol are more likely to have heart attacks. This might lead scientists to suspect that they can prevent heart attacks by lowering cholesterol levels with the new drug.

But how to prove that this suspicion is correct? Another kind of research study, called a *randomized controlled clinical trial* (RCT), is thought to be the best way to learn whether a certain treatment works or not. A *clinical trial* often involves thousands of human volunteers. They are assigned to two or more study groups by chance (*randomized*). One of the groups, the *control* group, receives a *placebo*. A placebo looks just like the treatment or drug being tested, but actually does nothing.

To start the clinical trial the scientists sign up volunteers. The volunteers are randomly divided into two groups. One receives the test drug, and the other, the control group, gets a placebo. The study is also *masked*. This means that neither the doctors nor the volunteers know who is getting the test treatment or the placebo. For the next several years the investigators keep track of cholesterol levels and heart attacks in each group. They also watch for side effects of the drug. At the end of the study period, everyone learns which group was getting the test drug and which was on placebo, and the results are analyzed. Fewer heart attacks in the group receiving the test drug would show that the drug prevents heart disease.

How Do They Explain the Results?

But, how well does this fictional drug prevent heart attacks? We have to look at how it affects someone's *risk* of heart attack. By studying large numbers of people, scientists can learn how big these effects are. Benefits and risks can be explained in several ways. These include *relative risk* and *absolute risk*.

When the difference between two groups is described as "relative," it is usually shown as a ratio or a percent. An "absolute" difference is nothing more than a number found by subtraction. How these numbers are presented to you can sway how you "feel" about the finding and affect whether you change your behavior.

Let's look at these differences first by using dollars. We'll compare Chris and Pat's retirement accounts.

	Chris	Pat
Account balance	*$130,000*	*$100,000*
Relative difference	*30% more than Pat*	
Absolute difference	*$30,000 more than Pat*	

Think about how the numbers make you feel. Would you rather say that "I have 30% more than Pat" or that "I have $30,000 more than Pat?" Both statements report the same finding,

but different people prefer to use different ways to present the results.

If we drop the account balances, would you answer differently?

	Chris	Pat
Relative difference	*30% more than Pat*	
Absolute difference	*$30,000 more n Pat*	

Relative Risk

Let's look again at our earlier research example. In describing the results, the scientist might talk about *relative risk*. This compares the likelihood that a person who takes the new medicine will have a heart attack to the likelihood that a person in the placebo group will have one. It tells us how much larger or smaller the chance of heart attack is while using the test drug. Maybe the researchers found the relative risk of heart attack in the placebo group was "1.5." Since a finding of "1.0" means there is an equal chance in each group, the finding of 1.5 means the **chance** of heart attacks in the group receiving the placebo is 50% greater than the **chance** of heart attacks in people taking the test medicine. It does **not** mean half of all those who did not receive the test drug had heart attacks.

Absolute Risk

Absolute risk gives an actual number of health problems that happened or are prevented because of the drug. In our imaginary study of a new cholesterol drug, let's say that there might be 50 heart attacks in 10,000 people taking the drug and 75 heart attacks in a similar group taking the placebo. That is, for every 10,000 people not using it, there would probably be 25 more heart attacks. That's the absolute risk. Some people find absolute risk—"X number of extra cases in 100, 1000, or 10,000 people"—easier to apply to their own health care decisions than a relative risk percentage.

Let's Put "Risk" to Work

How would someone use risk information when talking with his or her doctor about a health problem? Here's an example. Recently Julia learned that she has osteopenia, a loss of bone mass that can develop into osteoporosis. Exercising and getting more calcium and vitamin D are slowing her bone loss. But, her doctor has suggested a drug to prevent further bone loss leading to osteoporosis. Several choices are available. She should ask her physician how well each one would probably lower her chance of breaking a bone as she grows older. The doctor might be able to give her a percentage (relative risk) or the number of times people in the group get sick (absolute risk) for each medicine. Julia also needs to ask the physician about side effects from each medication and her risk of those. With that information, she can take part in making an informed decision about which drug to prevent osteoporosis is best for her to use at this time.

Ask Yourself

When you learn about a new medical finding, ask yourself:

1. Was it a study in the laboratory, in animals, or in people? The results of research in people are more likely to be meaningful for you.

2. Does the study include enough people like you? You should check to see if the people

in the study were the same age, sex, education level, income group, and ethnic background as yourself and had the same health concerns.

3. Was it a randomized controlled clinical trial involving thousands of people? They are the most expensive to do, but they also give scientists the most reliable results.

4. Where was the research done? Scientists at a medical school or large hospital, for example, might be better equipped to conduct complex experiments or have more experience with the topic. Many large clinical trials involve several institutions, but the results may be reported by one coordinating group.

5. Are the results presented in an easy-to-understand way? They should use absolute risk, relative risk, or some other easy-to-understand number.

6. If a new treatment was being tested, were there side effects? Sometimes the side effects are almost as serious as the disease. Or, they could mean that the drug could worsen a different health problem.

7. Who paid for the research? Do those providing support stand to gain financially from positive or negative results? Sometimes the Federal government or a large foundation contributes funding towards research costs. This means they looked at the plans for the project and decided it was worthy of funding, but they will not make money as a result. If a drug is being tested, the study might be partly or fully paid for by the company that will make and sell the drug.

8. Who is reporting the results? Is the newspaper, magazine, or radio or television station a reliable source of medical news? Some large publications and broadcast stations have special science reporters on staff who are trained to interpret medical findings. You might want to talk to your health care provider to help you judge how correct the reports are.

The bottom line is—talk to your doctor. He or she can help you understand the results and what they could mean for your health. Remember that progress in medical research takes many years. The results of one study need to be duplicated by other scientists at different locations before they are accepted as general medical practice. Every step along the research path provides a clue to the final answer—and probably sparks some new questions also.

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