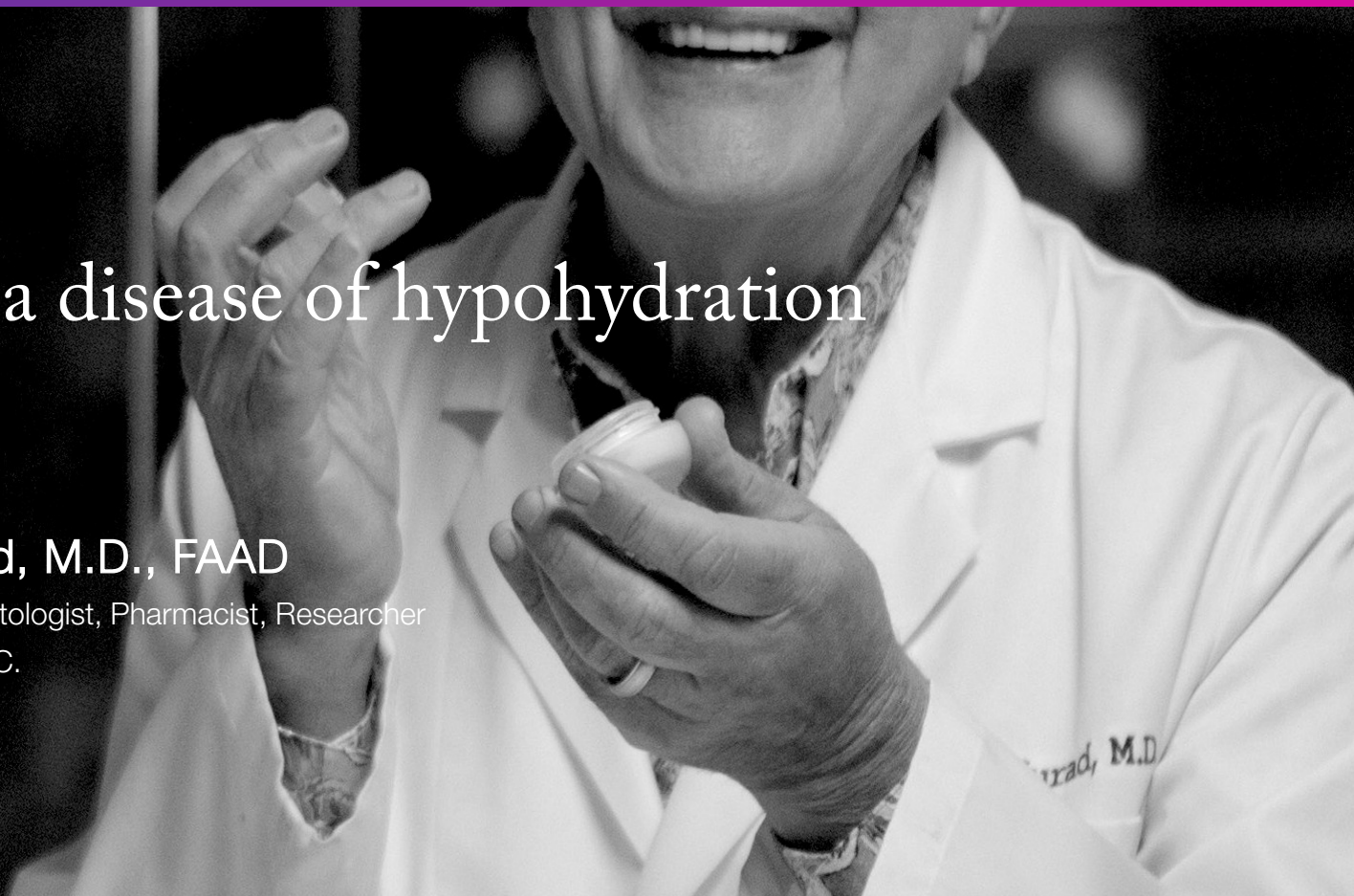




# Aging is a disease of hypohydration

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Founder of Murad, LLC.





“Discovery is seeing what  
everybody has seen and thinking  
what nobody else has thought.”

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Dr. Albert Szent-Györgyi Von Nagrapolt  
(Noble laureate 1937)





## There are over 300 different theories of aging.

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None are conclusively demonstrated.

Most prominent and well-studied is the free radical theory of aging.

However, in 1978, Hungarian researcher Imre Zs-Nagy proposed the Membrane Hypothesis of Aging (MHA)<sup>2</sup> and in 2002 explained how it improves upon the free-radical and other theories.<sup>3</sup>





