- **RULE 1:** Research published in peer-reviewed journals has undergone rigorous quality control by experts in the field. The most important papers are published in the top peer-reviewed journals: *Science*, *Nature*, *Cell*, *Proceedings of the National Academy of Sciences*, *Journal of New England Medicine*, and the *Lancet*. If something originates from a peer-reviewed journal, it generally is legitimate.

- **RULE 2:** Research published in known predatory journals should be treated with distrust. A list of nearly twenty-five hundred known predatory journals is given at https://beallslist.net/.

- **RULE 3:** The work on preprint servers has not yet undergone peer review. If you see something that originated from a preprint server, realize that other scientists and journal editors haven't certified it as real, legitimate science yet. Rather, the authors posted it for fellow scientists to evaluate and use as building blocks for their own research. Check how long the work has been on the preprint server. If it has been more than a year and hasn't yet been published in a peer-reviewed journal, be very skeptical of it.

- **RULE 4:** Check that the research was actually done on humans. Just because a certain drug works on rats or mice does not mean it will work in humans.

- **RULE 5:** Correlation does not imply causation. Just because you can see a connection or a mutual relationship between two variables, it doesn't necessarily mean that one causes the other. Other variables might be involved.

- **RULE 6:** Beware of spectacular extraordinary claims. If you find something that makes you gasp and say, "I can't believe that," you probably shouldn't believe it without seeing really reliable proof, such as a peer-reviewed paper. Beware if a piece of news or a social media post stirs up intense feelings, especially outrage. It was most likely designed to short-circuit your critical-thinking skills by playing on your emotions.

- **RULE 7:** News that is riddled with spelling and grammatical errors is suspect. If the author couldn't be bothered to spell-check it, it likely wasn't fact-checked either.

- **RULE 8:** Although a political debate requires two opposing sides, a scientific consensus does not. Beware of "false balance," in which the media give equal time to both a scientific consensus and the fringe science or opinions that disagree with the consensus. Beware of people expressing rogue views

that are funded by companies that have something to gain from undermining scientific consensus and sowing distrust in science.

- **RULE 9:** Beware of cognitive biases, such as your own negativity, availability, and confirmation biases.

- **RULE 10:** If you read or see something that is very compelling and confirms everything you already believe, make sure the information is coming from a source that is nonpartisan (not affiliated with a political party or identity) and that it doesn't play on a political bias or social identity of yours.

- **RULE 11:** Politicians don't always tell the truth. Sometimes their knowledge of science lets them down, sometimes they follow a misguided party line, and sometimes they have a vested interest in spreading disinformation or obscuring part of the facts.

- **RULE 12:** Beware of medical products and scientific ideas promoted by celebrities.

- **RULE 13:** If you are doubtful about a medical issue, see what the FDA, WHO, and CDC have to say. They represent the most up-to-date and accurate scientific findings, are free from outside interference, and are staffed by first-rate scientists who are charged with protecting our public health.

- **RULE 14:** If a study used human subjects, check to see whether they used a placebo-controlled double-blind clinical trial. The size of the trial is also important because when more patients are enrolled, safety issues and beneficial effects are seen sooner and the differences between the patients with the real medication and those with the placebo are more obvious. Clinical trials can have thousands of subjects, but some scientific studies involving humans are much smaller and should address how they have achieved the statistical confidence they claim to have.

- **RULE 15:** Ask yourself what evidence would convince you to change your mind. If there is no evidence, then beware of your own critical thinking.

- **RULE 16:** To sell their medical products and procedures, medical scammers often use testimonials of patients. Beware of medical products that sound unbelievably good and that claim to cure many different diseases. Testimonials are not a substitute for scientific proof, and real doctors would never promise results, because health is impossible to guarantee.

- **RULE 17:** If a supplement tries to look like a medicine, beware.

- **RULE 18:** Beware of clinics that use high-pressure sales techniques to recruit their patients, which include on-the-spot discounts, emotional patient-testimonial videos, and slick recruitment videos.

- **RULE 19:** TV hosts and journalists generate a substantial amount of fake news. To get our attention, morning shows and talk shows need something exciting and new, and not necessarily correct, to report on. Entertainers such as Oz, Dr. Phil (McGraw), and Dr. Drew (Pinsky) should not be your go-to medical sources.

- **RULE 20:** Be wary of promotions using words such as "scientific breakthrough," "miraculous cure," "secret ingredient," and "ancient remedy" and claims that the product is "natural" or "nontoxic" (which doesn't necessarily mean safe). Remember that not all chemicals are bad and that not everything natural is good.