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RESEARCH ARTICLE

Should We Eat the Human-Pig Chimera?

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Abstract
Scientists will soon be able to grow human-transplantable organs in pigs. This paper focuses on the question of whether it is morally permissible to eat genetically altered pigs after harvesting their organs. Despite a lack of scholarly discussion of this question, the impetus for it is straightforward. There is no reason to think that peoples' taste for pig will subside when scientists reach the point of being able to growing mature human organs inside them. In this paper, I argue that there is a good reason why we should eat genetically altered pigs and currently no compelling reasons to the contrary.

Keywords Chimeras · Organ research · Organ transplantation · Vegetarianism

Scientists will soon be able to grow human-transplantable organs in pigs. In 2010, Toshihiro Kobayashi and colleagues were able to grow a rat pancreas in a mouse. Jun Wu and colleagues reported in 2017 that they were able to create human-pig chimera blastocysts. Given that in America a name is added to the transplant waiting list every 10 minutes and 20 people die every day due to the lack of transplantable organs, not to mention patients on the transplant list have a reduced quality of life, growing transplantable organs in human-pig chimeras—i.e., creatures with a mix of human and pig cells—presents a significant possibility (American Transplant Foundation 2019). There will be a readily available source of organs, and because these organs will be generated from a patient's own cells there will no longer be a need for lifelong immunosuppression therapy. There are a host of questions and concerns that surround genetically altering pigs for organ donation, of course.[1] Are we morally permitted to create

[1]For ethical discussion, see Streiffer (2005) and (2019), Koplin and Savalescu (2019), Bourett et al. (2016), Shaw et al. (2015), Eberl and Ballard (2009), and Robert and Baylis (2003). For scientific discussion, see Tarifa et al. (2020), De Los Angeles, Pho, and Redmnond (2018), Yamaguchi et al. (2017), Rashid, Kobayashi & Nakauchi (2014), Nagashima et al. (2014), Kobayashi et al. (2010), Wu et al. (2016), Wu et al. (2017), and Suchy and Nakauchi (2017) and (2018).

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chimeras? How much will we actually have to genetically alter the pig in order to grow human organs? How will we know if human-pig chimeras manifest human-like cognition? What do we do if they manifest human-like cognition? What is the moral status of these creatures given that they will have some human genetic material? Who will receive these organs? And so on.

This paper focuses on the question of whether it is morally permissible to eat the flesh of pigs that have been genetically altered to grow human organs. Despite a lack of scholarly discussion of this question, the impetus for it is straightforward. There is no reason to think that peoples' taste for pig will subside when scientists reach the point of growing human organs inside them. We can, in effect, *maximize* our use of these genetically altered pigs by growing transplantable organs inside of them and then eating what remains after harvesting their organs. However, this question raises other questions. Does consuming human-pig chimeras amount to cannibalism? Does it violate our respect for human dignity? Should our disgust at the idea of eating the flesh of a creature that grew human transplantable kidneys, say, provide a compelling reason to refrain from consuming the flesh of that creature?

In this paper, I argue that there is a good reason why we should eat the flesh of pigs that have been genetically altered to grow human organs (human-pig chimeras) and currently no compelling reasons to the contrary. After offering some preliminary clarifications in section 1, in section 2 I offer and defend an argument that we should adopt chimera flesh in our diet. In section 3, I respond to objections to adopting the practice. I conclude by clarifying how the argument of this paper depends on certain factors turning out to be true, factors that we currently do not know.

Preliminary Clarifications

Before continuing on, I clarify four points. First, I focus on human-pig chimeras because pigs are considered ideal candidates for growing human organs and much of the research has focused on them. Their organs are of a similar size to ours; we know a lot about pig cells, anatomy, and so on because our familiarity with xenotransplantation trials; pigs mature at a fast rate; there are fewer prohibitions on pig research compared to nonhuman-primate research; and they produce a lot of offspring compared to other mammals. Second, I explain how I understand the creation of human-pig chimeras. Scientists delete the DNA relevant to growing a pig kidney, say, in a pig blastocyst, thereby creating a vacant developmental niche. Human induced pluripotent stem cells are then introduced into the blastocyst that fill this niche and program the developing embryo to grow a human kidney. The reality is more complex, to be sure, for scientists will have to edit the pig's vascular system and other components to ensure that it is compatible for human organ growth (Tarifa et al. 2020:5). This edited embryo is then implanted in a sow, who then gestates and births the chimera. The chimera will continue to grow until its kidney is suitable for transplantation. In theory, a chimera will outwardly look and behave like pigs.[2]