## Murad Hypothesis of Cellular Water™

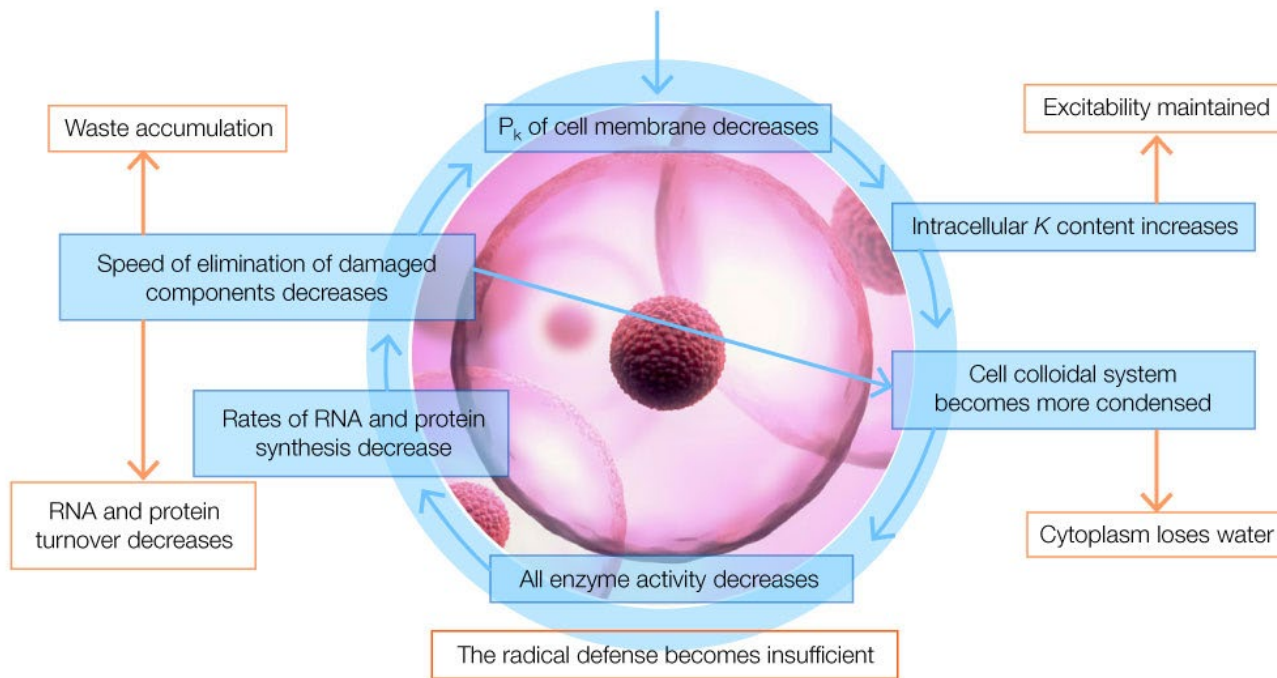
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“The unifying theory of aging and disease.”

We go from a state of full hydration to a state of low hydration as we age.

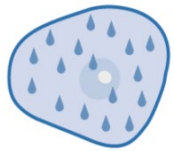


## Membrane Hypothesis of Aging

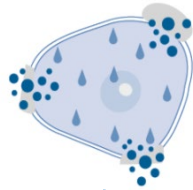




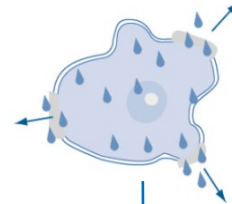
## How Membrane Damage Leads to Aging



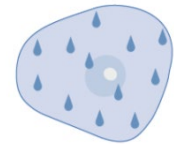
Healthy young cell,  
holding cellular water



Age, disease, free  
radicals, stress  
and inflammation  
attack the cell  
membrane



When the membrane  
is compromised,  
water leaks out and  
the cell starts to die



**Murad four  
pillars of health**  
create the ideal  
environment for strong cell  
membranes retaining  
cellular water



## As we age the cell membrane becomes thinner, holding less water in the cell.

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How can we encourage the cell membrane to stay strong and resist damage?

- **Osmolytes**, found in food, encourage water to enter the cells (ICW) instead of staying outside the cell (ECW)
- **Other cell membrane components**, such as **lecithin**, are cell membrane strengtheners
- **Aquaporins**, are pump systems built into the cell that allow water to enter the cell if it's needed from the connective tissue
- **Together, these three elements** help you stay younger and healthier, not only in your skin but everywhere





## Lecithin is found in many whole foods.

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Legumes, such as soybeans, kidney beans  
& black beans

Cooked green vegetables, brussels sprouts & broccoli

Organ meats

Red meats

Seafood







## Osmolytes

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## Betaine

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An organic osmolyte that supports cell metabolism. It's involved in liver function, cellular reproduction, and making carnitine (transports long fatty acids into the mitochondria to be oxidized as energy).

Food sources include:

- Beets, broccoli, spinach
- Grains
- Shellfish





## Taurine

- Another organic osmolyte that supports cell metabolism
- Is a chemical called an amino acid sulfonic acid
- Taurine is found in large amounts in the brain, retina, heart, & blood cells called platelets

