Periodic Graphics

A collaboration between C&EN and Andy Brunning, author of the popular graphics blog Compound Interest

THE SCIENCE OF EXERCISE

When you work out, how does your body produce the energy it needs? And what causes runner’s high? This graphic investigates.

ENERGY SOURCES

During exercise, your body’s main source of energy is a molecule called adenosine triphosphate (ATP).

[Diagram of ATP molecule]

HIGHS AND CRAMPS

During exercise, your body releases hormones called endorphins. These are commonly linked to a phenomenon known as runner’s high. However, scientists think that the effect is more likely to be caused by the release of endocannabinoids such as anandamide.

[Diagram of anandamide molecule]

PREPARING TO EXERCISE

Carbohydrates, electrolytes, and water are three of the body’s key requirements during exercise.

CARBOHYDRATES: ENERGY

Carbohydrates are molecules like sugars that supply muscles with fuel.

ELECTROLYTES: FLUID BALANCE

Electrolytes are substances like salts that balance fluid levels in the body.

WATER: HYDRATION

Drinking water replaces what you sweat and balances your fluid levels.

Sports drinks contain all these, though water is usually sufficient for the average exerciser.

You might get cramps or a side stitch during exercise, or soreness after. It’s a misconception that these are caused by lactic acid (or lactate) buildup. Their cause isn’t known, though several hypotheses exist.

CRAMPS DURING EXERCISE

Dehydration or electrolyte imbalance?

Muscle overload, leading to nerve signal imbalance?

SORENESS AFTER EXERCISE

Inflammatory response due to microtears in muscle?