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## Placebo Effect

### What is a placebo?

A *placebo* (pluh-see-bow) is a substance or other kind of treatment that looks just like a regular treatment or medicine, but it's not. It's actually an inactive "look-alike" treatment or substance. This means it's not a medicine. The person getting a placebo does not know for sure that the treatment is not real. Sometimes the placebo is in the form of a "sugar pill," but a placebo can also be an injection, a liquid, or even a procedure. It's designed to look like a real treatment, but doesn't directly affect the illness.

### What is the placebo effect?

Even though they do not act on the disease, placebos seem to affect how people feel (this happens in up to 1 out of 3 patients). A change in a person's symptoms as a result of getting a placebo is called the *placebo effect*. Usually the term "placebo effect" speaks to the helpful effects a placebo has in relieving symptoms. This effect usually lasts only a short time. It's thought to have something to do with the body's chemical ability to briefly relieve pain or certain other symptoms.

But sometimes the effect goes the other way, and causes unpleasant symptoms or worse. These may include headaches, nervousness, nausea, or constipation, to name a few of the possible "side effects." The unpleasant effects that happen after getting a placebo are sometimes called the *nocebo effect*.

Together, these 2 types of outcomes are sometimes called *expectation effects*. This means that the person taking the placebo may experience something along the lines of what he or she expects to happen. If a person expects to feel better, that may happen. If the person believes that he or she is getting a strong medicine, the placebo may be thought to cause the side effects. The placebo does not cause any of these effects directly. Instead, the person's belief in or experience of the placebo helps change the symptoms, or change the way the person perceives the symptoms.

Some patients can have the placebo effect without getting a pill, shot, or procedure. Some may just feel better from visiting the doctor or doing something else they believe will help. That type of placebo effect seems most related to the degree of confidence and faith the patient has in the doctor or activity.

### How are placebos used?

Placebos may be used in clinical trials. Clinical trials are research studies testing new drugs or other treatments in volunteers. Before a new treatment is used on people, it's studied in the lab. If lab studies suggest the treatment will work, the next step is to test it on animals. If that also gives promising results, it may then be tested in clinical trials to see if it has value for patients. The main questions the researchers want to answer are:

- Does this treatment work?
- Does it work better than what we're now using?
- What side effects does it cause?
- Do the benefits of the treatment outweigh the risks?
- Which patients are most likely to find this treatment helpful?

If standard treatments for the disease are already available, the new treatment is usually compared to one of these treatments. This tells researchers if the new treatment is as good as or better than the one that's currently available.

If there's no approved treatment for an illness or condition, some people in the study may be given a placebo, while others get the new treatment being tested. The main reason to have a placebo group is to be sure that any effects that happen are actually caused by the treatment and not some other factor.

The placebo looks, tastes, or feels just like the actual treatment, so that the patient's and the doctor's expectations don't affect the outcomes. The placebo control makes it possible to "blind" patients and doctors to what treatment they're getting. In a double-blind controlled study, neither the volunteers taking part in the study nor their doctors know who's getting which treatment. This study design helps avoid biases in measuring outcomes that can be caused by the researchers' or the patients' expectations about the treatment. This is not as big a problem in studies of cancer treatment, where objective outcome measures are most often used. It's more likely in studies that require patient reporting for symptoms like depression, sleeplessness, or pain.

If you would like to know more about clinical trials, see our document called [Clinical Trials: What You Need to Know](#).

People in a study that uses a placebo should always know that there's a chance they could be getting a placebo. It's not OK to give someone a treatment in a clinical trial and not mention that it could be a placebo. Please see our document [Informed Consent](#) for more information on this.

Those who get placebos in medical studies serve an important role. Their responses help provide a good way to measure the actual effect of the treatment being tested. The placebo group provides an important baseline with which to compare the treatment group. It helps researchers see what would have happened without the treatment, though both groups may still have some short-term effects based on what the patient expects. For instance, illnesses that sometimes go away on their own might be thought to get better because of the medicine, unless there's a placebo group and those people get better too. On the other side, bad effects that were going to happen anyway, or that occur from some unrelated cause, may be blamed on the treatment unless they also happen to people in the placebo group.

## How does the placebo effect work?

In the past, some researchers have questioned whether there's convincing proof that the placebo effect is a real effect. But there are studies showing that the placebo effect *is* real. For example, scientists have recorded brain activity in response to placebo. Since many scientific tests have shown the placebo effect, it's one way we know for sure that the mind and body are connected.

Some scientific evidence suggests that the placebo effect may be partly due to the release of *endorphins* in the brain. Endorphins are the body's natural pain killers. But there's probably more to it than this.

Many think the placebo effect occurs because the patient believes in the substance, the treatment, or the doctor. The patient's thoughts and feelings somehow cause short-term physical changes in the brain or body. The patient expects to feel better, and so he or she does feel better for some time. But even if a person feels better after taking a placebo, it doesn't mean the person's illness or symptoms were not real. For instance, the person may feel less anxious, so stress hormones drop. Taking a placebo may change their perception — for example, a person might re-interpret a sharp pain as uncomfortable tingling.