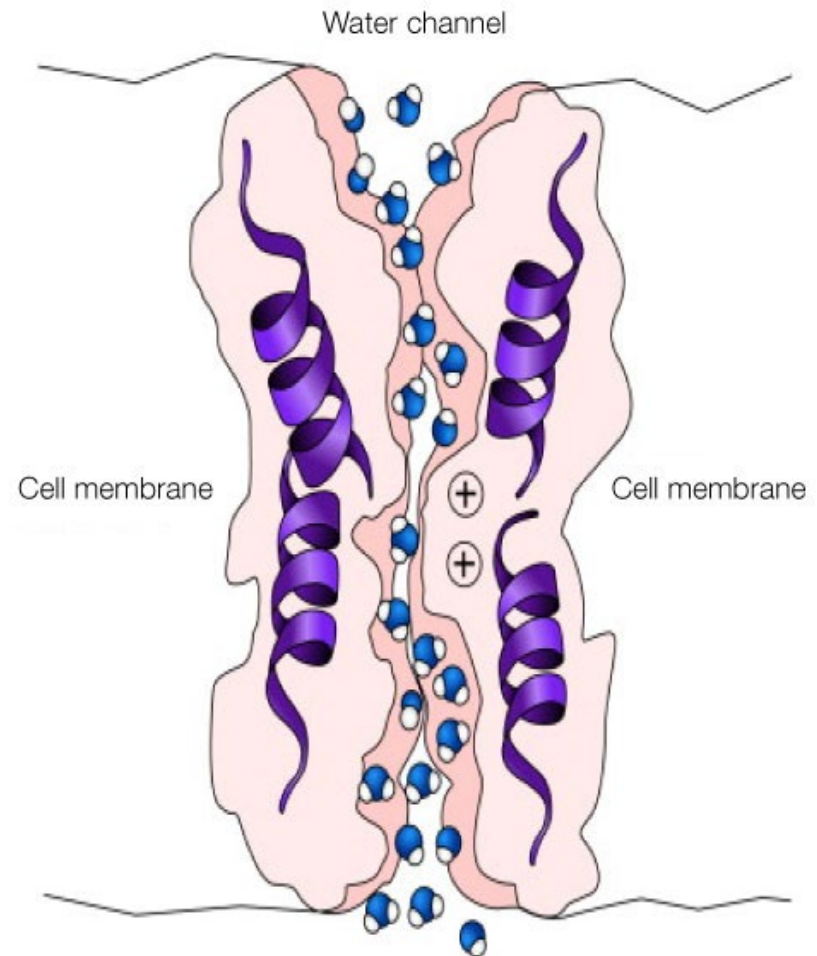
Food sources include:

- Meat
- Fish
- Eggs



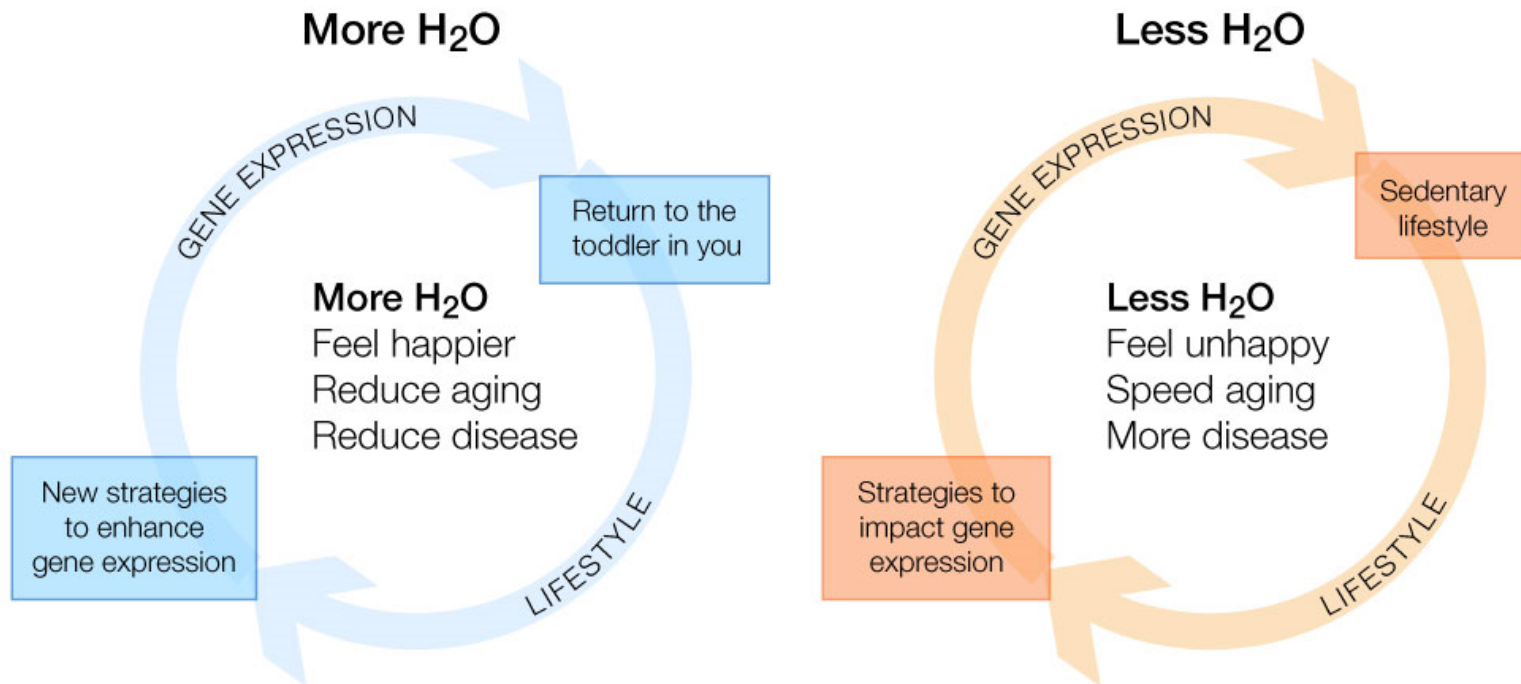
## Aquaporins

Also called water channels, these are cell membrane proteins that selectively transfer water molecules and sometimes glycerol between cells.