Third, I set aside arguments that show that we should not create chimeras to begin with or that we should not consume meat in general. Arguments that these chimeras have rights or that it is otherwise wrong to use them for our ends show that we should not pursue this research to

[2] I am focusing on genetically altering pigs for organ donation. I am not going to discuss genetically altering pig brains to study and develop new treatments for neurodegenerative disorders.

begin with. The guiding question of this paper assumes that pigs are being genetically altered in labs for human organ transplantation. Finally, I set aside currently unanswered empirical questions about the mental states of genetically altered pigs, specifically whether they might manifest human-like thoughts. While this empirical issue is important, it is beyond the current state of the research. If it turns out that chimeras manifest human-like thoughts or abilities, then this raises issues with harvesting their organs to begin with, as Tarifa and colleagues note: "those hypothetical chimeric animals [that manifest human-like thought] could no longer be used for hosting human organs and should be treated as one of our kind" (Tarifa et al. 2020: 6). As of now, we do not know how much human genetic material will migrate to the other parts of the genetically altered pig, but there are techniques that promise to localize human material in the relevant organ (see Suchy and Nakauchi 2018: 39, Bourret et al. 2016: 4, and Rashid et al. 2014). This paper assumes a pig that is genetically altered to grow a human pancreas will not manifest human thought.

An Argument in Favor of Eating Chimeras

I start by offering an argument for the claim that we should eat the flesh of human-pig chimeras that have been created for the sake of organ donation. The argument begins by appealing to a version of the least harm principle—People should adopt the diet that results in the least amount of harm to animals.[3] This principle assumes that causing harm to animals is morally significant and requires good reason; it does not assume that animals have high moral status, nor does it assume a particular ethical theory. The assumption underlying the principle, namely, that causing harm requires good reason, is intuitively plausible (Rachels 2011; DeGrazia 2009). I am morally justified in letting my daughter get vaccinated because, although needles harm her, the good of vaccines outweighs the harm brought about by needles. By contrast, I am not morally justified in kicking a puppy for fun because my having a good time does not outweigh the harm I cause the puppy. This point about harm requiring good reasons applies to dietary choices. If two diets are available to a person, one of which causes lots of harm to animals and one that does not, then, all things being equal, that person should adopt the diet that causes the least amount of harm to animals. To illustrate this point, consider meat-eating and factory farming. Since people do not need to eat meat in order to survive—there are many happy and healthy vegetarians and vegans—they do so for taste, convenience, or preference, and neither taste nor preference justifies the amount of suffering animals experience in factory farms, as Stuart Rachels argues:

> We eat the meat, and it helps to nourish us. But there is a catch: we could just as easily nourish ourselves in other ways. Vegetarian meals are also good. Nonetheless, most people prefer a diet that includes meat because they like the way it tastes, the question, then, is whether our enjoyment of the way meat tastes is a good enough reason to justify

[3] The Least Harm Principle is borrowed from Tom Reagan (1983) and Stephen Davis (2003). The harm can be either physical (e.g., being kicked in the ribs) or psychological (e.g., being the object of a smear campaign). The sufferer of harm may be consciously aware of the harm (e.g., experience the pain of being kicked in the ribs), but this need not be the case. A creature can be harmed but, for a variety of possible reasons, be unaware of being harmed. For instance, a person may be ridiculed by her peers, but fail to recognize the ridicule because it is never before her.

> the amount of suffering that the animals are made to endure. It seems obvious that it is not. (Rachels 2011: 261)

Just as one's enjoyment of watching dogs fight does not justify the suffering those dogs experience, so one's preference for meat does not justify the dehorning and neutering of cattle without anesthesia.

