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## **Scientific and Pseudoscientific Therapies**

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It's an unfortunate and all-too-common story: someone has been diagnosed with a disease for which conventional medical treatments have mostly proven ineffective. No surprise if he or she then turns to any therapy that offers hope, however radical or bizarre it may seem. Such alternative treatments are often discovered through word of mouth, media advertisements, or the internet. Unfortunately, because the average person does not have the medical background to cut through the scientific-sounding jargon, he may not be able to discern whether the treatment being touted is scientifically sound or is actually a pseudoscientific quack remedy. Furthermore, if the patient has lost faith in the established medical community, he may actually consider it a plus that the radical therapy goes against the grain of accepted medical practice. Because pseudoscientific therapies are widely available, this article will attempt to educate our mito families about what to look for when reading descriptions of unorthodox treatments. No single pseudoscientific therapy has all of these characteristics, but if one or more is present, be skeptical!

### **Characteristics of Pseudoscientific Therapies**

The following list was adapted from a classic work on this topic: *Science and Unreason*, by Daisie Radner and Michael Radner.

1) **“Pick-and-choose” approach to evidence** - Purveyors of alternative remedies often pick and choose only the evidence that supports their treatments. Opposing evidence is ignored or simply does not change their minds. Scientists, however, take into account all data obtained under controlled conditions. And they do not allow themselves to ignore contradictory evidence when reaching a conclusion.

2) **Use of anecdotal evidence or testimonials** - Today's alternative medicine web sites are full of testimonials from individuals who were helped by the treatment being promoted. While there is nothing sinister about a friend recommending a product such as a headache remedy, it is very different when a company justifies its health products based primarily on customers' unsubstantiated testimonies, which could be fictitious. Even if such testimonies are true, they are not the results of controlled scientific studies. What other outside factors may have contributed to the positive outcome of the treatment? Also, how many unsatisfied customers wrote to say the product didn't work, and yet their *negative* testimonies went unreported?

3) **Irrefutable hypothesis** - One mark of a true scientist is that he is willing to reject his hypothesis if it proves wrong when tested. The pseudoscientist's hypothesis may include cherished beliefs that he is unwilling to reject under any circumstances. If he cannot imagine a set of results that would falsify or refute his hypothesis, then it is not a real hypothesis. It's useless for someone to conduct investigations to determine whether or not an irrefutable hypothesis is correct when his belief in it will not be altered by the outcome.

4) **Incorrect use of the scientific literature** - By its very nature, true scientific research is often tentative and indefinite. Scientists know that experimental designs can be flawed, and that confirmed hypotheses are not absolute truths. Their research reports, which make

up the literature of science, often contain phrases such as “our study suggests” or “it is therefore possible.” The pseudoscientist treats research papers as the final word on a given topic - as long as they agree with his preconceived ideas. Just as he picks and chooses his data, he also uses a selective approach to the scientific literature. A common practice is to cite research performed in a lab owned by the company selling the product. He may even cite a legitimate peer-reviewed article from a recognized medical journal but ignores the reality that no scientific paper stands in isolation from others in the field.

5) **Misuse of scientific terms** - Pseudoscientific literature often misuses scientific terms and concepts. Knowing that the general public may not understand such jargon, the writer can manipulate the language of science to present a plausible scenario for how his remedy works. What he says may make no sense scientifically but will nevertheless convince many to buy his product.

6) **Outdated thinking** - A pseudoscientific article may refer back to a method of treatment or way of thinking about an illness that has been scientifically invalidated. Medicine is a progressive field that replaces outdated or less effective treatments with new ones. In contrast, it is a common pseudoscientific approach to make reference to obscure research conducted many years before. The implication is that this research was suppressed by the medical establishment, when it is much more likely to have been abandoned as ineffective or even harmful.

7) **False similarities** - The pseudoscientist tends to see similarities between his own unproven therapies and those that have been scientifically substantiated. For example, without providing any evidence, he may claim that, just as certain accepted medical therapies “boost the immune system,” his product does the same thing. This *sounds* scientifically similar to conventional treatments but is likely a false comparison.

8) **Use of conspiracy theories** - The inventor of a pseudoscientific therapy may claim that his product has been kept from public knowledge by the government, the medical community, or the pharmaceutical industry because its disclosure would prove economically disastrous. Countless healthcare jobs would be lost if the treatment or cure were made available. This, of course, presupposes that not even one physician is completely committed to the health and welfare of his/her patients, that every person “in the know” can keep a secret of that magnitude, and that none of those countless conspirators might also have a medical need for such a product themselves.

9) **Refusing to revise** - Because the pseudoscientist operates under an irrefutable hypothesis, he refuses to revise or reject his assertions despite evidence to the contrary. He already “knows” that he is right and cannot be convinced otherwise. Further, he does not take it well if his own “research” is questioned. Rather than evaluating the merits of the criticism, he derides the critics as being narrow-minded conspirators who are blinded to the “truth.”

## Let the Buyer Beware

With the above characteristics of a pseudoscientific approach in mind, the informed patient/consumer will want to consider the following suggestions when making decisions regarding unorthodox or unusual therapies:

- Read the vendor's literature or web site carefully, looking for examples of pseudoscientific reasoning.
- Determine if any supporting research or clinical trials were performed in an independent lab, particularly a recognized research facility such as at a large university.
- Conduct an online search for articles that objectively discuss the treatment. Note whether these articles are in respected mainstream journals or only in alternative medical literature. Include such websites as quackwatch.org. Beware if you can find no mention of the treatment in the scientific literature.
- Locate and read any research reports cited by the vendor. These should be available online, although only the abstract may be available free-of-charge. Then, using key words, do a Medscape (available through the *library* section of the UMDF website) or PubMed search for other scientific abstracts and papers that might refute the cited articles.
- Conduct an online search for other articles written by the scientist/author of a treatment article. Were these published in recognized scientific journals or only in alternative medicine publications?
- Trust your physician. Consult him/her if you are considering an unorthodox therapy. If he/she has objections, ask for specifics. Don't become your own doctor and leave the professionals out of the picture.

None of this is meant to preclude the possibility that a previously untested treatment or supplement really could prove effective once it is tested. Never give up hope. Keep an open mind, *but always ask for evidence.*