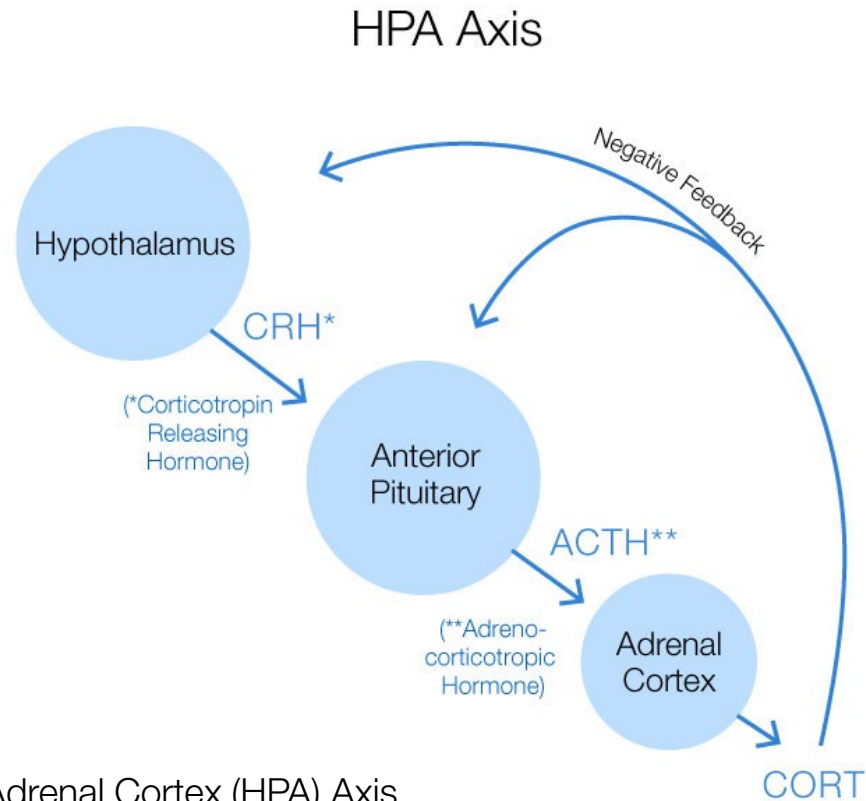


## Aging Is a Disease of Hypohydration





## The Effects of Stress



Hypothalamic – Pituitary – Adrenal Cortex (HPA) Axis





## The Silent Killer

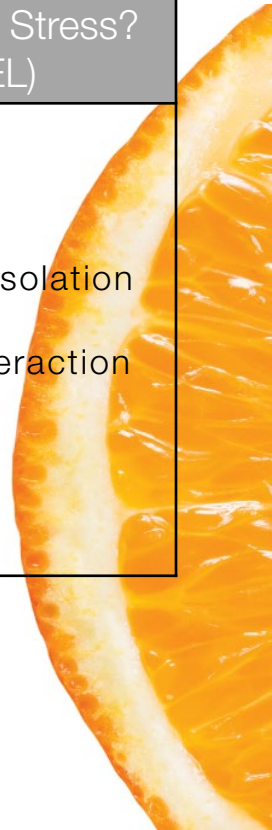
“Over the last decade, a new stress has come to our earth. I call it Cultural Stress. It’s the stress of modern living. It’s the rules and regulations, it’s a digital dependency which is wreaking havoc on every cell in your body because the stress that’s caused is pervasive and goes unabated.”

*Howard Murad MD*

## What Is Cultural Stress?

What Is Traditional Stress?	What Stress Is Cultural Stress? (TODAY)	What Stress Is Cultural Stress? (THE NEXT LEVEL)
<ul style="list-style-type: none"> <li>• A broken arm</li> <li>• A death in the family</li> <li>• Divorce or heartbreak</li> <li>• Job loss</li> <li>• An accident</li> <li>• Burglary</li> <li>• Storms &amp; natural disasters</li> </ul>	<ul style="list-style-type: none"> <li>• Techno stress</li> <li>• Poor sleep</li> <li>• Bullying/online trolls</li> <li>• Increasing traffic &amp; commutes</li> <li>• Work/life balance</li> <li>• Media pressure</li> <li>• Perfectionism &amp; increased expectation</li> <li>• Money</li> </ul>	<ul style="list-style-type: none"> <li>• Loneliness / social isolation</li> <li>• Sedentary lifestyle</li> <li>• A lack of human interaction</li> <li>• Robot replacement</li> </ul>