The next step is to note that pigs living on factory farms live in terrible conditions, conditions that are downright awful. No one disputes the terrible conditions on factory farms. David DeGrazia gives the following illustrative example to highlight the amount of harm experienced:

> After weaning at four weeks of age, Hog Y is taken to a very crowded, stacked nursery cage. Due to poor ventilation, he breathes in powerful fumes from urine and faeces. Upon reaching a weight of 50 pounds, he is taken to a tiny 'finishing' pen. It is slatted and has a concrete floor with no straw bedding or sources of amusement. Despite being a member of a highly intelligent and social species, Hog Y is separated from other hogs by iron bars and has nothing to do except get up, lie down, eat, and sleep. He is sometimes amuses himself by biting a tail in the next crate—until all the hogs' tails are 'docked' (cut off). Both this procedure and castration are performed without anesthesia. (DeGrazia 2002: 68)

Chimeras, by contrast, will not live in such conditions. True, their living conditions will not be ideal for them, as they will not live free range lives and will live shorter lives (Shaw et al. 2015). Nevertheless, their lives will be significantly better. The United States Department of Agriculture's *Animal Welfare Act and Animal Welfare Regulations* requires "sufficient space to allow each animal to make normal postural and social adjustments" (2019: 3.128), as well as access to "wholesome, palatable" food that is "free from contamination and of sufficient quantity and nutritive value to maintain all animals in good health" (2019: 3.129a). It also requires the use of sedatives and anesthesia with procedures that involve more than slight pain as well as painless euthanasia after procedures that would otherwise cause severe or chronic pain or distress (2019: 2.31d). There is good reason to think that chimeras will be treated well independently of the legal regulations. In order to maximize the health of the transplantable organs, chimeras will not be housed in cramped, miserable cages, nor will they live in their own waste. They will be housed in sanitary labs and fed nutritious food. To reduce psychological stress, which can be transmitted to the organs, chimeras will have some stimulation, including toys and possibly conspecifics. They will not be slaughtered in massive slaughtering factories that increase stress and pain; rather, in order to ensure the safe harvesting of organs as well as to reduce stress transmission to organs, the sedation will be as painless as possible. With these considerations before us, the argument can be presented schematically as follows:

1. People should, all things considered, adopt the diet that results in the least amount of harm to animals.
2. Adopting a diet that includes the flesh of genetically altered pigs will result in less amount of animal harm compared to other diets.
3. Thus, we should consume chimeras.

More needs to be said in defense of this argument, specifically premise 2. If the dietary options are pig flesh or genetically altered pig flesh, then we should adopt a diet that includes the latter

and not the former. However, there are other dietary options, such as vegetarianism and veganism, and vegans and vegetarians would likely resist premise 2 on grounds that chimeras are harmed. Two things can be said in defense of premise 2 therefore. First, all diets involve animal harm, including vegetarian and vegan diets. Scholars are becoming more and more aware that agricultural farming harms a lot of animals. Some harm is intentional, as when farmers place traps near silos or spray pesticide, and other harm is unintentional, as when pesticide runs off into local streams and kills fish or field animals are run over by tractors. Stephen Davis estimates the number of animals killed in the United States to produce a vegetarian diet to be around 15 field animals per hectare per year (2003: 245). Bob Fischer and Adam Lamey estimate that "9.5 million birds are killed per year in the US" and that, given increased fertilizer runoff and pesticide use, "it's all but certain that fish have continued to be killed in substantial numbers" since 1975 (2018:4–5). Accordingly, Fischer writes in another article that "no one disputes that some wild animals are currently harmed" in traditional plant agriculture (2018: 247). Second, chimera flesh is "free" in the following sense— this paper assumes that pigs are going to be genetically altered and harvested for human organs; their flesh will either be consumed or not, in which case it will be disposed of. Not eating their flesh will thus result in *more* animals being farmed to sustain a meat-based diet or result in more field animal deaths to sustain a plant-based diet. By eating chimeras, we lower the number of pigs harmed in factory farming as well as the number of field animals harmed in agricultural production.

This argument is simple and plausible. It relies on an empirical observation in premise 2 and a moral principle that many can agree to (we should minimize animal harm) for the conclusion that we should consume chimera flesh. Nevertheless, there are a number of possible criticisms that can be raised, and in the remainder of this section, I respond to criticisms of this argument.

