

What's In Your Shower?

Toxins Found In Everyday Personal Care Products & Their Effect On Mitochondria & Cell Oxidation

Alycia Bowles, Krystal Briggs, Kate Murray & Maddie Wallace



We Challenge You!

Examine your potential toxic exposure



- Look for:

 - sodium lauryl sulfate
in shampoo
 - parabens in cosmetics
 - sulfates in lotions
 - Titanium dioxide in
soap
 - triclosan in toothpaste
 - cocamid DEA

- Find alternatives!

Mitochondria



Oxidative Stress & Free Radicals

- Reactive Oxidative Species (ROS) produced during oxidative phosphorylation.
 - ROS = Free Radicals
 - Under normal conditions, ROSs degraded by cellular antioxidant enzymes.
 - Oxidative Stress → ROSs are produced at a level that can't be readily degraded by the cell.

References

- Multiple Choice Questions

1) Sodium lauryl sulfate has the following properties:
a) Increased dispersion
b) Increased LALS
c) Increased rheostatic resistance
d) Increased coagulation time

Healthy Choices

- Women use an average of 12 products per day
 - Men use an average of 8 products per day

How many toxins are in your everyday personal care products?

Healthy Choices

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How many toxins are in your everyday personal care products?

Sodium Lauryl Sulfate

-

Multiple Choice Questions

- **Chronic Disease**: We have learned to identify the risk factors for diseases such as Alzheimer's and Parkinson's.
 - Inflammatory conditions like heart disease.
 - Infectivity (influenza, COVID-19, etc.)
 - End of life issues.

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Mitochondria Structure & Function

The cell's "Powerhouse"
responsible for healthy cell function
Generates ATP during the electron transport chain for cellular phosphorylation



Oxidative Stress & Free Radicals

- Reactive Oxygen Species (ROS) produced during oxidative phosphorylation
- ROS damage DNA and proteins
- Under normal conditions, ROS degraded by cell glutathione peroxidase
- Oxidative Stress - ROS are produced at a level that can't be readily degraded by the cell



References



Propylene Glycol



- surfactant commonly found in toothpaste

Sodium Lauryl Sulfate



- 10% of shampoos and soaps
- 50% of O.S. contains hair care products containing sulfates
- sulfates penetrate skin
- 2 days include 15-30

Multiple Choice Questions



Multiple Choice Options



Healthy Choices



-Women use an average of 12 products per day
-Men use an average of 6 products per day

How many toxins are in your everyday personal care products?

Mitochondria

Structure & Function



- The Cell's "Powerhouse"
- Essential for healthy cell function
- Generates ATP during the electron transport chain via oxidative phosphorylation

Oxidative Stress & Free Radicals

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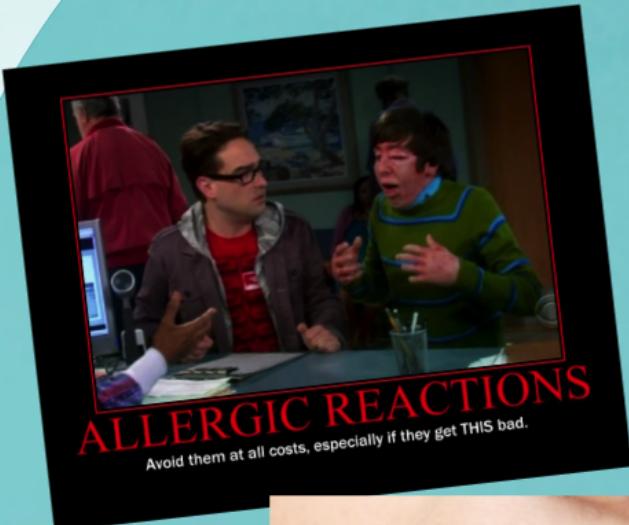
Manufactured Nanoparticles (NPs) Increase Free Radicals

- TiO₂, sodium lauryl sulfate --> after cellular uptake produced:
 - spontaneous ROS production
 - increased Ca uptake to mitochondria
 - damage to organelle membrane
- RESULT: oxidant/antioxidant disequilibrium leading to toxic cell oxidative stress

Manufactured Nanoparticles (NPs) Increase Free Radicals

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Propylene Glycol



- surfactant commonly found in toothpaste

Sodium Lauryl Sulfate



- 90% of shampoos and foaming products contain SLS
- Build up of SLS causes hair loss, irritation to mucus membranes
- Easily penetrates skin
- denatures DNA
- Stays in body for 5 days



Hair Loss?



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- sulfites in lotions
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- triclosan in toothpaste
- cocamide DEA
- Find alternatives!

References

Lin, M.T., et al. "Mitochondria dysfunction and oxidative stress in neurodegenerative diseases." *Nature* 443, 787-795 (19 October 2006). doi: 10.1038/nature05292; Published online 18 October 2006.

Willis, C., et al. "Immunocytochemical demonstration of reduced Cu-Zn-superoxide dismutase levels following topical application of dithranol and sodium lauryl sulphate: an indication of the role of oxidative stress in acute contact dermatitis". *European Journal of Dermatology*. Vol 8, No. 1, 8-12, Jan-Feb 1998.

Xia. T., et al. "comparison of the Abilities of Ambient and Manufactured Nanoparticles To Induce Cellular Toxicity According to an Oxidative Stress Paradigm". *Nano Letters*, 2006, 6 (8), pp 1794-1807, DOI: 10.1021/nl1061025k, Published online 26 July 2006.

Multiple Choice Questions

- 1.) Sodium lauryl sulfate has been linked to:
 - a. Improved digestion
 - b. Hair Loss
 - c. Increased membrane strength
 - d. Improved cognitive function

Multiple Choice

- 1.) Sodium lauryl sulfate has been linked to:
b. Hair Loss

Multiple Choice

- 1.) Sodium lauryl sulfate has been linked to:
b. Hair Loss

Multiple Choice Questions

- 2.) Oxidative Stress has been linked to:
- a. Neurodegenerative diseases such as Alzheimer's and Parkinsons
 - b. Inflammatory conditions like acute contact dermatitis
 - c. Excitotoxicity leading to cellular energy deficits
 - d. All of the above.

Multiple Choice

2.) Oxidative Stress has been linked to:

d. All of the above.

Multiple Choice

2.) Oxidative Stress has been linked to:

d. All of the above.