DISCLOSURES

-No relevant conflicts of interest with industry

-Author of a book for the general public on diet and dermatology
Wrinkling

Loss of elasticity

Brown spots (solar lentigos)

Rough, dry texture
Is there any way to help your skin better withstand the effects of gravity?
Is there any way to help your skin resist the damaging effects of UV radiation?
Is there any way to help your skin repair itself from sun damage?
The Power of Food
Your skin is under siege

Every minute of every day
The 3 Main Forces That Age The Skin

- Oxidation
- Major and minor inflammation
- Glycation
Aging Skin

• UV radiation
  – Oxidation and increased free radicals
  – Damage to DNA, proteins

• Damage triggers inflammation
  – Increase of MMPs such as collagenase and elastase, leading to further damage

• Glycation results in weakened collagen framework

Your skin is under siege

Every minute of every day
Which is why it has so many built-in defense and repair mechanisms
And the right foods can support and supercharge those systems
What can the right foods do for your skin?
• Quench free radicals
• Block the “scissor” enzymes collagenase and elastase
• Activate DNA repair systems
• Strengthen the skin barrier
• Promote the growth of good gut microbes that strengthen the skin barrier
• Thring TS, Hili P, Naughton DP. Anti-collagenase, anti-elastase and anti-
oxidant activities of extracts from 21 plants. BMC Complementary and
Alternative Medicine 2009 Aug 4; 9(1): 27

• Hacini-Rachinel, F., Gheit, H., Le Luduec, J. B., Dif, F., Nancey, S., &
Kaiserlian, D. (2009). Oral probiotic control skin inflammation by acting on

• Katta R, Brown DN. Diet and skin cancer: The potential role of dietary
antioxidants in nonmelanoma skin cancer prevention. Journal of Skin Cancer
WHAT TO EAT
1. Eat Power
2. Stop Sugar Spikes
3. Stop Skin Sabotage
Eat Power
FIGHT OXIDATION
How can you increase a person’s MED?
Some dietary antioxidants limit cellular damage induced by UV radiation
Dietary antioxidants

- UV exposure is associated with oxidative stress
- UV-induced reactive oxygen species (ROS) can degrade dermal collagen and elastic fibers.
- Dietary antioxidants may counteract ROS
Tomato paste rich in lycopene protects against cutaneous photodamage in humans in vivo: a randomized controlled trial.


Abstract

BACKGROUND: Previous epidemiological, animal and human data report that lycopene has a protective effect against ultraviolet radiation (UVR)-induced erythema.

OBJECTIVES: We examined whether tomato paste--rich in lycopene, a powerful antioxidant--can protect human skin against UVR-induced effects partially mediated by oxidative stress, i.e. erythema, matrix changes and mitochondrial DNA (mtDNA) damage.

METHODS: In a randomized controlled study, 20 healthy women (median age 33 years, range 21-47; phenotype III) ingested 55 g tomato paste (16 mg lycopene) in olive oil, or olive oil alone, daily for 12 weeks. Pre- and postsupplementation, UVR erythemal sensitivity was assessed visually as the minimal erythema dose (MED) and quantified with a reflectance instrument. Biopsies were taken from unexposed and UVR-exposed (3 x MED 24 h earlier) buttock skin pre- and postsupplementation, and analysed immunohistochemically for procollagen (pC) I, fibrillin-1 and matrix metalloproteinase (MMP)-1, and by quantitative polymerase chain reaction for mtDNA 3895-bp deletion.
Dietary tomato paste protects against ultraviolet light-induced erythema in humans.

Stahl W¹, Heinrich U, Wiseman S, Eichler O, Slie H, Tronnier H

Abstract

Carotenoids are efficient antioxidants capable of scavenging reactive oxygen species generated under conditions of photooxidative stress. It has been shown that supplementation with high doses of beta-carotene protects skin against UV-induced erythema. This study was designed to investigate whether intervention with a natural dietary source rich in lycopene protects against UV-induced erythema in humans. Tomato paste (40 g), providing approximately 16 mg/d of lycopene, was ingested with 10 g of olive oil over a period of 10 wk by 9 volunteers. Controls (n = 10) received olive oil only. Erythema was induced by illumination of dorsal skin (scapular region) with a solar simulator at the beginning of the study, after 4 wk and after 10 wk.
Some of the antioxidants that combat photoaging in lab studies

- Lycopene-tomatoes
- Ellagic acid-raspberries
- Genistein-soy
- Curcumin-turmeric
- Quercetin-onions
- Resveratrol-grapes
- Polyphenols-green tea
Spices and Herbs: A Triple Threat
The Power of Spice: Research Studies

- **Anti-inflammatory Powers**: Turmeric, ginger, garlic, saffron, pepper, thyme, oregano, rosemary, parsley

- **Rich Source of Antioxidants**: In a USDA study of the top 50 antioxidant-rich foods (per 100 gm weight), the top 5 five were dried spices: clove, oregano, ginger, cinnamon, turmeric

- **Antioxidant Powers**: In another study, cloves, cinnamon, and oregano scored highest, with sage, thyme, rosemary, bay, and mint also with high levels
Prebiotics and Probiotics
How PROBIOTICS and 'GOOD' GUT MICROBES Act to Help the Skin

Probiotics help to counter the "bad" bacteria in our guts [also known as "pathogenic" bacteria]. These pathogenic bacteria have been linked to several chronic diseases.