The first objection would be to deny the moral principle that people should adopt the diet that results in the least amount of animal harm. Timothy Hsiao, for example, argues that all non-human animals lack moral status, and it "is morally permissible for us to use them [animals] for our own purposes" (2017: 48 see also Hsiao 2015). If Hsiao is right, then it is not the case that we need to adopt the diet that results in the least amount of harm to animals. However, this is not so much of a problem for the position of this paper dialectically. Hsiao is defending the moral permissibility of eating meat and factory farming, and so, he is of the position that eating meat and treating animals as we do in factory farming is morally permissible. Thus, if he is opposed to eating chimera flesh, this will be because he has some reason unique to this kind of flesh, not animal flesh more generally. I address possible reasons why someone would not want to eat chimera flesh in the next section. The argument of this section is directed at vegetarians and vegans in order to show that a position of animal care entails the adoption of chimera flesh in one's diet.[4]

Another possible objection is that the argument opens the floodgates for consuming other unsavory items (Abbate 2019). If we replace "genetically altered pigs" with "recently deceased human flesh," then we get the conclusion that we should consume recently deceased human

[4] The position defended in this paper is in line with "new omnivorism," which, according to Andy Lamey, refers to the position that "endorses animal protection as philosophy but goes on to defend eating animals." (Lamey 2019: 1; see Fischer and Lamey 2018: 410). New omnivorists agree that animal suffering is morally significant and that factory-farmed animals suffer greatly. They go on to note, however, that animals also suffer in a variety of ways in the planting and harvesting of plants, and thus, minimizing animal suffering does not require us to adopt a strict vegetarian diet.

flesh. After all, consuming recently deceased human flesh lowers the overall amount of harm to animals in the field and on the farms, and thus, given the moral principle in premise 1, we should adopt a diet that includes recently deceased human flesh.

The problem with this objection is that it overlooks the "all things considered" *provisio* of the moral principle in premise 1. A person may have dietary restrictions that require her to consume meat, and so, such a person would be exonerated from adopting a diet that does not necessarily minimize animal harm; she may have to adopt a diet that harms animals in order for her to live a flourishing life. Likewise, there are a variety of possible reasons why people should not consume human flesh: it is unhealthy, violates our moral obligations to the dead, is psychologically harmful, may promote human harm, may undermine human dignity, may be socially problematic, and so on. These reasons, if true, excuse us from adopting human flesh in our diet in order to reduce animal harm. In other words, although eating human flesh would lower animal harm, it would increase human harm, and thus, we are under no obligation consume it. Of course, the question arises, are there reasons why people should not consume the flesh of a genetically altered pig. I respond to possible reasons why someone might think this in the next section, but suffice it to say now, I do not think there is currently a good reason not to include their flesh in our diet. Importantly for present purposes, this argument does not open the flood gates to other unsavory food items.

Another set of objections focus on premise 2, and because I think one response suffices for both objections, I present the objections together. First, it might be objected that there are other dietary options that result in less animal harm. Donald Bruckner (2015) argues that consuming recently killed roadkill would help reduce the number of plants required to sustain a vegetarian diet, and thereby, lower the number of animal deaths in plant agriculture. Christopher Cox (2010) argues that vegetarians should eat oysters because oysters do not feel pain, and so cannot be harmed. Others argue that we should consume nonsentient insects because such insects cannot feel pain and do not have interests in their future (Fischer 2016). Second, it might be argued that there is going to be a multiplying effect. These genetically altered pigs will need to eat, and so, there is going to be more animals harmed in order to sustain a diet that includes chimera flesh. Accordingly, it is not obvious that eating chimera flesh will in fact reduce overall animal harm.

The problem with these criticisms, however, is that *not* eating chimera flesh will not reduce the number of chimeras created and thus the amount of food required to feed them. I grant both that these other diets may help to minimize animal harm—this is an empirical issue—and that chimeras will need to eat, which in turn will require other animals to be harmed in order to produce chimera food; but these observations are beside the point. The argument above claims that there is going to be available, edible flesh to consume, and by eating such flesh, we thereby lower the demand for food from systems that result in animal harm. Here is another way of getting the point across. It seems morally wrong for a number of reasons to waste available, edible food: other people could eat it; lowering food waste lowers the demand for food, which in turn can have a positive environmental impact, not to mention decrease the number of animals harmed. Applied to chimeras, the point is that not eating them will result in *more* animal harm than eating them will. Since we should adopt the diet that causes the least amount of harm to animals, and chimera flesh is going to be available, we should incorporate chimera flesh in our diets.

