

# Scientific Fact or Fiction? How to Discern the Difference

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**W**hile at a trade show or conference, you often see new and wonderful devices displayed for use in emergency services. We also hear a lot of tall tales about strange and unusual calls, many of which turn out to be urban myths. How do you know when someone is pulling your leg? Which stories or claims are valid? Which devices, drugs and procedures really make a difference for patients, and which are better left for the next sucker to come along?

To help you discern fact from fiction, *Best Practices* consulted *Why People Believe Weird Things*. In this book, author and *Skeptic* magazine founder Michael Shermer, PhD, points out common areas of confusion that lead many people down the slippery slope from science to what he calls pseudoscience. Heed these words of caution the next time you are confronted with a story that seems too good to be true.

**Anecdotes do not make science.** Anecdotes are stories that are recounted to support a claim. For example, a promoter might relate a story of a patient or patients in a certain city whose lives were saved by his or her company's product. These anecdotes are often detailed and can be very convincing, but they tell little overall about the effectiveness of the device or procedure in question.

**Scientific language does not make a science.** The use of novel scientific-sounding terms tend to add credibility to a claim, but they may be little more than hype. The non-steroidal anti-inflammatory drug Celebrex is such an example. The name was chosen to make the uninformed think that doctors were "celebrating" a grand discovery. While Celebrex is effective and has fewer side effects than other drugs in its class, studies have shown that the drug is no more effective than ibuprofen.

**Bold statements do not make claims true.** Beware of claims that sound too good to be true. Such was the case with administering high-dose steroids for

acute spinal cord injury. A single group of researchers reported positive findings that changed medical practice overnight; however, other researchers could not reproduce the findings and later, the methods used in the original study were found to be suspect.

**Reversal of the burden of proof.** The burden of proving that a medical procedure, device or drug works falls squarely on the shoulders of those promoting the practice. Some practices, including some in EMS, were thrust onto the profession without scientific evidence to support them. Later, mainstream researchers looked at the practices and found them ineffective, or in certain instances, harmful. Always ask for solid scientific evidence to support a given practice or procedure before adopting it.

**What is unexplained is not inexplicable.** This is a cardinal feature of pseudoscience. That is, if somebody cannot prove that something does not work, then it must work. This is why magicians do not tell their secrets. If their secrets were known, the magic could be explained and the trick seen for what it really is.

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**Failures are rationalized.** Negative findings in science are often more important than positive ones. Often, however, practice proponents don't want to look at negative findings, and thus, they will look for reasons or loopholes to explain why these negative findings don't apply to their product. Ultimately, many will revert to the claim that if critics cannot disprove everything about the practice, then it must be valid.

**Coincidence.** Coincidence does not make science. Many experienced EMTs will say that there are more dog bites, psychiatric emergencies and obstetrical calls on nights when the moon is full. They might even postulate that the moon has a greater influence on the earth during this period, causing dogs to bite, psychiatric patients to decompensate or women to go into labor; however, no science exists to support it. When you actually look at the lunar phases, you will see there are 13 full moons in a year, and the moon may appear full for several days before and after its fullest phase. Several studies have proven that lunar phases have no impact on patients.

**Ad hominem attacks.** The attempt to discredit a claim by discrediting the claimant is referred to as an ad hominem (to the man) attack. Purveyors of pseudoscience will often resort to this tactic when credible people criticize their products. For example, when a critic is mentioned, the proponent will try and discredit him or her personally or professionally.

**Reductio ad absurdum reasoning.** This argument involves refuting a critic's argument and reducing it to an absurd conclusion. For example, a proponent might say that if you don't use my device, then you will not detect subtle changes in a patient's status. And, if you don't detect subtle changes in a patient's status, then you might not provide an intervention in time. Then, if you don't provide an intervention in time, the patient might die. If your patient dies, you will be sued for malpractice. Thus, if you don't buy and use my device, you will be sued for malpractice. Such thinking is circular and plays on fear and emotion and is a favored tactic of pseudoscience.

Above all, never take anything at its word or at face value. An old doctor once said, "Never be the first to use a new drug, nor the last to give up an old one." This admonition holds true for EMS. 