**The pressure of reducing stress:** You must do yoga. You must wear Lululemon yoga clothes. You *must* relax.





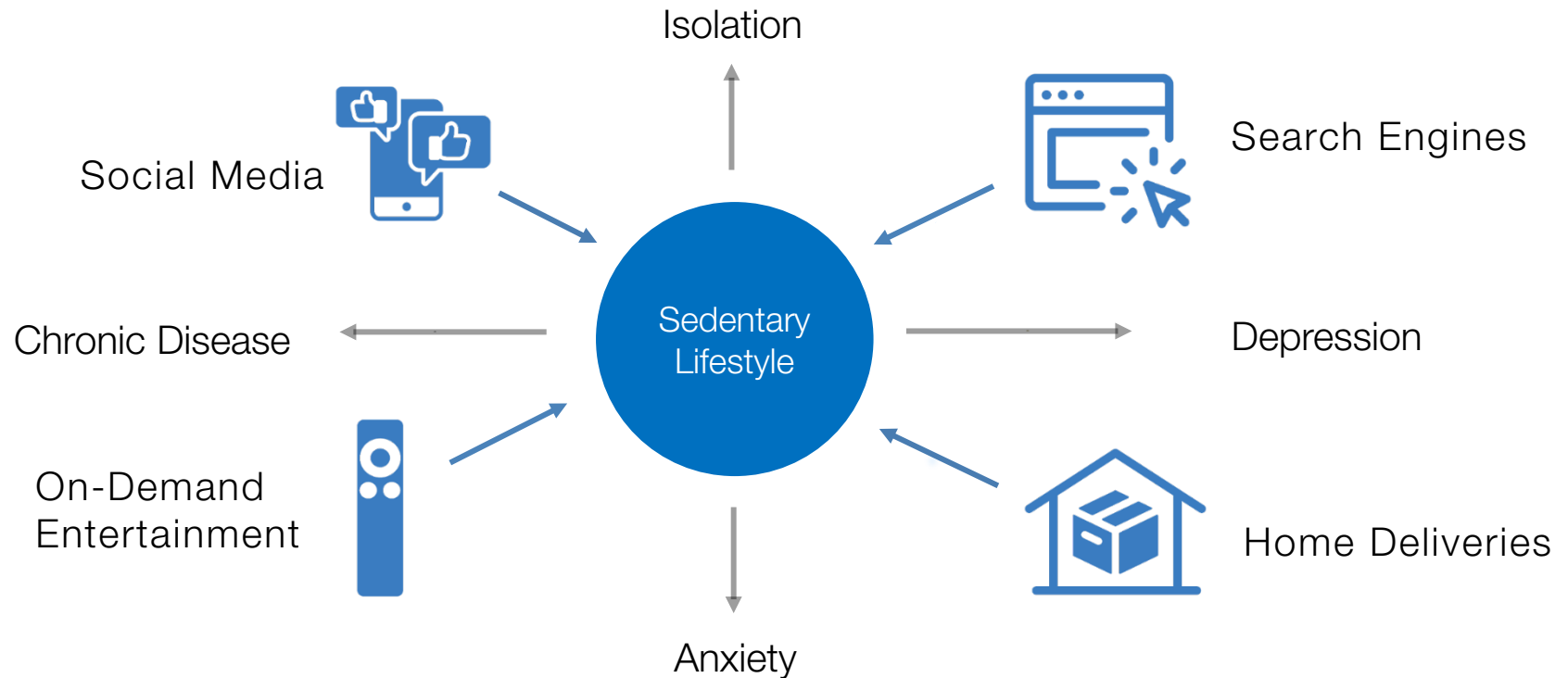
## Cultural Stress<sup>®</sup>

- Cell phones, wireless internet and hand-held computers are used anywhere, anytime, 24/7, more rules and regulations
- People are working longer hours
- Rush hours are starting earlier and ending later
- Nearly half of working mothers are heavily stressed every day
- Today's family is increasingly isolated as the stress of modern life pushes them
- Even young children are suffering from anxiety due to cultural stress
- More and more is expected from all of us



