Was mom right all along? Don’t be D-ficient

Keshna Sood* ♦ Dr. Mazen Hamadeh ♦ KINE 4120 F 2014 ♦ York University

Why this is important:
Vitamin D₃ (Vit D) is considered a master regulator.
→ Influences > 200 genes
→ Binds > 2,776 sites in the genome
Deficiency correlates to autoimmune diseases such as MS, rheumatoid arthritis, T1D, certain cancers, and even dementia.

Vitamins A, C, E are anti-oxidizing agents that serve to neutralize free radicals. Free radicals are reactive molecules that could cause cell damage, neurodegenerative diseases and are associated with increased aging.

Can vitamins A, C, E or D serve as ergogenic aids?

Vitamin D
- Increases size and # of type II muscle fibers
  (Yato et al. Cerebrovasc Dis 2005)
- Up-regulates notch, IGF-1 pathway
  (Domínguez-Forteza et al., Nutr Metab 2014)
- Speeds up recovery: ↑ proliferation; ↓ apoptosis
  (Sriram et al., Am J Pathol 2013)
- Inhibits myostatin (a proliferation inhibitor)
  (Luna et al, Mol Ther 2012)
- Increases VDR expression
  → prevents muscle wasting by helping repair: ↑ dysferlin exp
  (Han and Campbell, Curr Opin Cell Biol 2008)
- Vitamin D improves cardiovascular fitness
  (mobilizes Ca²⁺, fat oxidation) (Auchuma et al, Nephrol Dial Transplant 2012)

Vitamin ACE: Antioxidants

Free Radicals = Molecules that are oxidized leading to unpaired electrons
Antioxidants = Prevents oxidation of molecules
Reactive Oxygen Species = Reactive molecules formed from O₂ metabolism
Oxidative Stress = when [ROS][Antioxidants]; causes cell damage

Focus Study Purpose Result
Beneficial
Trofin et al. (2014)
Sachseck et al. (2003)
Nazaroglu et al. (2010)
Cesari et al. (2004)
Observing either performance outcome OR oxidative stress marker to determine ergogenic effect
- Vit C = lowered plasma MDA
- Vit E = protective effects, decreased MDA
- Vit E + C taken especially together had beneficial effects on exercise perf.
Not Beneficial
Gey et al. (1970)
Gomez-Cabrera et al. (2008)
Viitala et al. (2004)
Cumming et al. (2014)
- Vit C negative effects on training adaptation in VO₂ max
- Vit E and C had no synergy impacting antioxidant pathways

Vit D has significant positive effects on motor balance, musculoskeletal strength and endurance abilities in both athletic and non-athletic populations. Although recommendations for adequate vitamin D₃ levels are still controversial, individuals living at high latitudes run risk of deficiency and thus are encouraged to supplement with at least 3000 IU daily.

Supplementing with Vit ACE to enhance exercise performance has yet to be scientifically supported.

What impacts your [Vit D] level?
- Time of Sun exposure
- Seasons (Latitude)
- Diet
- Sun Screen
- Ethnicity

African American people need to be exposed to UV-B for up to 10 X longer than Caucasian individuals of similar age and health to attain similar 7-dehydrocholesterol amounts.

Research Methodology:
Research was conducted in a meta-analysis approach to understand impact of Vitamin D, A, C and E in elderly, athletic and healthy populations. In addition to using Boolean operators to find appropriate literature, review papers were first referred to before individual correlational or randomized controlled trial studies were quantitatively evaluated. Tip: Organize all articles with Mendeley.