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Hope drives antiaging hype

As the 75 million baby boomers see their parents facing age-related problems (and begin to experience some of their own), this segment of our population is spending billions of dollars in response to enticing but often misleading marketing. And because we live in a world of medical revolutions and cures, many people accept antiaging claims as fact, particularly when the claims are accompanied by pictures of scholarly looking people in white coats with stethoscopes hanging around their necks.

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Antiaging, longevity, and age-management clinics and institutes offer benefits that would appear to the appropriately skeptical eye to be too good to be true. Some advertisers claim that with their products or services you can do some or all of the following:

- Reverse 2 decades of aging
- Live to be 125 or older
- Give yourself a natural face-lift and body muscle rejuvenation
- Substantially reduce your adipose tissue
- Increase your skin thickness and elasticity
- Increase your lean body mass
- Increase your physical strength and energy
- Lower your cholesterol.

The therapies have high price tags to add even more credibility, and the gullible are swallowing these claims hook, line, and sinker.

The bottom line is that no substance has been shown in a scientifically rigorous manner to stop or reverse aging. What is surprising is the huge market that has been developed by "swindlers, hucksters, and snake oil salesmen" (as described by witnesses before a Senate subcommittee),[1] as intense marketing campaigns overwhelm the small objective, academic, and consumer-advocate presence on the Internet and elsewhere.[2]

As patients are more and more inundated with fountain-of-youth promises, they are increasingly coming to their health care providers for advice, and herein lies the importance of reliable information on the subject.

In this issue of the *Cleveland Clinic Journal of Medicine*, Kamel and colleagues provide an objective review of the most prominent substances claimed to enhance longevity, appropriately dividing them into dietary supplements and hormones.

Some claims are just too good to be true

DIETARY SUPPLEMENTS: A TRUCK-SIZED LOOPHOLE

We normally think of dietary supplements as vitamins and minerals, but the 1994 Dietary Supplement Health Education Act (DSHEA) also includes herbs or other botanical products, amino acids, concentrates, metabolites, and extracts in this category.

The wording of "concentrates" and "extracts" provides a loophole big enough to drive a truck through. Many substances that should be regulated as drugs are sold, relatively free of regulation, as dietary supplements. One example is dehydroepiandrosterone (DHEA), a bioactive, endogenous hormone that is a precursor of estrogen and testosterone.

For those who use questionable claims to sell products, there are tremendous advantages to labeling these products as dietary supplements. Dietary supplements do not require premarket review or approval by any agency.

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No independent agency ascertains that the product actually contains what the consumer believes he or she is purchasing. Promoters can make unsubstantiated claims of what their products do (eg, reverse aging, improve strength or memory)—the only stipulation is that they cannot claim the product treats a specific disease. Manufacturers do not have to provide the US Food and Drug Administration (FDA) with any reports they receive of adverse events. No warning of known contraindications is required. And the FDA can take action only after the fact against dietary supplement products that may be unsafe or that have been promoted as drugs.

Therefore, dietary supplements can entirely bypass peer review and independent assessment of efficacy and safety. Thanks in part to the DSHEA, the antiaging industry has grown tremendously.[1–3]

HORMONES: NO FOUNTAIN OF YOUTH

Ever since hormones were discovered, lay people have associated them with youth.[4] Thus, hormones are a favorite class of substances to market as cure-alls.

Only 1 in 10,000 adults meets the criteria for GH therapy

Even the mainstream medical community has promoted some hormones—particularly estrogen—as panaceas. But relatively short-term studies of estrogen as a means of reducing cardiovascular disease had mixed results, and the Women's Health Initiative subsequently found that estrogen replacement therapy in postmenopausal women was associated with increased risk of stroke[5] and impaired cognitive function.[6] Controversy remains, but estrogen therapy is not a cure for aging.

The antiaging industry once promoted melatonin as a fountain of youth, with claims of incredible benefits. When this hormone did not prove to be a big money-maker, it was quickly replaced by DHEA. In a recently published 2-year, placebo-controlled, randomized, double-blind study of 87 older men and 57 older women, neither DHEA nor testosterone replacement demonstrated benefit in body composition, physical performance, insulin sensitivity, or quality of life.[7] As DHEA fell out of favor, the next heir apparent became growth hormone (GH).