Probiotics have anti-inflammatory effects. In a study in mice, taking an oral probiotic bacteria helped to calm down T-cell mediated skin inflammation.

Probiotic bacteria produce certain substances, called metabolites, that have effects of their own. In a laboratory study, these metabolites were able to combat the formation of collagen-damaging reactive oxygen species.

Probiotics help protect the lining of our gut. They've also been shown to help our skin barrier. Use of an oral probiotic helps improve the function of the skin barrier, and helps reduce skin sensitivity.

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by KattaMD
Policemen, Teachers, and Factory Workers

- Help to counter pathogenic microbes
- Help train T cells
- In animal studies, help calm T-cell mediated skin inflammation
- Produce metabolites (SCFAs) that help protect gut barrier and skin barrier


Prebiotic foods include many vegetables
Foods that contain live cultures, such as kefir, miso, kimchi, and yogurt, serve as natural probiotics.
COMBAT INFLAMMATION
Designing and developing a literature-derived, population-based dietary inflammatory index

Nitin Shivappa 1,2, Susan F. Stice 1,2, Thomas G. Hurley 1, James R. Hussey 2, and James R. Hebert 1,2,*

Abstract

To design and develop a literature-derived, population-based dietary inflammatory index (DII) to compare diverse populations on the inflammatory potential of their diets.

Design

Peer-reviewed primary research articles published through December 2010 on the effect of diet on inflammation were screened for possible inclusion in the DII scoring algorithm. Qualifying articles were scored according to whether each dietary parameter increased (+1), decreased (-1) or had no (0) effect on six inflammatory biomarkers: IL-1β, IL-4, IL-6, IL-10, TNF-α, and C-reactive protein.
# ANTI-INFLAMMATORY FOODS AND NUTRIENTS

<table>
<thead>
<tr>
<th><strong>ANTI-INFLAMMATORY FOODS</strong></th>
<th>Turmeric, green/black tea, ginger, garlic, onion, alcohol (moderate portion), saffron, pepper, thyme/oregano</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ANTI-INFLAMMATORY MACRO AND MICRONUTRIENTS</strong></td>
<td>Fiber, magnesium, vitamin D, omega 3 fatty acids, vitamin C, vitamin E, vitamin A, vitamin B6, zinc, niacin, selenium, folic acid</td>
</tr>
<tr>
<td><strong>ANTI-INFLAMMATORY PHYTONUTRIENTS</strong></td>
<td>Flavones, isoflavones, beta carotene, flavonols, flavan-3-ol, flavonones, anthocyanidins</td>
</tr>
</tbody>
</table>
Eat Power

• Foods that are naturally rich in antioxidants
• High-nutrient, high-fiber carbohydrates
• High-nutrient fats
• Herbs and spices
• Prebiotic foods
• Probiotic foods
THE GLOW DIET: EAT POWER
Eat foods rich in powerful nutrients

- **ANTIOXIDANTS**: Foods high in antioxidants include fruits, vegetables, spices, green tea
- **POWER CARBS**: Carbs that contain fiber, protein, and antioxidants
- **POWER FATS**: Fats that contain anti-inflammatory nutrients
- **HERBS AND SPICES**: Powerful, concentrated sources of antioxidants and anti-glycation nutrients
- **PREBIOTICS**: Foods that promote the growth of good bacteria
- **PROBIOTIC FOODS**: Foods that contain live microorganisms, such as yogurt with "live, active cultures" of good bacteria

www.SkinAndDiet.com
by RattaMD
PREVENT GLYCATION
Diabetes impairs wound healing.

Does this impact collagen in other ways?
Sugar Sag

Your skin is supported by evenly aligned collagen fibers.

Just like a soccer goal net, this makes for a strong support that bounces back beautifully.

With too much sugar, though, new “sticky” compounds called AGEs are formed in your body. These act to cross-link collagen fibers.

And just like tangled nets no longer bounce back, cross-linked collagen loses elasticity. This ultimately causes sagging skin.

www.SkinAndDiet.com
by Rajani Katta MD
Sugar Sag: Glycation and the Role of Diet in Aging Skin

Harrison P. Nguyen, BA and Rajani Katta, MD
Department of Dermatology, Baylor College of Medicine, Houston, TX, USA
Conflicts of interest: None Reported.

ABSTRACT

First described in the context of diabetes, advanced glycation end products (AGEs) are formed through a type of non-enzymatic reaction called glycation. In renal disease, chronic obstructive pulmonary disease, and, recently, skin aging. Characteristic findings of aging skin, including decreased resistance to mechanical palpation, are attributable to glycation. Multiple factors mediate cutaneous senescence, and these factors are generally characterized as endogenous (e.g., telomere shortening).
Stop Sugar Spikes
GLOW: STOP SUGAR SPIKES

EAT THE RIGHT CARBS: Consume power carbs, which combine fiber, protein, and antioxidants. Power carbs include whole grains, beans, and lentils.

