

Name:..... Date:.....

Vitamins

Vitamin C is often talked about because it is supposed to help prevent colds. Is there truth in the rumour? How much vitamin C should we take in and are we getting enough? Are vitamin pills good for you, or a waste of money?

Vitamin C and scurvy

A scurvy tale

The link between vitamin C and health was found out in a rather terrible way. Read this account of what happened on board a British Navy ship in the 18th century.

'The sailor's teeth wobbled in his jaw when he pushed them with his tongue. A week later his teeth fell out, and his bloody gums erupted with boils. Exhausted, he was unable to drag himself from his hammock until the boatswain forced him to his feet by whipping him with a rope end. Once on deck, in the sunlight, the sailor saw that his old wounds, scars and sores from years of work at sea had reopened and were bleeding. Worn out from climbing the ladder, he fell to his knees and then collapsed on the wooden deck. He was dead.

Crewmates who had the strength arranged his funeral: one man wrapped the sailor in an old scrap of sail and tied a few small cannonballs to his feet. A short prayer from the captain, a plank tipped over the rail, a splash. Without a grave, the body rested on the ocean floor. One more sailor dead from scurvy...'

Life on board ships was hard - the diet was poor and a lot of physical effort was needed to do the jobs. Sailors were expected to do their duty and were beaten by the chief sailor, the 'boatswain' if they did not. Although there were lots of diseases from which sailors could die, scurvy was a big problem. At the time, no-one really knew what caused scurvy. Much later, it was discovered that humans, like apes, guinea pigs and fruit bats, cannot make vitamin C. Instead, we have to eat food containing vitamin C, or we will die like the sailor.

Find out more about this vital vitamin.

A scurvy problem - and an experiment

In 1747 James Lind was a surgeon on the Royal Navy ship H.M.S. Salisbury sailing along the English Channel. At the time, over half a ship's crew died from scurvy. James Lind did the first ever experiment using people to compare treatments. We call this kind of experiment a clinical trial today. Here is his description of his experiment. Use the language guide to help with some old English words.

**Of the Prevention of the Scurvy
by James Lind
Surgeon on board H.M.S. Salisbury**

On the 20th May, 1747, I took twelve patients in the scurvy on board the Salisbury at sea. Their cases were as similar as I could have them. They all in general had putrid gums, the spots and lassitude, with weakness of their knees. They lay together in one place, and had one diet in common to all, water gruel sweetened with sugar in the morning; fresh mutton broth for dinner; at other times puddings, boiled biscuit with sugar etc, and for supper barley, raisins, rice and currants, sago and wine.

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- Two of these were ordered each a quart of cyder a day.
- Two others took twenty five drops of elixir vitriol three times a day upon an empty stomach.
- Two others took two spoonfuls of vinegar three times a day upon an empty stomach.
- Two of the worst patients were put under a course of sea water. Of this they drank half a pint every day and sometimes more or less.
- Two others had each two oranges and one lemon given them every day. These they eat with greediness at different times upon an empty stomach. They continued but six days under this course, having consumed the quantity that could be spared.
- The two remaining patients took an electary recommended by an hospital surgeon made of garlic, mustard seed, rad. raphan., balsam of Peru and gum myrrh.

The consequence was that the most sudden and visible good effects were perceived from the use of the oranges and lemons; one of those who had taken them being at the end of six days fit for duty. The spots were not indeed at that time quite off his body, nor his gums sound; but he became quite healthy before we came into Plymouth, which was on the 16th June. The other was the best recovered of any in his condition, and being now deemed pretty well was appointed nurse to the rest of the sick.

I shall here observe that the result of all my experiments was that oranges and lemons were the most effectual remedies. I am apt to think oranges preferable to lemons. Next to oranges I think cyder had the best effects.



James Lind
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Drawing of H.M.S. Salisbury based on a model created from architectural plans.
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Language guide

H.M.S. His/Her Majesty's Ship; this is used today for all Royal Navy ships

'in the scurvy': with scurvy

putrid: rotting; in scurvy gums start bleeding and boils (large spots) appear

the spots: bleeding happens around hairs on arms and legs making red spots.

lassitude: feeling tired all the time

gruel: a porridge made with oatmeal and water

mutton broth: a soup made from mutton, which is meat from an adult sheep

quart: two pints, about 1 dm³

cyder: old spelling for cider which is fermented apple juice

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elixir vitriol: sulfuric acid, perhaps with herbs added

acidulated: made acidic; the vinegar was probably mixed with water

electuray/electuary/electary (more than one spelling): a paste

rad raphan: not known, most likely the strong-tasting herb horseradish

balsam of Peru: an oily liquid from the balsam tree thought to help treat skin diseases

gum myrrh: an oily liquid from the myrrh plant, thought to help appetite

Questions

1. What are the signs of scurvy?

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2. Why were sailors more likely to get scurvy than people living on land?

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3. What was the sailors' diet?

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4. Was the sailors' diet healthy? Explain your answer.

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5. What were the treatments Dr. Lind tested? Why did he choose these?

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6. Why did Dr. Lind try different treatments?

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7. Why did Dr. Lind give each treatment to two sailors, rather than one?

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8. How could Dr. Lind have improved his experiment?

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9. Was Dr. Lind's conclusion correct?

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Conclusion

Dr. Lind concluded that eating fresh fruit prevents scurvy, but it took nearly fifty years before lemons and limes were added to sailors' diets. In a way, Dr. Lind did not help - his 400 page report says that damp weather and feeling miserable also helped cause scurvy and that the sailors' diet was actually very good. So the Navy did not change. In 1795, Dr. Lind did another, longer experiment in which two ships were sent on a voyage, one with lemon and lime juice in the sailors' diet and the other without. More deaths happened on the ship with no fruit. The results caused the Navy to make all ships give lemon and lime juice to their crews. As a result, British sailors got the nickname 'limeys' (lemons were also called 'limes' at that time).