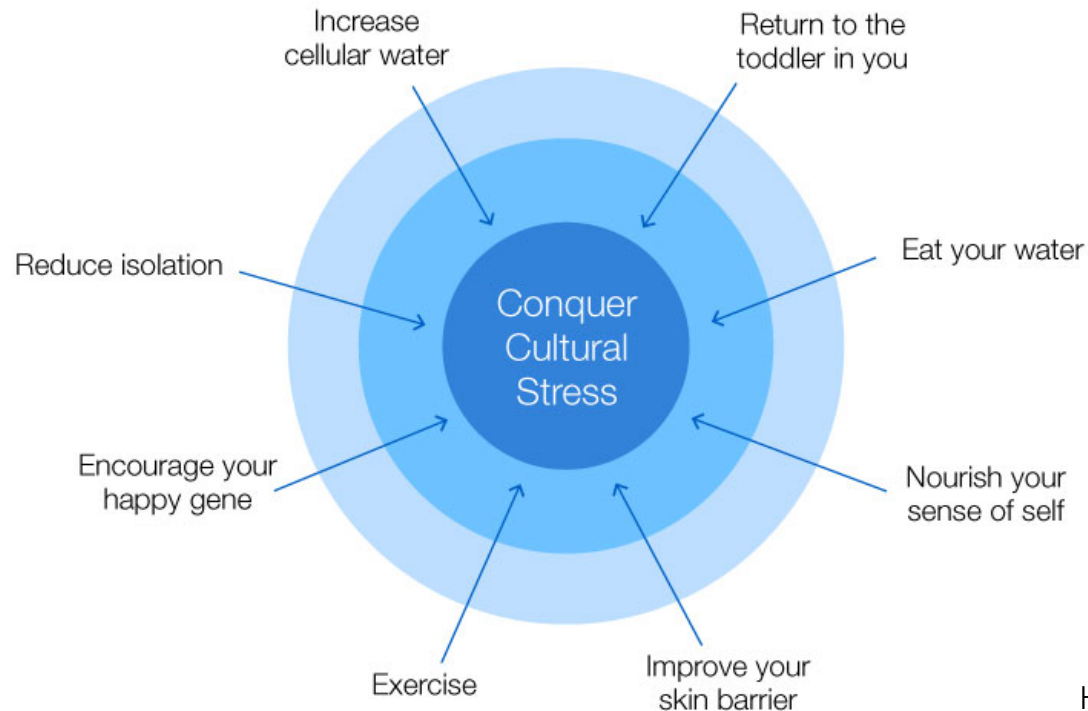


## The Result of Cultural Stress





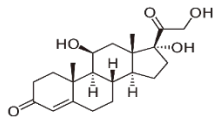
## Increase Cellular Hydration



Howard Murad, M.D.



## Stress and Skin Aging



People with a high baseline cortisol look on the average 3.5 years older<sup>1</sup>

High cortisol correlates with reduced facial attractiveness in young women (early 20's)<sup>2</sup>

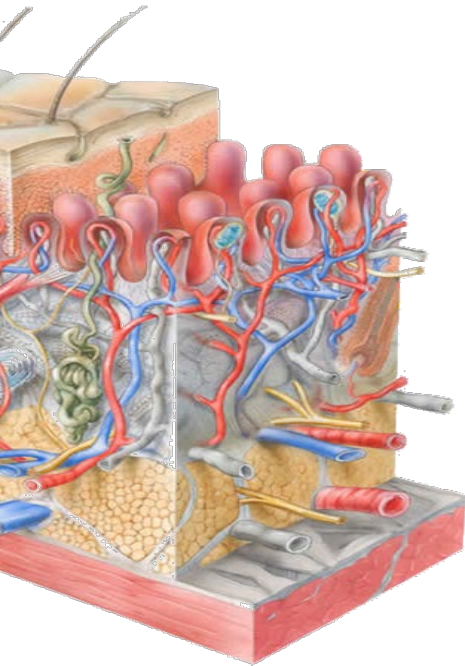
High-stress lifestyle is associated with accelerated telomere shortening, equivalent to 9-17 years of aging<sup>3</sup>

1. Cortisol serum levels in familial longevity and perceived age: The Leiden Longevity Study, 2012.

2. Rantala MJ, Coetzee V, Moore FR, Skrinda I, Kecko S, Krama T, Kivleniece I, Krams I. 2013 Facial attractiveness is related to women's cortisol and body fat, but not with immune responsiveness. Biol Lett 9: 20130255. <http://dx.doi.org/10.1098/rsbl.2013.0255>.

3. [www.pnas.org/cgi/doi/10.1073/pnas.0407162101](http://www.pnas.org/cgi/doi/10.1073/pnas.0407162101)





Skincare is health care. The skin is connected to every system in the body and is the first line of defense.

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- Cardiovascular
- Digestive
- Endocrine
- Lymphatic
- Muscular
- Nervous System
- Reproductive
- Skeletal
- Urinary
- Integumentary
- Immune
- Every cell is connected

## The Effects of Stress on Skin

Breakouts & inflammation



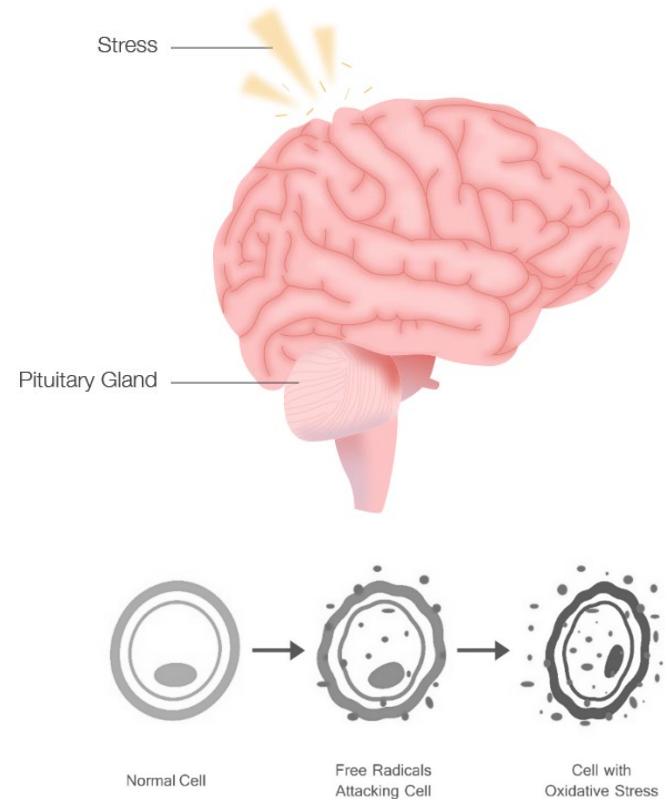
Dark circles & puffiness



Expression lines & crows feet



Dehydration & dullness





## Hypohydration and Aging

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In my clinical dermatology practice of 50 years, I have confirmed Zs-Nagy's hypothesis:

Hypohydration is the common unifying factor in my patients' health and functional (as opposed to chronological) age.