EAT THE RIGHT AMOUNT: Portion sizes are important, even for power carbs.

FILL UP ON FIBER: The ideal healthy plate is half fruits and vegetables, which ensure a hefty dose of fiber to slow down sugar release.

EAT BALANCED MEALS: There’s no perfect ratio, but eating a combination of carbs, protein, and fat at every meal helps limit blood sugar spikes.

LIMIT SUGAR BOMBS: Limit cookies, cakes, and other desserts, but also watch out for covert sugar bombs, such as breakfast cereals, iced teas, juices, and smoothies.

LIMIT REFINED CARBS: Refined foods such as white bread, white pasta, and crackers are more easily digested, which can spike blood sugar.

www.SkinAndDiet.com
by RattaMD
Everybody’s different
Personalized Nutrition by Prediction of Glycemic Responses.

Zeevi D 1, Korem T 1, Zmora N 2, Israeli D 3, Rothschild D 1, Weinberger A 1, Ben-Yacov O 1, Lador D 1, Avnit-Sagi T 1, Lotan-Pompan M 1, Suez J 4, Mahdi JA 4, Matot E 1, Malka G 1, Kosower N 1, Rein M 1, Zilberman-Schapira G 4, Dohnalová L 4, Pevsner-Fischer M 4, Bikovsky R 1, Halpern Z 5, Eilinav E 6, Segal E 7.

Abstract
Elevated postprandial blood glucose levels constitute a global epidemic and a major risk factor for prediabetes and type II diabetes, but existing dietary methods for controlling them have limited efficacy. Here, we continuously monitored week-long glucose levels in an 800-person cohort, measured responses to 46,898 meals, and found high variability in the response to identical meals, suggesting that individual diet responses may provide a means to identify dietary strategies with limited utility. We identify a personalized approach that allows each individual to tailor meals for the desired response.
Stop Skin Sabotage
GLOW:
STOP SKIN SABOTAGE

LIMIT ADDED SUGARS:
Foods high in added sugar can lead to rapid rises in blood sugar levels. When this happens, the body produces AGEs (advanced glycation end products) which damage collagen.

LIMIT FRIED FOODS
Fried foods contain pre-formed AGEs. These harmful substances cause collagen damage, which leads to wrinkling and sagging of the skin.

DO NOT CONSUME ANY TRANS FATS:
Factory foods, such as cookies and crackers may contain trans fats. These chemicals were produced in a laboratory to help food last for years on a shelf. Studies have shown that they are harmful. Avoid completely.

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by KattaMD
Concentration of AGE per Standard Serving Size

- Fried Bacon: 11,900
- Broiled Beef Hot Dog: 10,100
- Boiled Beef Hot Dog: 9,000
- Pan Fried Beef: 7,900
- Grilled Beef: 6,700
- Roasted BBQ Chicken: 6,700
- Poached Chicken: 3,000
- Broiled Salmon: 1,000
- Boiled Salmon: 1,000
- Whipped Butter: 1,300
- Tub Margarine: 900
- Peanut Oil: 600
- Vegetables (grilled): 200
- Vegetables (raw): 50
- Bread: 30
- Whole Milk: 12
- Juice: 10
- Coffee: 4

Summary

Role of oxidation
- Foods naturally rich in antioxidants
  - Fruits, vegetables, whole grains, spices, herbs

Role of inflammation
- Anti-inflammatory foods
  - Similar to foods naturally rich in antioxidants
  - Omega-3 fatty acids

Role of glycation
- “Sugar sag”
  - Strategies to reduce blood glucose levels
Action Items

• Mediterranean diet, DASH diet, MIND diet
• Emphasis on unprocessed foods
• More fruits, vegetables, nuts, seeds
• More spices and herbs
• Fermented foods
• Less processed foods/ less sugar/ less refined carbohydrates
EAT POWER
Eat foods that are rich in powerful nutrients, such as fruits, vegetables, spices, and probiotic foods.

STOP SUGAR SPIKES
Eat meals that avoid rapid rises in blood sugar levels. Meals that combine carbs with a healthy dose of fiber, such as the HALF-VEGGIE PLATE, will help. So will meals balanced with protein and fat.

STOP SKIN SABOTAGE
Certain foods may cause collagen damage and promote premature skin aging. Avoid added sugars, deep-fried foods, and heavily processed foods.

www.SkinAndDiet.com
by Rajani Katta MD
Why VEGETABLES Are So Important for Healthy Skin

Many vegetables contain high levels of antioxidants. These powerful nutrients fight off the collagen and DNA damage inflicted by UV-induced free radicals.

The fiber in many vegetables acts as prebiotics. Prebiotics help support the growth of “good microbes” in our gut, which have been shown to help reduce skin inflammation.

Vegetables provide a hefty dose of fiber, which promotes health in many ways. A meal rich in fiber helps to stabilize blood sugar levels, which limits collagen damage.

Vegetables are rich in many phytonutrients, which provide a number of health benefits. For example, the carotenoids in carrots help promote radiant skin.

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by KattaMD
ADDITIONAL REFERENCES


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