I conclude that the argument is defensible and that we have a good reason to eat genetically altered pig flesh. Before I address possible reasons why we should not consume chimera flesh, it is important to highlight that the argument is contingent upon two assumptions. The first

assumption is that chimeras will be created for the sake of organ transplantation. Given the immense progress in recent years, this assumption seems reasonable. As Shaw and colleagues observe, this "technology is now widely regarded as a real possibility" (Shaw et al. 2015: 971). I am not arguing that we create chimeras in order to eat them. The second assumption is that genetically altered pig flesh will be as safe to consume as non-genetically altered pig flesh. There are two worries here. First, there is the worry about zoonosis, or the transference of pig-specific viruses to humans. Scientists are optimistic that this worry can be met. N. Cengiz and C. S. Wareham write that "the potential risk for zoonotic infection…can be diminished or eliminated" by testing the chimeras, housing chimeras in sanitary labs, and genetically engineering possible viruses out (Cengiz and Wareham 2019:67–68). Fabian Suchy and Hiromitsu Nakauchi report that scientists have been able to inactivate pig-specific viruses in pig fibroblasts through gene-editing (Suchy and Nakauchi 2018: 40). Second, there is the worry that consuming chimera flesh might be problematic to our health. Unfortunately, this worry is currently unanswerable because chimeras have yet to be created, and so, we do not yet know what the health effects will be of consuming chimera flesh. Accordingly, the success of this argument depends on the assumption that consuming chimera flesh will be as healthy as consuming non-genetically altered pig flesh.

Reasons to Oppose Eating Chimera Flesh

The argument above shows that we should eat chimera flesh. As noted already, some might think that we have good reason to refrain from doing so, and thus, the moral principle does not hold in this case. I turn to address reasons that, if convincing, show that we are not obligated to adopt chimera flesh in our diet because to do so would be harmful or otherwise impermissible in some way—these are reasons that defeat the applicability of the least harm principle to consuming chimera flesh. In this section, I respond to four general worries. Before proceeding, I should clarify once again that I am focusing on reasons relevant to the question of this paper. I thus set aside the topic of animal rights because, if animals have human-like rights, then we should not create chimeras to begin with and use them for organ donation.

The Yuck Factor

The first reason why we should refrain is that to do so would be gross, disgusting or otherwise repugnant. Leon Kass offers a formulation of why we should take the "wisdom of repugnance" seriously:

> [R]epugnance is the emotional expression of deep wisdom, beyond reason's power fully to articulate it. Can anyone really give an argument fully adequate to the horror which is father-daughter incest (even with consent), or having sex with animals, or mutilating a corpse, or eating human flesh, or even just (just!) raping or murdering another human being? Would anybody's failure to give full rational justification for his or her revulsion at these practices make that revulsion ethically suspect? Not at all. On the contrary, we are suspicious of those who think that they can rationalize away our horror, say, by trying to explain the enormity of incest with arguments only about the genetic risks of inbreeding. (Kass 1998: 687)

Proponents of the yuck factor argue, as Robert Streiffer explains, that "the revulsion that some people experience in contemplating certain activities sometimes suffices for knowing that the activity is wrong" (2003: 38). There are a couple issues surrounding the practice of consuming chimeras that might garner a disgust response. Would someone want to eat bacon from a pig that grew their liver and kidneys? We eat pigs, not humans, and so chimeras—being part human, part pig—violate our moral categories (Robert and Baylis 2003). For this and other reasons, we might be disgusted at the prospect of eating bacon, say, from a genetically altered pig whose human organs were transplanted for human-use. According to Kass, while it might be difficult to offer reasons for why this is disgusting, to discredit the disgust reaction would be foolish. Repugnance or disgust, he tells us, though it is "not an argument," warns us not to transgress what is profound (1998: 687). There is thus a nonrational, sentimental grounds for opposing eating chimera flesh.