What's commonly called the placebo effect even plays a role in mainstream medicine. Many people feel better after they get medical treatments that they expect to work. But the opposite can also happen, and this seems to support the idea of the expectation effect even more. For example, in one study, people with Alzheimer's disease got less relief from pain medicines. These patients required higher doses — possibly because they had forgotten they were getting the drugs, or they forgot that the pain medicines had worked for them before.

This suggests that past experiences also play into the placebo effect. In one study that looked at the placebo effect in pain relief, one group got a real pain medicine and the other did not. In the following days, both groups were given a placebo that looked like the real pain medicine. Those who had gotten the real pain medicine were able to tolerate more pain than those who had not gotten pain medicines before.

In the same study, people who were given a drug that raised a certain hormone level beforehand actually had a similar (but smaller) hormone response when they were given a placebo later. Those who had not gotten the real drug beforehand had no change in their hormone levels when they got the placebo, even though they were told that they would. This helped to separate the power of the researcher telling them they would have an effect from the learned experience of having the effect in the past. This type of learned response after personal experience is called the *conditioning effect*. It seems to be part of what we call the placebo effect.

The nocebo effect, in which a person has more symptoms or side effects after a placebo, is still being studied. Researchers

believe it may be partly explained by a substance in the body that sends messages through the nerves. When a person is anxious, for instance, the substance is activated and the person feels more pain than a person who isn't anxious. The nocebo effect shows up in the brain: brain-imaging studies have shown that pain is more intense when a person expects more pain than when they don't. This is linked to changes in certain brain regions on the imaging studies.

Although we may not know exactly how it works, the idea that the mind can affect the body has been around for thousands of years and is well-proven in certain situations. Many ancient cultures depended on mind-body connections to treat illness. Shamans or medicine men would not have viewed their efforts as placebos. But their healing powers may have worked partly through the patient's strong belief that the shaman's treatments would restore health. Or it could be that a sick person was going to get better anyway, but the recovery was thought to be because of the treatment — which might have really done nothing for the illness.

Because placebos often have an effect, even if the effect doesn't last long, some people think that the placebo produced a cure. But placebos do not cure. And in studies where doctors are looking at whether a tumor shrinks, placebos have very little, if any, effect.

Still, placebos clearly can help reduce certain symptoms such as pain, anxiety, and trouble sleeping in some people. In earlier times, placebos were sometimes given by doctors out of frustration or desperation, because nothing else was available or seemed to work. They might even be tried today — a 2008 study found that nearly half of the doctors polled said that they used a placebo when they felt that it might help the patient feel better.

Sometimes if the placebo looks more real, the person may think it's an active medicine or treatment and believe in its power even more. For example, a larger pill may look more powerful than a small pill. And in some people, an injection may have a stronger placebo effect than a pill.

Some believe that placebos seem to work because many illnesses improve over time even without treatment. People may also take better care of themselves by exercising, eating healthier, or resting if they are taking a placebo. Just as natural endorphins may relieve pain once they are released, some research shows the brain may respond to an imagined scene much as it would to something it actually sees. A placebo may help the brain remember a time before the symptoms and bring about a chemical change. This is a theory called *remembered wellness*.

Some scientists believe that the effects of many alternative therapies may simply be a placebo effect. If the patient believes in the treatment and wants it to work, it can seem to do so, at least for a while. If this effect worked on an illness that usually would not get better on its own, and it lasted, it would be considered a real cure, not a placebo effect.

Finally, there's evidence to suggest that what a patient expects about real medicines can influence how the patient feels after the medicine is taken. Even though responses from real drugs aren't typically thought of as placebo effects, some short-term effects are affected by expectations — good ones as well as bad.

There's still much to find out about the placebo effect and all the ways it may work. Researchers agree that the placebo effect cannot cure people or make them live substantially longer. Still, they continue to study it in order to learn more about it, and find out whether and how it may be used to help people feel better.

## Other things that can add to or be confused for the placebo effect

Certain other factors can affect study outcomes, and may be confused with the placebo effect. These are effects that can cause a study to report that a placebo (or even a treatment) had some effect when in reality, it didn't.

### Timing of unrelated events

Along with the placebo or nocebo effect, incidental events (unrelated effects that might have happened without the placebo) might also be linked to the placebo because of their timing. For example, a headache or rash that happens soon after taking a placebo could be caused by something else entirely, but the person might think the placebo caused it. The same can be said for good outcomes: if a person happened to start feeling better after taking a placebo, that improvement may be thought to be due to the placebo.

### Healing or changes in symptoms

A health problem that improves on its own (many do) can sometimes add to what's thought of as the placebo effect. Even in serious conditions such as cancer, some types appear to get better and worse on their own, although they continue to spread and worsen over time. This is part of the effect of timing, noted above. A person who was taking a placebo when symptoms started improving on their own is very likely to believe that the placebo had some effect. And a self-limited illness

that goes away completely on its own at such a time might have the placebo-taker convinced it was a miracle drug.