Although some antiaging practitioners claim that 20,000 studies support the use of GH as an antiaging therapy, in fact not one scientifically rigorous, unbiased study supports this use.[8] Daniel Rudman, the first author of an oft-cited clinical trial of GH in 12 older men,[9] decried the misinterpretation of his work by the antiaging industry.[10] Furthermore, numerous studies showed that mice (animals in which longevity can be studied within a reasonable period of time) live longer if they are relatively resistant to the effects of GH.[11,12]

But the $10,000- to $20,000-a-year price tag and huge profits associated with GH distribution apparently provide incentive for pharmaceutical companies not to take action to limit the supply, and for antiaging Web sites and clinics to pour whatever resources necessary, legal and monetary, into being able to continue marketing GH as an antiaging therapy.

Off-label use of GH is illegal

Legal and lobbying maneuvers are an issue with GH because, in fact, using GH to treat aging and age-related problems is illegal.

The Food, Drug, and Cosmetic Act sets very stringent indications for the use of GH (and anabolic steroids). In adults, GH can only be given for acquired immunodeficiency syndrome (AIDS) wasting syndrome, short bowel syndrome, and adult growth hormone deficiency. There is no such thing as legal off-label provision or distribution of GH.[13]

Since the details of the law recently received prominent media attention, many antiaging clinics and the like have shifted gears to say that they are no longer giving GH for antiaging, but rather that they are providing it for GH deficiency. This is a misleading attempt to provide GH within the confines of the law.

To meet the legally required diagnostic criteria of adult growth hormone deficiency, the patient must fail a physiologic stimulation test, ie, his or her anterior pituitary gland must fail to produce a standard minimum amount of GH in response to administration of growth hormone-stimulating hormone, arginine, or less commonly, insulin. Not surprisingly, most antiaging clinics do not perform the test (and Web sites do not require it). Only 1 in 10,000 adults, including the very old, would fail this test and could legally receive GH.[12]

The other criterion that must be met for providing GH is that a demonstrable pathologic cause for the decreased GH response must be provided. In nearly all cases, the cause is an anterior pituitary tumor or treatment of the tumor with surgery or radiation therapy or both.

A number of antiaging clinics and clinicians are currently under investigation by the Drug Enforcement Agency, and others have been reprimanded by the FDA and State Medical Boards.[14,15] The most important action for these agencies to take will be to stop pharmaceutical companies from directly or indirectly distributing GH to antiaging clinics and online pharmacies. At least one major pharmaceutical company may be currently under investigation for marketing GH for antiaging.[16]

One hopes that these events signal the imminent demise of GH for antiaging therapy. But as certainly as the entrepreneurial opportunists seized upon GH as the panacea to replace melatonin and DHEA, once GH disappears, another nostrum will likely replace it. The road to perpetual youth is paved with (fool's) gold.

CALL IT QUACKERY

There's a word for this sort of thing: quackery.

Use of this word may seem bold, but in my opinion, it fits the definition. *Dorland's Illustrated Medical Dictionary* defines a quack as "one who fraudulently misrepresents his ability and experience in the diagnosis and treatment of disease, or the effects to be achieved by the treatment he offers."[17] In the report *Quackery: A $10 Billion Scandal*, produced by the United States House of Representatives Select Committee on Aging's Subcommittee on Health and Long-Term Care, a quack is defined as ". . . anyone who promotes medical schemes or remedies known to be false, or that are unproven, for a profit."[3]

With the desires of the aging baby boomers, the Internet, and, until it is amended, the DSHEA behind it, antiaging quackery is unfortunately here to stay. For this reason, I list some signs of potential quackery[17] here so that health care providers and the public can better suspect it when it rears its head.

- Claims that are pitched directly to the media without evidence of unbiased peer review
- Claims that the purveyor's work or message is being suppressed by the scientific establishment
- Phrases like "scientific breakthrough," "exclusive product," "secret ingredient," or "ancient remedy"
- Plentiful testimonials and anecdotes, often without last names
- "Centuries-old remedy"
- Attempts to convey false senses of credibility with pictures of people in white coats, misleading credentials, and terms like "academy," "institute," and "clinic"
- No mention of adverse reactions; claims that sound too good to be true
- Simplistic rationales to dupe the public
- Use of celebrities to promote products, and attempts to associate a product with well-known legitimate but unsuspecting scientists through honoraria or awards
- "The esteemed medical tradition of off-label use"
- Conflict of interest: clinicians promoting drugs and other substances from which they profit
- Misleading interpretations of studies or outright false claims
- Long disclaimers
- Money-back guarantee
- "We are on your side."

The road to perpetual youth is paved with (fool's) gold

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