The "yuck factor" argument has been subject to much criticism in the broader debate over creating chimeras.[5] Here are some of the criticisms of the argument as it is applied to eating chimera flesh. First, absent a positive reason for opposing the practice, this argument leaves us with the bare assertion that consuming chimera flesh is wrong because it is disgusting, and it is not obvious why disgust at the prospect of eating chimera flesh is a reason to refrain. G. Owen Schaffer and Julian Savulescu explain that "a distaste for something is no reason to think it immoral — just as a distaste towards eggplant is no reason to think its consumption immoral" (2014: 198).[6] There is a conceptual difference between a disgust response and a reason. Kass might argue that disgust reveals certain moral truths, but this would commit him to moral particularism, and not everyone endorses moral particularism; also, this would seem to commit him to the view that one's disgust at eating eggplant reveals a moral truth about eggplants. Second, as Martha Nussbaum notes (2004: 80), to state that we are disgusted about these things on Kass's list and that we need not look further into reasons why we experience disgust seems premature. Rape, murder, bestiality and other acts on the list that Kass offers involve Millian harms, and we can ground their wrongness accordingly.

It is important, also, to ask why people would experience disgust or revulsion at the idea of eating genetically altered pig flesh. People might be disgusted at the idea of consuming this flesh because they imagine it will be like consuming human flesh or that the flesh is somehow tainted by human genetic material. But this is not evidently going to be the case. Scientists are optimistic that they are going to be able to localize organ growth such that there is little to no human genetic material outside the human organ. Suchy and Nakauchi report that careful injection of non-pluripotent cells in addition to the pluripotent cells would result in "potentially higher local chimerism", an advantage being to minimize the possibility that human genetic material transfers elsewhere (2018: 39; see also Rashid et al. 2014). Bourret and colleagues note that injecting human cells for complementation—i.e., injecting them into developmental niche created through gene editing— would render human cells "less competitive than pig cells in a pig microenvironment", which would considerably limit the "risk of significant animal brain colonization by human cells" (2016: 4). Furthermore, it is possible that scientists will be able to genetically modify human induced pluripotent stem cells to make the incapable of taking over the brain of the host (Bourret et al. 2016: 4). Accordingly, the disgust response

[5] See Streiffer (2019: section 2)

[6] J. Jeremy Wisnewski notes similarly that disgust "by itself is no indication of whether or not" eating something "is immoral" (2007: 19). Shaw and colleagues write that "revulsion does not constitute a sound reason for objecting to something" (2015: 973).

results from ignorance of what is being consumed and presumably could be eliminated through greater awareness of what a chimera is. Finally, I should note that it is not obvious to me that people are disgusted by eating the flesh of a pig that grew human organs. These creatures will look and act like pigs. Their "human" element will not be visible to the naked eye, and there is no human person that is possibly being eaten. If people do not share the disgust response to the practice of eating genetically altered pig flesh, then this argument does not apply to them.

Human Dignity

It might be objected that consuming chimera flesh disrespects the human species and is thereby wrong. According to Phillip Karpowicz and colleagues, human dignity is a kind of "unconditioned and incomparable worth" and individuals with dignity are "uniquely valuable and worthy of respect" (2005: 119–120). They argue that we should not create chimeras to begin with because doing so would diminish human dignity:

> By giving nonhumans some of the physical components necessary for development of the capacities associated with human dignity, and encasing these components in a nonhuman body where they would either not be able to function at all or function only to a highly diminished degree, those who would create human-nonhuman chimeras would denigrate human dignity. The torturer or the enslaver of human beings denies them the option of exercising the capacities associated with human dignity. The creator of the human-nonhuman chimera would do even worse—he or she knowingly would diminish or eliminate the very capacities associated with human dignity. (2005*:* 120–121)

Applied to the question of this paper, they might argue that eating chimeras would denigrate human dignity because it would be to dismiss the worth of a human-like creature.

