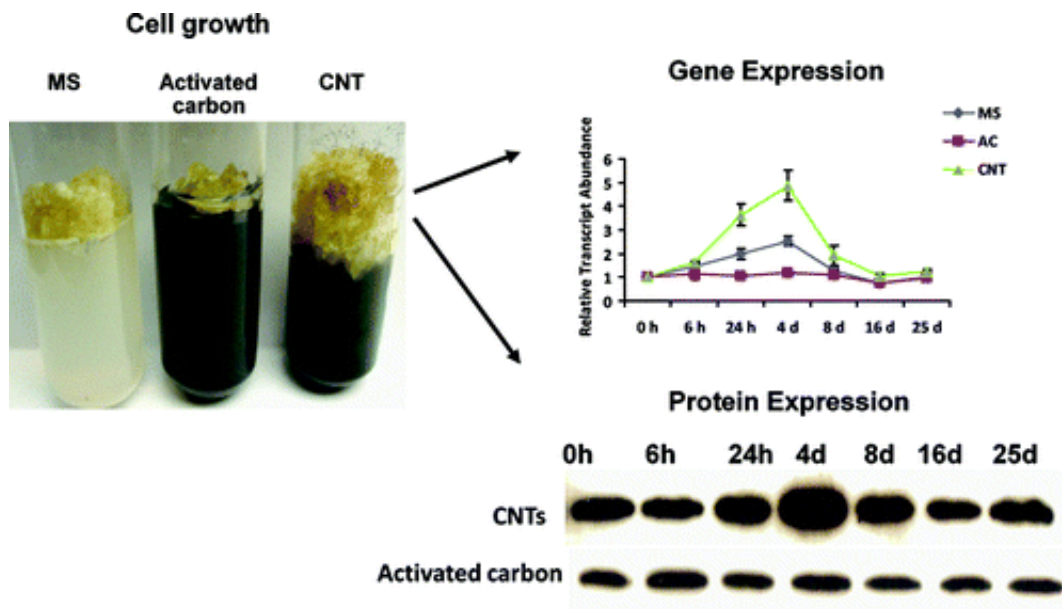


Carbon nanotubes can double growth of cell cultures important in industry

April 4 2012



A dose of carbon nanotubes more than doubles the growth rate of plant cell cultures — workhorses in the production of everything from lifesaving medications to sweeteners to dyes and perfumes — researchers are reporting. Their study, the first to show that carbon nanotubes boost plant cell division and growth, appears in the journal *ACS Nano*.

Mariya V. Khodakovskaya and colleagues explain that their previous

research demonstrated that so-called multiwalled carbon nanotubes (MWCNTs) can penetrate through the thick coatings on seeds, stimulate germination of the seeds and stimulate the growth of certain plants. MWCNTs are wisps of pure carbon so small that thousands would fit on the period at the end of this sentence.

Those discoveries "have the potential to transform agricultural practices in the near future and to provide solutions to some of the most serious problems related to plant growth and development," the scientists said.

Their new research focused on how MWCNTs affect the growth of model tobacco [plant cell](#) cultures. Plant cells of many plant species, grown in large industrial vats, find extensive use in producing medical and commercial products and plants for agriculture. The scientists found that tiny amounts of MWCNTs ramped up the activity of genes involved in cell growth. MWCNTs also seem to work by activation of channels that transport water into cells, helping cells divide and grow faster.

More information: Carbon Nanotubes Induce Growth Enhancement of Tobacco Cells, *ACS Nano*, 2012, 6 (3), pp 2128–2135. [DOI: 10.1021/nm204643g](#)

Abstract

Carbon nanotubes have shown promise as regulators of seed germination and plant growth. Here, we demonstrate that multiwalled carbon nanotubes (MWCNTs) have the ability to enhance the growth of tobacco cell culture (55–64% increase over control) in a wide range of concentrations (5–500 $\mu\text{g}/\text{mL}$). Activated carbon (AC) stimulated cell growth (16% increase) only at low concentrations (5 $\mu\text{g}/\text{mL}$) while dramatically inhibited the cellular growth at higher concentrations (100–500 $\mu\text{g}/\text{mL}$). We found a correlation between the activation of cells growth exposed to MWCNTs and the upregulation of genes involved in cell division/cell wall formation and water transport. The

expression of the tobacco aquaporin (NtPIP1) gene, as well as production of the NtPIP1 protein, significantly increased in cells exposed to MWCNTs compared to control cells or those exposed to AC. The expression of marker genes for cell division (CycB) and cell wall extension (NtLRX1) was also up-regulated in cells exposed to MWCNTs compared to control cells or those exposed to activated carbon only.

Provided by American Chemical Society

Citation: Carbon nanotubes can double growth of cell cultures important in industry (2012, April 4) retrieved 25 April 2024 from

<https://phys.org/news/2012-04-carbon-nanotubes-growth-cell-cultures.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.