Jack LaLanne got it right

In this issue of *Fertility and Sterility* Machtinger et al. (1) describe a study assessing relationships between in vitro fertilization (IVF) outcomes and the female partner's intakes of selected beverages, with a focus on sugared drinks, caffeinated beverages, and diet soda. It is one of a plethora of studies, published over the last three decades, performed to better understand relationships between, on the one hand, lifestyle factors for both women and men, and, on the other hand, both the presence of infertility itself and treatment outcomes. Like that of Machingter et al., nearly all of these studies have been observational, which is to be expected given the great practical barriers to performing randomized trials that theoretically might better assess the same relationships.

The study population comprised 340 women who completed questionnaires regarding beverage intake on the first day of stimulation or day of oocyte retrieval. Associations were studied using regression models that took into account confounding variables including age, body mass index, and smoking status. The main finding of interest was that higher intake of sugared beverages was associated with worse outcomes, including lower numbers of oocytes retrieved and "top quality" embryos as assessed on day 2 or day 3, as well as lower clinical pregnancy and live birth rates. No such associations were seen for intakes of caffeine or diet sodas. The authors conclude, "pre-pregnancy consumption of sugared sodas seems to have the most detrimental impact on IVF outcomes compared to other commonly consumed beverages."

The study is unlikely to change much what we as clinicians are already telling patients. Thus I will continue to recommend to my patients, who I mostly see for infertility or recurrent pregnancy loss, that they avoid sugared soda, but as well minimize intake of caffeinated beverages and even diet soda, given other study results suggesting all three beverage categories may have deleterious effects on health outcomes, both those directly related to successful reproduction and otherwise.

Importantly, however, the study does add to the large body of evidence that the same lifestyle practices considered for decades to provide benefit to one's overall long-term health are virtually identical to those making successful reproduction more likely, whether or not treatment is undertaken. These practices, to a large extent inextricably intertwined with one another, include: combining a healthy diet with regular exercise so as to optimize body composition and overall physical fitness; taking steps towards optimizing restful sleep and minimizing psychological stress; complete avoidance of smoking; at most, a moderate consumption of alcohol and caffeine; and minimizing exposure to toxic substances, whether self-administered in the form of drugs, either illicit or unnecessarily prescribed, or environmental toxins. Accordingly, when asked by patients about what they might do to enhance their chances of having a child, my usual answer, similar to that of many colleagues, is "anything that you would want to do anyway for your general health." I should mention explicitly this advice includes modifying behaviors for that small fraction of patients who have ovulatory dysfunction on the basis of excessive exercise coupled with decreased energy intake.

In any event, why bring up Jack LaLanne? For me, contemplation of the specific findings of Machtinger et al. regarding sugared drinks, as well as of relationships in general between lifestyle and health, evokes memories of the man, who died in 2011 at age 96. Most remembered in the United States as a television exercise guru beginning in the 1950s, and for his feats of strength and endurance even in his later years, LaLanne in fact took a holistic approach to fitness and health (2). It is striking that starting well over half a century ago, prior to anybody knowing much about such things as biomarkers of oxidative stress or insulin resistance, he vigorously promoted all of the described favorable lifestyle practices. Among other things sugared drinks for him were an anathema, making him a forerunner of sorts for such writers as Michael Pollan (3) ("Eat plants. Not too much. Mostly plants.") and anti-sugar zealot Gary Taubes (4). LaLanne largely attributed his poor health as a child to being a "sugarholic." Accordingly he championed avoiding drinks of any kind to which sugar had been added, in addition to minimizing consumption of all "fizzy" drinks (which would include diet sodas), caffeinated beverages, and alcohol. Instead of such drinks he advocated drinking plenty of water and using a juicer to produce drinks from fresh vegetables and fruit.

Unfortunately, aside from the decline in tobacco use, many if not most Americans in recent decades have not heeded LaLanne's advice. Most obviously, both in the United States and worldwide, obesity rates have risen to crisis levels, despite great advances in the understanding of many aspects of obesity, especially at the basic science level. As recently reviewed in this journal by Meldrum et al. (5), we live in an obesogenic environment, a key element of which is unrestricted easy access to large portions of high-calorie and highly processed foods, often containing large amounts of sugar. World Health Organization guidelines recommend that free sugars (both monosaccharides and disaccharides) comprise no more than 5% of total daily energy intake, corresponding to about 25 grams for people needing 2000 calories daily, and yet the average American citizen consumes over five times this amount. In short, leaving individuals to eat healthier and slim down on their own without any help doesn't work, and as a society we are failing to implement changes to help people modify their behaviors for the better.

Obviously there are no easy solutions. Governmental action to change individual behaviors for what seems the better is, of course, much debated. In my view, however, such action is justifiable especially when the costs of those behaviors are inflicted not only those individuals themselves, both economically and otherwise, but also on society as a whole, for example, in the form of overall loss of productivity and higher health care costs for everyone. Such governmental measures, including tobacco taxes and

hard-hitting media campaigns, appear to have played a critical role in the decline in smoking in the United States. Both in the United States and elsewhere, recent years have seen similar steps increasingly being taken to nudge (or shove) people into changing what and how much they eat, in the form of taxes on sugary drinks and trans fats restrictions, for example, but it is unclear how this will play out.

Whatever governmental policies may or may not be in place, we as clinicians would do well to even more forcefully emphasize to our patients the importance of implementing the described lifestyle practices, precisely because of the reproductive benefits to be had, and to do so as early as possible, even years before any pregnancy is desired. For women of reproductive age, the lure of delivering a healthy baby, whether next year or 10 years from now, may be stronger than that of the possible avoidance, at age 60 or 70, of cardiovascular disease, type 2 diabetes, or cancer. Jack LaLanne told his television viewers that he wanted to be considered as "your health consultant." We are fortunate that many of our patients are already inclined to consider ourselves as such, and we can exploit that.

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https://doi.org/10.1016/j.fertnstert.2017.09.036

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