## Case Study: 4340

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**Age:** 28 years old

**Gender:** Male

**Occupation:** Athlete

**Status:** Single

**Concern:**

- Sun damage
- Improve muscle recovery time
- Sleep deprived
- Increase exercise
- Improve diet
- Weight

**Length of study:** 10 Weeks

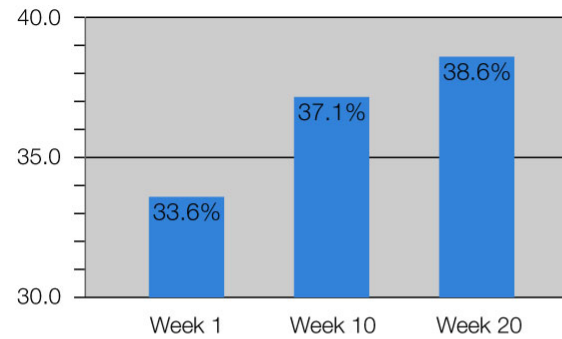
**Treatment:** Inclusive Health Athletic Program



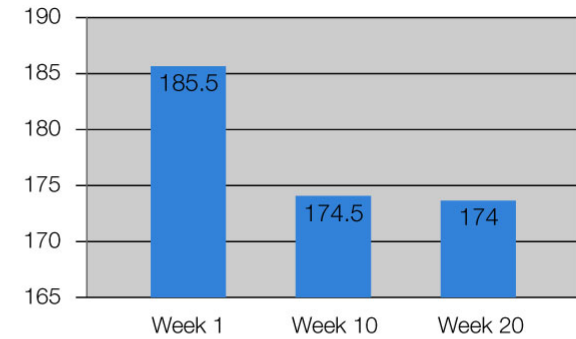


## Case Study: 4340

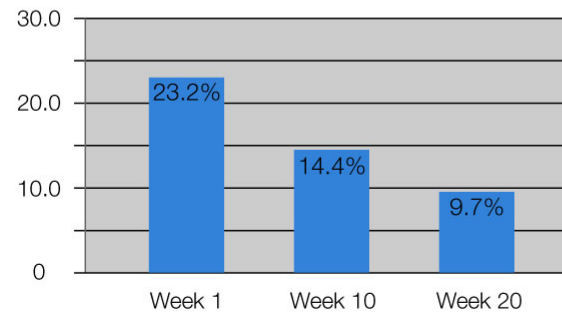
■ Intra-Cellular Water Percentage



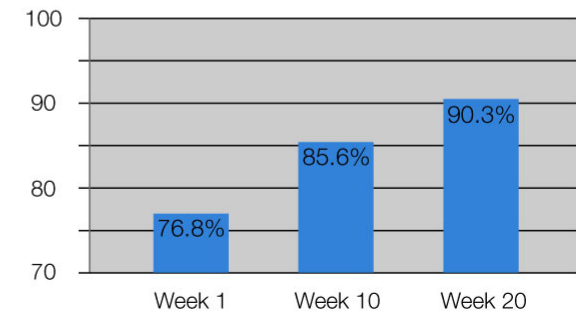
■ Weight in Pounds



■ Body Fat Percentage



■ Fat-Free Mass Percentage





## Murad Inclusive Health 10-Week Program

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Facial or massage every other week

Work out together in a group setting every other week

Art Therapy classes with lecture; group setting met once

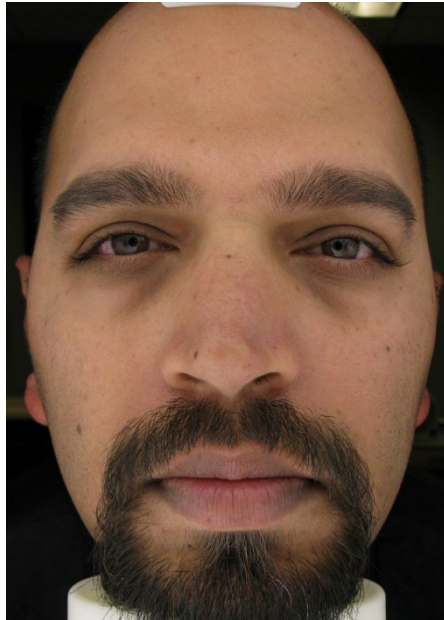
Nutrition/cooking class with recipes; group setting met once

