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Exercise in a pill: have scientists really found a drug that's as good for you as a 10km run?

Level 3: Advanced

1 Warmer

a. Discuss these questions.

1. What are the benefits of doing exercise regularly and eating healthily?
2. Is it easy for people to maintain a regular exercise habit and a healthy diet? Why / why not?
3. If you could dream up the easiest way for people to stay healthy, what would it be?

2 Key words

a. Match the correct word to each definition. Then find and highlight them in the article to read them in context.

1. appetite	a. confidence and belief in your ability
2. counterpart	b. a small hard ball of any substance
3. endurance	c. to have the same qualities as something else
4. free fatty acids	d. parts of a cell that are passed on from a parent to a child
5. genes	e. the ability to keep doing something difficult or painful for a long time
6. infirm	f. describes someone who is extremely overweight
7. nickname	g, accepting behaviour and beliefs from people different from you
8. mimic	h. something with the same purpose as another in a different place
9. obese	i. a great and sudden increase
10. ongoing	j. to prevent something from being expressed or from working
11. pellets	k. source of energy in our body that comes from oils and animal fats
12. self-esteem	l. the feeling someone has when they want to eat food
13. supplement	m. continuing to exist, or happening at the moment
14. suppress	n. needing medical care for long periods of time
15. surge	o. something that is added to complete it
16. tolerance	p. a name used informally by friends and family instead of a real name

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b. Complete the sentences with words from the previous activity. You might have to change the form of the word.

1. He was exhausted, so he made himself a coffee to get a(n) _____ of energy.
2. Mice and hamsters often are given food in the form of _____.
3. This is not a country which is known for its _____ of other cultures.
4. You really need to develop your _____ if you want to run a marathon.
5. Changing from vegetable oil to olive oil can reduce the amount of _____ in your diet.
6. Everyone's compliments about her presentation really boosted her _____.
7. Your dad's _____ must be very strong. You look exactly like him!
8. The doctor recommended a vitamin _____ to prevent getting ill.
9. That cake looks delicious, but I just don't have much of a(n) _____ today.
10. Susan spends all her time driving her kids around so our _____ for her is Subaru.
11. As an actor, he was famous for his impressions. He could _____ almost anyone.
12. If he doesn't start to move more and improve his diet, he could easily become _____.
13. The effects caused by global warming are _____ and will probably escalate.
14. It is important to protect the health of the old and the _____.
15. The prime minister is going to meet his European _____ to discuss the economy.
16. She tried to _____ her anger, but it showed on her face.

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Just how excited should we be about LaKe, the substance discovered by researchers at Denmark's Aarhus University?

Joel Snape
4 November 2024

1 Can a pill really mimic all the beneficial effects of exercise? You'd think so from some of the stories about substances that "could make going to the gym unnecessary". There was another rash of these a few weeks ago, when researchers from Aarhus University in Denmark announced that a drug called LaKe "brings the body into a metabolic state corresponding to running 10km at high speed on an empty stomach". But what's going on here?

2 First things first: the most commonly accepted term for drugs like LaKe is "mimetics", because what they do, as a rule, is mimic the biological effects of working out without the need to actually break a sweat. The idea has been around for a while: in 2008, San Diego's Salk Institute introduced the world to a drug called GW501516 (516 for short), which signals key genes to burn fat instead of sugar, helping rodent test subjects run for longer without hitting the proverbial wall.

3 In later tests, a pair of rodents nicknamed Couch Potato Mouse and Lance Armstrong Mouse, both reared on the same diet of fatty, sugary pellets, did the same amount of daily physical activity, but Lance Armstrong Mouse was dosed with 516 – and markedly increased its endurance, while staying much leaner than its control counterpart. Compound 14, first announced in 2015, started development as a way to treat other diseases, before researchers discovered that it could reduce fasting blood glucose levels, improve glucose tolerance and promote weight loss in obese mice. Since then, we've also seen research on Lac-Phe, a chemical usually produced in the body through resistance training, and a new molecule known as SLU-PP-332, which boosts metabolism and endurance, helping rodents run 50% further than they previously could. The latter, its lead researcher says, tells skeletal muscle to make the changes typically provoked by endurance training. That has the potential to help dieters maintain muscle mass during weight loss, or older people avoid sarcopenia as their bodies respond less strongly to exercise.

4 LaKe is still in the rat-study stage of development, so it's not certain that the results will transfer over to humans. But what it seems to do is first prompt a quick surge of lactate in the body – mimicking the sort of effect you'd typically see after a bout of high-intensity exercise – and then a more gradual increase of a chemical called beta-hydroxybutyrate (BHB). BHB is a ketone, or a chemical synthesised in the liver from fatty acids to provide the body with energy when it doesn't have enough glucose – which is where the notion of "running on an empty stomach" comes from.

