Re: selection criteria for obesity

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On Thu, 23 Dec 2004 04:46:37 GMT, "Charles" <lmno@mindspring.com>
wrote:

*>>[Pauline]The fat Venuses I have seen are *clearly* obese,*
>[Charles]do you have any ideas about the selection criteria for obesity? why such a
>phenomena would continue & apparently even be desirable, in our hss line?

Well, I'm not sure that obesity has been selected for, as such, or simply a degree of fat. You said yourself that currently obesity is an 'epidemic' and that implies a degree of maladjustment (ie an illness rather than a normal state of affairs). Generally speaking, all humans have a relatively high level of fat, but not all humans are obese.

As to what is 'desirable' − I think anything which is part and parcel of being a normal, healthy individual is likely to be desirable, and in a more or less monogamous species, with no alpha−type criteria, the range of desirable features is likely to be quite broad. In a population where obesity was the norm for healthy individuals (think of seals!), I think obesity would be desirable, but not in modern humans, where obesity is still a minority state, and is generally regarded as being unhealthy.

As far as the fat Venuses are concerned, we do not know whether they represented the norm or an occasional extreme. It may be that they were created to celebrate a particularly fruitful period which resulted in some individuals achieving a very rare level of obesity, who knows?

I made some notes a while back on the possible reasons for human subcutaneous fat, which I will dig out and add to the bottom of this email (it's rather long).

>>[Pauline] And your point that the large human brain is evidence
>> for continuous abundance is also a good one.
>[Charles]thanks! I have fought that fight in the past and got no−where, or have been
>looked at as some sort of pariah. If we are generalists, then I don't see
>any particular reason why we would have to starve....

Exactly, and the evidence is that our ancestors were nowhere near starvation. Most Homo fossils are tall and clearly healthy, with few signs of nutritional deficiences (think of the Nariokatome Boy). It is only with early agriculture that such problems become commonplace.

> ... and yes, it occured to me
>that if we are fat 40 kya, why shouldn't we also have been fat at the
>beginning of our species... 170 +/− kya. ? And one thing that might make
>us "fat" is an increase in domesticated, cooked vegetable matter... such as
>a yam. and if we got yams, why don't we also have the "seed" for
>agriculture. (pun intended). Maybe hss has always been scratching around
>in the earth.

It has been proposed that root vegetables were the driving force behind the evolution of modern humans − we learned to cook them, they were plentiful and fairly nutritious, and needed less jaw−power to eat. It may even have been roots which triggered the start of agriculture. Personally, I always found it the easiest thing in the world to bury a few potatoes in spring and then dig up lots more of them a few months later.

Finally, some thoughts on human subcutaneous fat, and the possible reasons for it:

It is generally accepted that humans have a lot of subcutaneous fat: "thicker than that found in other primates and represents significant energy reserves" [JL]; "Only cetaceans, pinnipeds and a few species of carnivores and rodents normally have as much fat as 'typical' humans"; "The average fatness of humans is much greater than that of monkeys" [CP1]; "More than half the 31 captive monkeys that we examined were less than 5% fat, thinner than most laborotory rodents, although all of them had continuous access to food and little opportunity to exercise. ... The minimum fatness recorded for teenage girl athletes is 7%, and for men 5%. Thus most human beings are not only much fatter than most wild and captive mammals, but women and girls are consistently fatter than men and boys." [CP2]
However, hard data is difficult to find. Human body fat levels can vary in males from 5% in some athletes, to 25% in older men, with averages around 10−20%. Females can vary from less than 10% in some athletes, to over 30% in older women, averaging 15−25% [Web]. Obese individuals can have much higher values. There seems to be no reliable data for hunter/gatherer groups, or for wild apes, although captive gorillas have body fat levels within human ranges [ZM]. It is not impossible, therefore, that adult males may have fat levels comparable to wild apes.
Adult females and infants have more body fat than males and older children. Females whose fat levels drop below a certain point stop menstruating, and are therefore infertile. Human infants start to lay down fat some two months before birth, and are born with more fat than any other mammal infant (15%), although the harp seal (which has an unusually short lactation period) and the guinea−pig (which provides

very un−nutritious milk) have more than 10% [CK].
There are very few theories on the reasons for general human fat, but the most common are: insulation after loss of fur; energy store to protect against periodic food shortages; insulation, buoyancy and streamlining in an aquatic environment. For infant fat, the standard theory is that it assists the fast−growing brain by protecting against interruptions in the food supply.
a) Insulation after loss of fur: this says that we lost our fur (for some reason) and needed some compensating insulation. This makes no sense at all: in terrestrial environments, fur is the optimum method of temperature regulation under any conditions, and even if it had already been lost, the most effective means of insulation would be to regrow it (unless the reasons for losing it were overwhelming).
b) Energy store to protect against periodic food shortages: this proposes that hominids/humans were at some stage faced with an erratic food supply, and laid down fat in the good times as protection. This has some merit, as fat does indeed act as an energy store, and humans (like many other species) can accumulate a lot of fat if overfed, but no other species uses such a method, except for the regular, predictable seasonal (winter) shortages in temperate climates (in tropical climates, migration is the favoured option), and humans are such omnivores that it is difficult to conceive of such severe shortages that would trigger this response. Also, since female fertility is linked to fat levels, clearly our ancestors always had enough food to produce the minimum level of fat required, and this is supported by the fossil evidence (Homo specimens were generally tall and well−built, with few signs of the nutritional deficiencies which are evident in post−agricultural populations). So this theory is possible, especially for infant and maternal fat, but not very plausible.
c) Insulation, buoyancy and streamlining in an aquatic environment (the AAT idea): this is the most common reason for fat, and is almost universal in mammals which spend a lot of time in water. It is also true that, among human athletes, swimmers have more body fat than runners (in males 12% vs 7%, in females 20% vs 15%) despite having comparable training regimes and energy budgets [KJ]. Early hominids (Australopithecus and Paranthropus) are strongly associated with well−watered and wet habitats, although Homo species are also found in drier, more open environments [KR]. This idea also explains the greater fat in infants, who would benefit from greater buoyancy and insulation until they can swim competently. However, it would have needed a lot of time immersed in water (not just shallow wading) to produce so much fat, which cannot be verified, and modern humans (particularly infants and females) generally retain their fat, despite spending very little time in water. It also doesn't account for adult females having more fat than males. So this is plausible, but has some problems to resolve.
d) Protects the growing brain against interruptions in the food supply (infant fat): the human brain is uniquely large and energy−hungry, and this theory proposes that infant fat is designed to protect the brain from any energy deficiency. The period of infant fat (from before

birth to approximately 4 years) tallies with the period of fastest brain growth, and there is a huge volume of research showing that short−term and/or severe malnutrition produce significant deficits in broad measures (such as IQ and school tests) and also subtle biochemical effects on the brain itself. However, there appears to be no reliable evidence that these effects are permanent if the underlying malnutrition is relieved before the age of approximately 4, or that infant fat (or maternal fat) in any way protects against these effects. It is likely, however, that some infant fat protects very well against short−term disruptions resulting from infectious or other childhood diseases [CK], but this is more commonplace in modern humans living in settled, densely−populated villages, towns and cities.
Summary: it is unlikely that any one scenario can adequately explain human subcutaneous fat. The most plausible solution is that all humans acquired fat at some stage in their evolutionary history because of an aquatic lifestyle. In modern humans, males and older children no longer require much (or any?) fat, but adult females have retained it because it has become a fertility signal, and infants have retained it because it protects against short−term illness.

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