

## Re: Physical fitness and evolution

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**From:** Tim Tyler (*tim\_at\_tt1lock.org*)

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Peter Webb <webbfamily@diespamdieoptusnet.com.au> wrote or quoted:

> "Tim Tyler" <tim@tt1lock.org> wrote in message

>> Peter Webb <webbfamily@diespamdieoptusnet.com.au> wrote or quoted:

>>> *The adaptations that occur in response to cardio training are harder to*

>>> *explain. These include increased capillaries, more mitochondria, and*

>>> *numerous others. However, none of these seem to have a downside.*

>>

>> *They all have energetic costs to maintain. If you are not using muscles,*

>> *they are probably not needed. Maintining them would be a significant*

>> *energy drain. That's basically why muscles that are not used eventually*

>> *atrophy.*

>

> *Yes, the argument as to why muscles atrophy is clear, and I used it as an*

> *example myself above (the energy cost involved in carrying around muscle is*

> *higher than the energy cost in carrying fat, per gram of energy stored).*

>

> *But what are the energetic costs of being fit in a cardio sense? Certainly*

> *people who exercise use more energy, but not because they are fit per se;*

> *its because they are exercising. I have never heard any suggestion that at a*

> *given level of energy expenditure (eg walking 10 kms in two hours) that a*

> *(cardio) fit person uses more calories than an unfit person – indeed, my*

> *personal experience is quite the opposite.*

>

> *I stress again that I am talking about cardio fitness. I understand that a*

> *person with huge muscles will use more energy walking 10 kms in 2 hours than*

> *somebody with normal build.*

>

> *Given all of the health costs associated with being unfit – as well as the*

> *considerable evolutionary disadvantage of not being able to run away from*

> *sabre toothed tigers – I cannot see the corresponding benefit in your body*

> *reversing the adaptations to exercise and becoming unfit.*

Why doesn't the heart muscle doesn't behave differently to all other skeletal muscles in response to lack of exercise?

There are basically two sorts of answer to this:

\* The heart muscle is still muscle tissue – and it's reasonable to expect it to behave in a very similar manner to all other muscle tissues in response to exercise and lack of exercise;

\* Even something as small and insignificant as a big, strong heart muscle takes some energy heat and maintain. If the tissue lies unused for an extended period of time it might well make good sense to recycle it and utilise the resources elsewhere.

> > > *Anybody know why not exercising makes you unfit, or has a plausible*

> > > *theory?*

> >

> > *Tissues that are not used represent a drain in terms of the energy*  
> > *needed to heat them – and the cost of lugging them around with you*  
> > *wherever you go. Also the more tissue blood has to flow through the*  
> > *harder the heart has to work.*

>

> *But being cardio fit doesn't involve an increase in tissue.*

That's a different question from the one I was answering.

However, it probably does involve increased tissue mass – in the body of the heart muscle.

> > *Calories were not readily available to most of our ancestors – they*  
> > *took care to conserve the ones they had, and avoided wasting them on*  
> > *unused functions.*

>

> *Yes, but I don't see that the adaptations that occur in response to cardio*  
> *training involve any additional energy consumption. (Though the training*  
> *itself obviously does). Its not tissue mass – cardio training doesn't*  
> *increase your body weight (usually the opposite). Nor have I have ever heard*  
> *a theory that fit people need more food than unfit people at the same level*  
> *of activity.*

Heart fitness is associated with a strong and well-exercised heart muscle, though.

...and there's the issue of the "expense" (in terms of additional complexity) in making heart muscle behave differently from all other muscles.

> *So what is the evolutionary advantage of reversing the*  
> *adaptations to exercise, which compensates for the huge*  
> *disadvantage that unfit people have when confronted by*  
> *hungry tigers?*

If there were many hungry tigers around, the people in question would be likely to be getting more exercise –

and the subject would be less likely to come up.

> *What is the hidden (to me) cost of being fit?*

As I've mentioned, much of the answer lies in energetic considerations.

In *\*practice\**, being physically fit has some other costs as well – e.g. in terms of the other nutrients needed to rebuild muscle tissue, and the time taken to perform the exercises which are – in practice – needed to maintain fitness.

*\*If\** you could somehow magically stay fit without exercising, then your question would make more sense. However – in practice – many of the benefits of exercise come from the process of actually doing it.

E.g. to make sure your tubes stay unclogged you have to pump fluid through them under pressure. It's all very well to ask why they don't stay unclogged when you stop exercising – but it's just in the nature of tubes with stagnant fluid in them to get clogged up.

So part of the answer to your question as to why a particular unmaintained machine tends to go wrong as time passes – must be of the form: that's just what unmaintained complex machinery *\*does\**.

Regular maintenance is needed to keep most complex equipment with moving parts in good working order.

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