

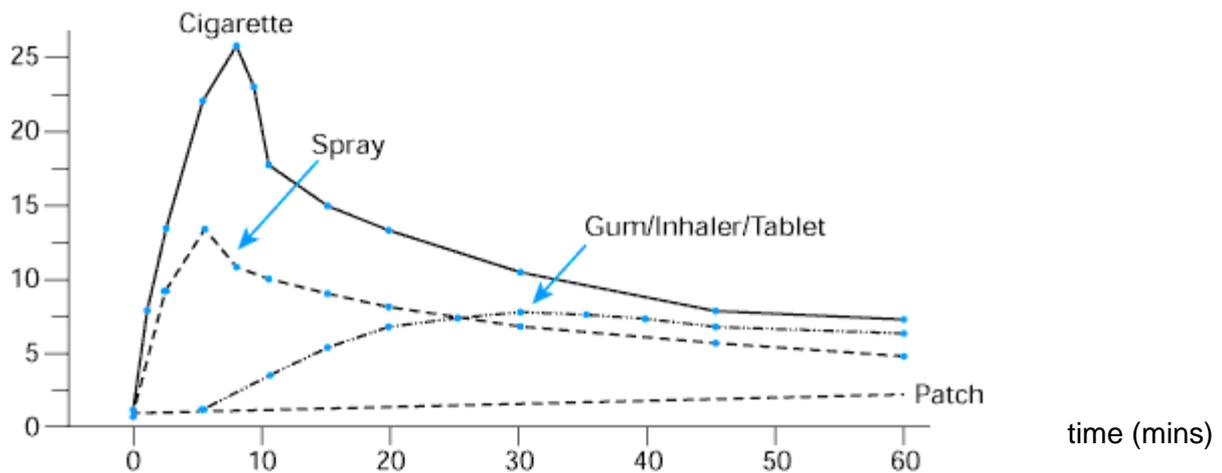
Measuring the effects of nicotine

Experiment 1

The following diagram sums up the data obtained in an experiment.

- Describe the experiment.
- Sum up the results.

nicotine in blood plasma (mg/ml)



Schematic diagram showing rise in blood nicotine levels after smoking a cigarette and after using different nicotine replacement therapy products, following a night of not smoking at all.



Experiment 2

With the help of a Vernier temperature probe¹, a TI graphing calculator and the LABPro Interface² measure the skin temperature at the finger tips of a test subject before, while and after smoking a cigarette.

- a) List the data (temperature in °C every five seconds).
- b) Visualize the data in a suitable graph.
- c) Speculate on the reason(s) for the data measured and possible consequences for a smoker's health.
Check the information sheet to find out whether your ideas are shared by experts. Take notes of the facts in form of a table or a mind map.

¹ See: <http://www.vernier.com/products.html>

² See: <http://www.vernier.com/mbl/index.html>

Effects of nicotine on the circulatory system³

Nicotine has different effects on different organs.

- a) Nicotine causes constriction of blood vessels in the skin, which results in a decrease of fingertip temperature.
Adequate blood flow to the skin is important in the process of wound healing. Animal and human studies have shown that exposure to cigarette smoke or nicotine slows down the healing process of skin wounds.
Decreased blood flow to the skin may also be responsible for the "smoker's face". A large study, showed that smokers have premature and increased facial wrinkling compared to non-smokers.
- b) It also causes constriction of coronary arteries that provide the heart muscle with oxygen and glucose. This increases the risk of heart attacks.
- c) Arteries to the stomach also respond with constriction. Cells in the stomach wall that produce a protective layer against acids in the stomach cannot work so well. The acids turn against the stomach itself. Cell division in stomach cells can get out of control. This increases the risk of stomach cancer.
- d) Nicotine increases the heart rate and blood pressure. This is seen as a reaction of the body to cope with the lower supply of oxygen and glucose through constricted coronary arteries.
- e) Nicotine makes the blood vessels in skeletal muscles dilate causing more blood to flow to the muscles.
- f) Nicotine increases the metabolic rate i.e. many cells work harder and faster, which means that they burn more food reserves. Smokers weigh on average 4 kg less than non-smokers.
- g) Nicotine reaches the brain about eight seconds after the smoke is inhaled. In the brain nicotine acts by stimulation of certain nerve cells, which is why some people want the stuff.

Important words:

to constrict - to get narrow
to dilate - to get wider
adequate - the right amount
exposure to - contact with
wound - Wunde
premature - vorzeitig, frühzeitig
coronary arteries - Herzkranzgefäße
acids = Säuren
metabolic rate - Stoffwechselrate
metabolism - Stoffwechsel



³ Sources:

- <http://www.rcplondon.ac.uk/pubs/books/nicotine/2-physical.htm>
- <http://www.emedicine.com/derm/topic629.htm>
- <http://www.state.de.us/dhss/dph/dpc/images/quitline.gif> (cartoon)