## Patient reporting

Lack of blinding can affect reporting of these kinds of coincidental timing effects and belief in what caused them. For example, people who know they're getting placebos will know that their headache is not due to the medicine, and may not report it. Those who know they are getting the real medicine are more likely to believe that the medicine is causing the headache, and are more likely to report it. Blinding helps to balance these incidental timing effects.

## Self-report of symptoms on a scale

Studies comparing placebo to no treatment found that patients were more likely to tell the study investigator that there was some improvement in their comfort if they were on placebo. This was observed when the patient had to rank their symptoms on a scale, say, from 1 to 10. When the patients' rankings were compared with outcomes others could measure (signs, like swelling or movement) there would be no improvement in the measurable outcome. Some researchers believe this is due to patients wanting to give the investigator good news. It may also be that the patient is comparing current symptoms to the worst discomfort this problem had caused in the past.

## Getting outside treatment

The patient who isn't getting better in a study may also seek outside medical help without mentioning it to investigators. Or outside treatment for a related problem may help the symptom being studied in the clinical trial. This can affect outcomes for both the placebo and treatment groups.

## Study dropouts

People who are not getting better in the study, including those on placebo, are more likely to leave the study before it's over. This means that people who aren't helped are less likely to be counted in the final analysis. This makes any treatment look as if it works better than it does, because the people who felt better during treatment were more likely to have their results counted at the end of the study than those who didn't.

## To learn more

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### More information from your American Cancer Society

Here is more information you might find helpful. You also can order free copies of our documents from our toll-free number, 1-800-227-2345, or read them on our Web site, [www.cancer.org](http://www.cancer.org).

[Clinical Trials: What You Need to Know](#) (also in Spanish)

[Complementary and Alternative Methods for Cancer Management](#) (also in Spanish)

[Dietary Supplements: How to Know What Is Safe](#)

[Guidelines for Using Complementary and Alternative Methods](#)

[Learning About New Cancer Treatments](#)

[Informed Consent](#) (also in Spanish)

American Cancer Society Operational Statement on Complementary and Alternative Methods of Cancer Management

Along with the above, information on many different types of cancer treatment, including complementary and alternative treatments, are available at no cost to you from the American Cancer Society. You can find them on our Web site or request a copy from our toll-free number as noted above.

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### Other organizations and Web sites\*

Today there's a great deal of interest in complementary and alternative therapies. Mass communication, especially the Internet, makes it possible for people to share ideas and information very quickly. But too often information on the Internet is written by promoters of useless treatments. Along with the American Cancer Society, the following is a partial list of Web

sites and phone numbers of reputable groups that provide information on complementary and alternative therapies, and in some cases, other cancer information:

**National Cancer Institute**

Web site: [www.cancer.gov](http://www.cancer.gov)

Toll-free number: 1-800-422-6237 (1-800-4-CANCER)

TTY: 1-800-332-8615

Offers information about cancer, treatment, clinical trials, and related help on many cancer topics

**National Center for Complementary and Alternative Medicine (NCCAM)**

Web site: <http://nccam.nih.gov>

Toll-free number: 1-888-644-6226

TTY: 1-866-464-3615

Offers more details on many complementary treatments

**Memorial Sloan Kettering Cancer Center**

About Herbs and Botanicals

Web site: [www.mskcc.org/cancer-care/integrative-medicine/about-herbs-botanicals-other-products](http://www.mskcc.org/cancer-care/integrative-medicine/about-herbs-botanicals-other-products)

Has summaries of information on a number of complementary and alternative treatments

**MD Anderson Complementary/Integrative Medicine Education Resources (CIMER)**

Web site: [www.mdanderson.org/education-and-research/resources-for-professionals/clinical-tools-and-resources/cimer/therapies/index.html](http://www.mdanderson.org/education-and-research/resources-for-professionals/clinical-tools-and-resources/cimer/therapies/index.html)

**United States Department of Agriculture, Food and Nutrition Information Center**

Web site: <http://fnic.nal.usda.gov>

Choose “Dietary Supplements” from the left menu bar for information on dietary supplements, including vitamins and minerals

**United States Food and Drug Administration**

Web site: [www.fda.gov/Food/DietarySupplements/default.htm](http://www.fda.gov/Food/DietarySupplements/default.htm)

Toll-free number: 1-888-463-6332 (1-888-INFO-FDA)

Has information on dietary and food supplements. You can also report side effects or other adverse events from a dietary supplement by calling Medwatch at 1-800-332-1088 (1-800-FDA-1088)

**National Council Against Health Fraud**

Web Site: [www.ncahf.org](http://www.ncahf.org)

To help you discern scammers and fraudsters from real cancer treatment

**Quackwatch**

Web Site: [www.quackwatch.org](http://www.quackwatch.org)

Reports on so-called cancer treatments that don't actually work

*\*Inclusion on this list does not imply endorsement by the American Cancer Society*

No matter who you are, we can help. Contact us anytime, day or night, for information and support. Call us at **1-800-227-2345** or visit [www.cancer.org](http://www.cancer.org).

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