Hike; group setting met once

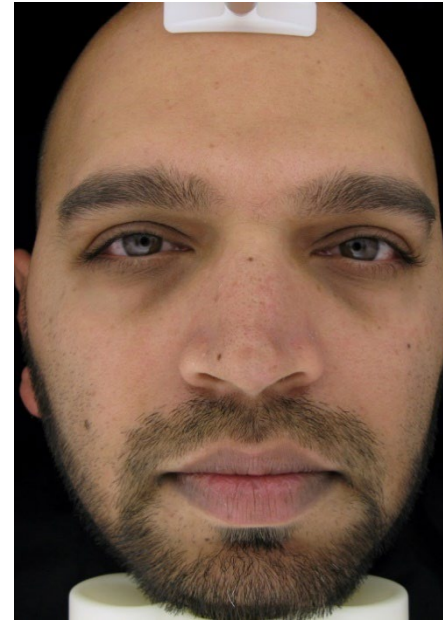


## Case Study: 3233

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BASELINE 9/21/2010

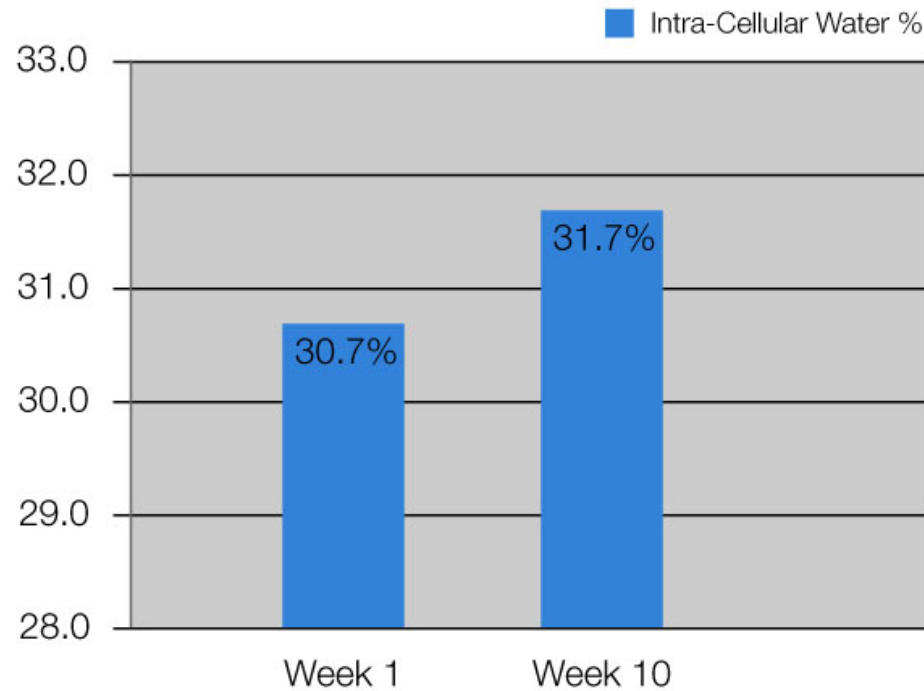


ENDPOINT 11/22/10



## Case Study: 3233

### Intra-Cellular Water Percentage



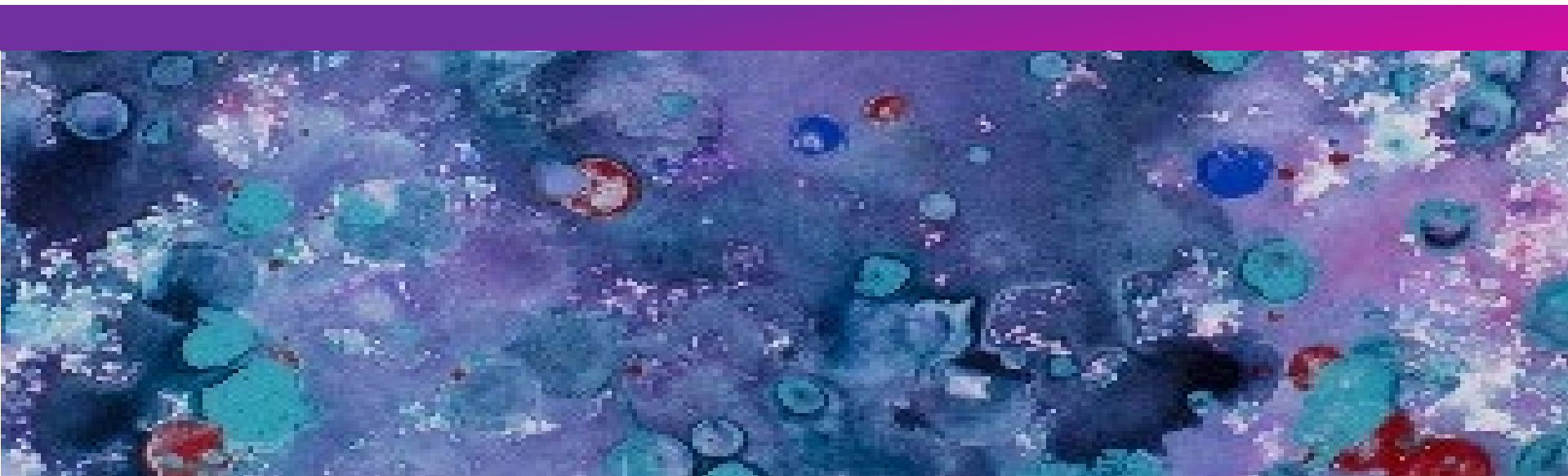




## Conclusion

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Hypohydration is a common and readily addressed phenomenon of aging that needs to be better understood by dermatologists to help our patients prolong health and well-being as they age.



Water is essential to life and every cell.

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*Howard Mural mo*



# Q&A

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