The problem with this objection is that chimeras created for the sake of organ donation will not develop the "physical components" necessary for developing the human capacities that ground human dignity. Presumably, the capacities that ground human dignity are reasoning, complex communication, language, abstract thought, and so on. To be sure, there is some evidence that chimeras might manifest human-like capacities. In a 2013 study by Xiaoning Han and colleagues, they found that mice implanted with human glial progenitor cells displayed enhanced activity-dependent plasticity and learning. There is reason, however, to think that chimeras created for organ donation will not manifest human-like cognitive abilities. Andrew Crane and colleagues' review of 150 transplantation studies "found no evidence suggestive of humanization of the animal host" (2019: abstract). This is to be expected for a couple of reasons. First, given the difference in developmental time between pigs and humans, it is unlikely that there will be enough time for human neural structures to develop (Karpowicz et al. 2004 and 2005). Second, as Tarifa and colleagues explain, "interspecies barriers are too strong for this to happen" (2020: 6). Despite the similar mammalian physiology, there is still millions of years of evolutionary divergence between pigs and human beings. Third, as noted above, there are promising techniques that minimize or eliminate human genetic transfer. Accordingly, these chimeras will have human organs (e.g., pancreas, kidney) and will be regulated to ensure that they do not manifest more human-like abilities. If a chimera does display evidence of human-like abilities, or early embryonic testing reveals significant human genetic material in the brain, scientists will presumably either terminate the chimera in utero or not harvest its organs; the guiding question of this paper will not arise. Nevertheless, I agree

with Jonathan Hughes in thinking it is "implausible that the pig would acquire anything like the cognitive sophistication that would put it morally on a par with humans" (2016). Thus understood, people will be eating the flesh of a pig that grew human organs, and nothing in this process will involve the undermining of human capacities.

Cannibalism

It might be objected that we should not eat the flesh of pig-human chimeras because it is possible that human genetic materials find their way to the flesh of the chimera. Despite techniques that promise to eliminate this possibility and the fact that researchers are highly motivated to localize human genetic material, let us grant this possibility here. Thus, one would be eating *quasi* human flesh, and it is morally wrong, some might argue, to eat human flesh. The success of this argument depends on the claim that it is morally wrong to eat human or quasi-human flesh. I address three arguments for this conclusion and explain why they do not apply to chimeras.

Frederick Ferré argues that cannibalism is morally wrong because it is disrespectful to the inherent value of human beings. He explains his reasoning as follows:

> Psychological grounds aside, the strongest ethical ground for the avoidance of eating human flesh is the familiar principle of due respect for inherent value. Human beings are entities so complex as to be capable of the most creative and free mental activities known in the universe. It would be gross disrespect for such qualitative excellence — the capacity for intense consciousness of being for oneself — to look at such an entity and see only meat. (1986: 44; cited in Schaffer and Savulescu 2014: 198)

We should, Ferré argues, refrain from eating human flesh because to do so is to deny the moral significance of human capacities. The problem with this argument is that, although it might explain why ordinary cases of cannibalism are wrong, it does not easily apply to chimeras. There is no human person, per se, nor any part of a human *person* that is consumed because there never was a human person to begin with. It is primarily pig flesh with trace human genetic material that is consumed, and assuming some human cells make their way into the flesh, there is not a "gross disrespect" of human persons because one is not consuming a creature with human-like "qualitative excellence". Recall, if chimeras manifest human-like qualitative excellence, the assumption of this paper—chimeras will be created for organ donation—will likely not be true.

J. Jeremy Wisnewski offers a Kantian-inspired argument for why cannibalism is morally wrong. In brief, we should not consume human flesh because that is the flesh of a former rational agent who did not want to be eaten and eating their corpse would violate our obligation to said agent. He writes:

> We recognize in our agency a value-conferring capacity: we make ends meaningful by adopting them. One of the features of moral agency is to respect those ends adopted by other agents precisely because they have been so adopted. Respect for agency involves respecting the (morally-permissible) ends of agents; indeed, it even involves promoting those ends where possible. We have obligations to the dead because we had obligations to the ends of the living, and those ends live beyond the grave. (2007: 20)

Although this might explain why ordinary cases of cannibalism are wrong, this reasoning does not apply to chimeras because there was never a rational or moral agent to begin with.

If chimeras are moral agents, then we should not harvest their organs or otherwise use them for our ends. But this paper assumes that chimeras will *not* manifest human-like cognition and other human-like capacities. Recall that I am focused on chimeras created for organ donation, not chimeras created to study neurodegenerative disorders. Chimeras will lack the moral agency, rationality, and all other features that make human persons moral agents, and thus, consuming chimera flesh will not violate our obligations to respect the wishes of dead agents.

