

there would be if the omega-3 pig goes to market.

COMPETING INTERESTS STATEMENT

The authors declare competing financial interests: details accompany the full-text HTML version of the paper at <http://www.nature.com/naturebiotechnology/>.

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Autumn Fiester responds:

Kang and Leaf charge that I misunderstood their science, ignored evidence and made erroneous statements, implying that if I were better informed, I would support their omega-3 transgenic pig project. I disagree on all points.

The most serious charge of their letter is that I misrepresented the science and made specious claims about their research. Let's check my original article and their response. First, mine: maybe the recent skepticism about the health benefits of omega-3 oils¹ has been resolved definitively by separating fish-based omega-3 oils from plant-based omega-3 oils^{2,3}. And maybe the exalted claims currently being made about fish and fish oil supplements will stand the test of time^{4,5}—though the track record of past nutritional wonders isn't good⁶. But what all of this amounts to is simply an affirmation of the AHA guidelines to eat two servings of readily available fatty fish per week. We don't need omega-3 bacon to get the right kind of omega-3.

Now let's look at the claims made by Kang and Leaf. First, they claim that the high ratio of omega-6 to omega-3 in the US diet is linked to an increased risk of many diseases⁷. Fair enough. But then they claim that the dietary tweaking that we need to regain the balance between omega-6 and omega-3 “is not easy to do because most common foods available today in the market contain a large amount of omega-6, but little or no omega-3.” Well, nothing in the produce aisle has it. And this gets

to the elephant in the room: our “modern nutritional problem” is that we eat too many processed, highly refined foods instead of whole foods, and these foods are unhealthy and have made us fat (65% of us, to date). It is clear that this will not change with the availability of omega-3 pig products on our supermarket shelves. In fact, the omega-3 pig represents just the latest in a long line of ‘processed’ foods that we need to avoid.

A second, questionable inference in the Kang and Leaf response is that transgenic omega-3 pigs are likely to be “even healthier” than non-GM pigs, resulting in enhanced animal well-being and safety. This is true, they say, because “recent studies” (that is, Kang's own) show that transgenic omega-3 mice are less vulnerable to melanoma and colitis^{8,9}. There are many problems with this claim. First, pigs aren't mice: maybe genetically altered pigs will end up with identical health profiles to Kang's transgenic mice, but at this point there are no data to support their claim. Second, I doubt that melanoma tops the list of health and welfare concerns of the domestic hog. Third, I am sure that domestic hogs would be happy to avoid colitis, but the solution to food animals' gastrointestinal problems is better treatment—not genetic modification. Fourth, there are data about how well the animals fared in Kang's omega-3 pig research, and it isn't good news from an animal welfare standpoint. A full one-third of the piglets had to be euthanized in week 3 for heart failure due to a cardiac congenital defect, which the authors claim is common in cloned pigs¹⁰. And finally, if we want to talk about animal well-being and safety, we need to look at the full picture of animal suffering involved in this research: the costs to the donor and surrogate animals, the health of the live offspring, the conditions for the animals throughout the research¹¹. As a snapshot, look at the details of this experiment: the authors began with 1,633 embryos, which they transferred into 14 gilts, which generated five pregnancies that went to term, producing only ten live offspring (two stillbirths), three of which had congenital heart defects and had to be euthanized. So from 1,633 embryos, the researchers achieved seven (apparently) healthy animals, or an efficiency of 0.4%. In this context, I do not believe it is plausible to speak of animal welfare ‘benefits’ of the omega-3 pig research.

The most specious of all of their claims is their conclusion: they state that if people “eat the omega-3 pork instead [of other meat], they can also obtain a sufficient amount of omega-3 and receive many health benefits, such as a 40% reduction in the risk of sudden cardiac death,” and they cite a study² to back this claim. The study they cite is about fish², and its findings cannot be extrapolated to the case of omega-3 pork. In fact, there is no scientific evidence whatsoever that there is any—let alone “many”—health benefits from eating omega-3 pork, and certainly not a 40% reduction in sudden cardiac death. Has this meat even been cooked? And, if so, which parts have been cooked and how? This question matters because there are compelling data to show that how fish is prepared may significantly affect the benefits from eating it¹²; when fish is fried, for example, it not only fails to decrease the risk of ischemic heart disease, but it may increase that risk¹². It is because of such data that Deckelbaum and Akabas—in the paper³ quoted by Kang and Leaf—tout the health benefits of EPA plus DHA in the context of the “proper selection and preparation of fish.” Given how complicated the nutritional picture of pork products is—with the confounding variables of saturated fat, various cuts of meat and many different methods of preparation—there are no legitimate health claims that can be made about the untested omega-3 pork. Their concluding sentence says it all: “You can imagine how much impact on public health there would be if the omega-3 pig goes to market.” The omega-3 pig is scientific imagination run amok.

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