5 Between them, these two changes do seem to lower the level of free fatty acids in the bloodstream and also suppress appetite – which are effects you'd expect from fasted exercise (working out without eating beforehand), and could help to reduce the risk of conditions such as heart disease, stroke and type 2 diabetes over the long term. And (again, in rats) the pill seems to show no signs of toxicity – unlike early versions of 516, which promoted rapid cancer cell growth in their rodent test subjects. Promising stuff, then – but is it really that simple?

6 Well, it's tough to say. Exercise affects almost all of the body's systems, in often intricate ways that we're a long way from understanding (the largest research programme dedicated to comprehending its impact at the molecular level, using almost 2,600 volunteers, is still ongoing). But any supplement has limitations: exercise is a full-body experience, with downstream effects that include everything from improved bone density to better sleep. It enhances mood and self-esteem while decreasing stress, and it seems to have qualities that protect against dementia. All of these impacts come from complex interactions between any number of biological effects – but even if science could mimic them all with pills, it would be much tougher to recreate the psychological advantages of running a 5k with friends, or hitting a new personal best in the squat.

7 We're still a fairly long way from finding safe drugs that can replicate exercise's most beneficial effects in humans, but when they exist, they'll probably be most useful for people who are elderly, ill, infirm, or otherwise unable to do the real thing. They might help people recovering from surgery – or astronauts who, even if they work out while in orbit, suffer bone loss and muscle wastage because their bodies

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work less hard in microgravity. For the rest of us, the benefits of a gentle walk or a handful of squats are tough to mimic with pills, and (reasonably) easy to get without them. One day, perhaps we'll be able to take our exercise in pill form – but right now, it's much easier to hit the road.

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3 Comprehension check

a. Answer the questions using information from the article.

1. In what year was the first mimetic developed?
2. How many different types of mimetics are mentioned in the article?
3. How did Lance Armstrong Mouse compare to Couch Potato Mouse after using 516?
4. Which two kinds of animals are used to test these mimetics?
5. How do changes to the levels of lactate and beta-hydroxybutyrate affect the body?
6. How might SLU-PP-332 help people stay strong while on a diet?
7. How is LaKe safer than 516?
8. What are the mental health benefits of exercise?
9. In the opinion of the author, which people would most benefit from mimetics?
10. In general terms, is the author in favour of or against the use of mimetics?

4 Key language

a. Decide if the words in bold in these extracts from the article refer to the Present (Pr) or the Past (Pa).

1. … a pair of rodents nicknamed Couch Potato Mouse and Lance Armstrong Mouse … **Pr / Pa**
2. Compound 14, first announced in 2015, started development as a way to treat other diseases … **Pr / Pa**
3. … a chemical usually produced in the body through resistance training … **Pr / Pa**
4. a new molecule known as SLU-PP-332 … **Pr / Pa**
5. The latter, its lead researcher says, tells skeletal muscle to make the changes typically provoked by endurance training. **Pr / Pa**
6. BHB is a ketone, or a chemical synthesised in the liver from fatty acids … **Pr / Pa**

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b. Complete the sentences using the phrases from the box. One phrase is used more than once.

which is	which are	which were	which was

1. … a pair of rodents _____ nicknamed …
2. Compound 14, _____ first announced in 2015 …
3. … a chemical _____ usually produced in the body …
4. … a new molecule _____ known as SLU-PP-332.
5. … the changes _____ typically provoked by endurance training.
6. … a chemical _____ synthesised in the liver …

c. Write two personalised sentences using the phrases below.

… who is / was nicknamed …

… which is / was known as …

1. _____
2. _____

5 Discussion

a. Discuss these statements.

- 'Developing a safe drug for weight loss is the most important area of medical research'.
- 'Only through the use of drugs like these will people be able to control their weight'.
- 'There are many more benefits of using drugs like these than disadvantages'.

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6 In your own words

a. List the advantages and disadvantages of pills like LaKe. Consider what the long-term effects might be using this kind of pill.

Use these questions to guide your ideas.

- What are the proven physical effects of these drugs?
- How could those physical effects help people?
- Are these drugs good for short-term solutions or long-term solutions?
- Are there people who cannot easily benefit from diet and exercise?
- Do these drugs help people to learn how to eat healthily? Why? Why not?
- Do these drugs help build healthy habits of exercise? Why? Why not?

b. Present your ideas to the class. Mention the physical effects of the drugs and how these effects could help people. Explain what you think the consequences might be.

Here are some phrases that might help you during your presentation.

- *a gene known for its ability to send signals*
- *a chemical usually produced in the body*
- *a molecule shown to boost endurance*
- *a chemical synthesised in the liver*
- *glucose is seen as a major source of energy*
- *changes normally provoked through exercise*