Mathew Lu (2013) offers an Aristotelian-inspired defense of the moral wrongness of cannibalism. The basis for his argument is the claim that "a dead human body possesses a kind of value that the virtue of justice requires us to respect" (2013: 447). This value is objective, not dependent on the intentions of the deceased, and it is grounded in the claim that human persons have value in virtue of being "a hylomorphic composite of soul and body, form and matter" (2013: 451). The value of a corpse, despite not being a human person, derives from the fact that it "reflects the form of a living person" (2013: 454). Lu thus offers the following argument:

> (I) Human corpses possess genuine moral value and so are morally vulnerable. (II) Justice demands respect for the vulnerable. (III) Therefore, justice demands respect for human corpses. (IV) An act of cannibalism (anthropophagy) for unserious reasons violates respect for dead human bodies. (V) Therefore, cannibalism for unserious reasons is contrary to justice. (2013: 448)

There are two problems with this argument. One problem is that this account of the moral wrongness of cannibalism assumes a contentious position in metaphysics, namely, hylomorphic dualism. Non-Aristotelians will not be convinced by this argument, for they will not be convinced by Lu's defense of premise (I). A more pressing problem is that there is not a dead *human* body that is being consumed. It is the body of a human-pig chimera, a body that is most definitely more pig than human. Whatever the form of the chimera is, it is definitely not a human form, and the corpse of a chimera does not "reflect" the form of a living person. There is accordingly no demand for respect grounded in justice in this case.

Moral Caution

A final objection is to appeal to moral caution (see Koplin and Savulescu 2019; Savulescu 2016). The argument begins by focusing on the fact of rampant disagreement among scholars. Scholars disagree whether we should create chimeras; scholars disagree whether cannibalism is morally permissible; scholars disagree whether eating meat is morally permissible. There is thus rampant scholarly disagreement surrounding the moral permissibility of eating chimera flesh. It is either morally wrong to consume the flesh of genetically altered pigs or not. Yet there is not much disagreement about the alternative course of action, namely, refraining from consuming chimera flesh. This latter option appears to be morally neutral, while the option of eating chimeras is morally risky. The rational thing to do in light of the disagreement and uncertainty is to err on the side of caution and refrain from adopting chimera flesh in our diets.

This is not a convincing argument, however. It is important to distinguish two kinds of uncertainty: empirical and moral. There is the empirical uncertainty about the health risks of eating chimeras, the amount of human genetic material that makes its way to the chimera flesh, and so on. We will have to wait until further research answers these questions. Fortunately, the empirical uncertainty is not at issue in the moral caution argument. The argument claims that

we are epistemically unsure how to classify the act of eating chimeras. I argued in section 2 that there is a good reason to eat genetically altered pig flesh and in this section that there is no good reason *not* to. The moral caution argument falsely assumes that *not* eating them is permissible and morally neutral. I argued that this is not the case; not consuming them is morally risky because it is possible that more animals suffer because of our decision to not eat chimeras. Stated differently, refraining from eating chimera flesh will promote animal harm. Consequently, both actions—eating chimera flesh and not eating chimera flesh—are morally risky, and so there is no morally cautious act; since there is no morally cautious act, considerations of moral caution do not provide us with reason not to consume chimera flesh.

Conclusion

I conclude that there is currently no compelling reason not to eat chimera flesh and a good reason to do so. Let me highlight the conditional limitations of the argument of this paper. First, this argument assumes that chimeras will be created and that they will *not* manifest human-like cognition. If chimeras are not created, or they manifest human-like cognition, then it is not clear to me that scientists will or should harvest their organs. The question of this paper will not then arise. Second, this argument assumes that chimera flesh will not be harmful to human persons beyond the unhealthiness of a meat-eating diet in general. If it turns out that chimera flesh is more harmful to consume than pig flesh, then one has a pragmatic reason not adopt a diet that includes chimera flesh. While there are promising techniques of localized organ growth, we are not in a position to say confidently whether it will be as healthy to consume, so we will have to wait. Note carefully, however, that our uncertainty about the health risks of consuming chimera flesh does not provide us with a reason not to proceed; it only provides a reason to proceed with caution. These two assumptions aside, we have good reason to eat chimera flesh. I grant that the position defended in this paper is controversial, so I welcome rebuttal.

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