DISCLOSURES

- Advisory Board, Vichy Laboratories

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

• Be able to address common myths and misconceptions about skin and diet
Objective

• Speak with authority, providing recommendations that are grounded in scientific research
Objective

• Be able to translate nuanced scientific evidence into straightforward, actionable recommendations
Skin and Diet

- Diet has always been a part of medicine
- We’ve known for centuries that diet impacts the skin.
  - Poor wound healing in diabetics
  - Acanthosis nigricans
FRAMEWORK

**CO-MORBIDITIES**: Review risk of potential co-morbidities for each skin disease/ condition

**TRIGGERS**: Discuss potential triggers: eating patterns/ foods/ nutrients that may worsen skin disease

**HELPERS**: Discuss potential “helpers”: eating patterns/ foods/ nutrients that may help in the treatment of skin disease
The Goal

Translate evidence-based research into recommendations that are:

– Specific
– Individualized
– Actionable
Diet and Rosacea
Dietary Triggers in Rosacea

- Survey by National Rosacea Society
- Over 400 pts
- 78% had tried altering their diet
- 95% indicated this had helped reduce flares
Food Triggers in Rosacea: Cinnamaldehyde

- Hot sauce 54%
- Wine 52%
- Cayenne pepper 47%
- Hard liquor 42%
- Red pepper 37%
- Hot coffee 33%

- Tomatoes 30%
- Hot tea 30%
- Beer 30%
- Chocolate 23%
- Citrus 22%
Vasodilators

- Alcohol
- Hot beverages
- Activation of transient receptor potential potential channels that control neurogenic vasodilation
  - Capsaicin
  - Cinnamaldehyde
Gut-skin connection in rosacea?
Rosacea and GI Disease

- Population-based cohort study of close to 50K patients with rosacea
- Increased risk of multiple GI conditions and diseases
Rosacea and gastrointestinal disorders: a population-based cohort study.


Abstract

BACKGROUND: Rosacea is a common inflammatory facial skin condition. Recent genetic and epidemiological studies have suggested pathogenic links between rosacea and gastrointestinal disorders, but data are limited.

OBJECTIVES: The objective was to investigate the association between rosacea and coeliac disease (CeD), Crohn disease (CD), ulcerative colitis (UC), Helicobacter pylori infection (HPI), small intestinal bacterial overgrowth (SIBO) and irritable bowel syndrome (IBS), respectively.

METHODS: We performed a nationwide cohort study. A total of 49,475 patients with rosacea and 4,312,213 general population controls were identified using nationwide administrative registers. We established the prevalence of the aforementioned disorders, and used Cox regression analysis to obtain hazard ratios (HRs) of the risk of new-onset CeD, CD, UC, HPI, SIBO and IBS, respectively, in patients with rosacea.
Rosacea and gastrointestinal disorders: a population-based cohort study.
Rosacea and SIBO

JAAD Online: Notes & Comments

The role of small intestinal bacterial overgrowth in rosacea: A 3-year follow-up

To the Editor: We read with interest the review by Two et al that reports the microorganisms known to trigger or worsen rosacea such as Demodex folliculorum, Staphylococcus epidermidis, Helicobacter pylori, and Bacillus oleronius with no mention of the role of small intestinal bacterial overgrowth (SIBO). 1,2

At this first LHBT/GBT follow-up, 58.3% of patients with rosacea had normal intestinal flora (Fig 1) and remission of rosacea, that is, absence of papules and pustules and no or slight erythema.

All 40 patients completed one cycle of a 10-day rifaximin treatment and were re-evaluated with LHBT/GBT and clinically every 6 months for 3 years. At the 3 year follow-up, only 5.7% of patients had positive LHBT/GBT.

Frequencies and odds ratio throughout the follow-up are described in Table II. At the 3-year...
Rosacea and SIBO

- In one center, found increased risk of SIBO [small intestinal bacterial overgrowth] in pts with rosacea
- Treatment of SIBO in 40 patients led to remission of rosacea in all
- This persisted in the majority at 3-year follow-up
Comorbidities in rosacea: A systematic review and update

Roger Habr, MD,1,2 and Maria El Gemayel, MD3,4
Beirut, Lebanon

Background: Rosacea is linked to abnormalities of cutaneous vasculature and dysregulation of the inflammatory response. Recent reports on rosacea have shown a significant association with cardiovascular, gastrointestinal, and psychiatric diseases, all of which may affect morbidity and mortality among these patients.

Objective: To review available data regarding comorbidities associated with rosacea, discuss their pathogenesis, and highlight the evaluation of affected patients.

Methods: We performed a complete and systematic literature review in PubMed/Medline, Embase, and the Cochrane Collaboration databases, searching for all articles on possible associated diseases that have been reported with rosacea, with no limits on publication date, participant age, sex, or nationality.
More research needed

• Rosacea patients may have increased risk of CV disease
• Inflammatory pathways
# The Rosacea Diet: Foods to Avoid

## Heated Beverages
- Hot Coffee
- Hot Tea

## Alcohol
- Wine
- Beer
- Hard Liquor

## Capsaicin-Related
- Spices / Cayenne
- Red Pepper

## Cinnamaldehydes-Containing
- Cinnamon
- Tomatoes
- Citrus
- Chocolate

[www.skindanddiet.com](http://www.skindanddiet.com)

Rajani Katta MD
SUMMARY

Reduce risk of co-morbidities
- Population studies of close to 50K individuals indicate increased risk of GI conditions

Helpers
- Case series of SIBO (small intestinal bacterial overgrowth) treatment resulting in long-term resolution of rosacea
- Consider measures to support gut flora, including prebiotics and probiotics

Triggers
- Consider foods and beverages that result in vasodilation, either directly or via neurogenic vasodilation via role of TRP channels [transient receptor potential channels]
- Hot beverages
- Alcohol
- Capsaicin-related: spicy foods, red pepper, cayenne pepper
- Cinnamaldehyde-related: cinnamon, tomatoes, citrus, chocolate
ACTION ITEMS

1. Screen with history for GI co-morbidities
2. Refer to GI if necessary
3. Education on food and beverage triggers, including handout
4. Food diary vs 8-week elimination of potential rosacea triggers
Diet and Atopic Dermatitis
Synbiotics for Prevention and Treatment of Atopic Dermatitis: A Meta-analysis of Randomized Clinical Trials.

Chang YS1, Trivedi MK2, Jha A3, Lin YF4, Dimaano L4, Garcia-Romero MT5.

† Author Information

Erratum in

Abstract

IMPORTANCE: Atopic dermatitis (AD) is a highly prevalent condition that may be associated with an altered gastrointestinal microbiota that promotes an immune environment more susceptible to allergic disease. Synbiotics, a mixture of prebiotics and probiotics, have been used for the prevention and treatment of AD.

OBJECTIVE: To investigate the efficacy of synbiotics for primary prevention and treatment of AD.

DATA SOURCES: PubMed/MEDLINE, EMBASE, the Cochrane Central Register of Controlled Trials, and the CAB Abstracts Archive searchable database were searched from the inception of all databases to October 15, 2016, with no language restrictions.

STUDY SELECTION: We included all published randomized clinical trials of synbiotics for prevention and/or treatment of AD. To be included, a publication needed to clearly define the intervention as oral administration of synbiotics (combination of probiotics and prebiotics) and must have included an assessment of AD disease severity, such as the Severity Scoring of Atopic Dermatitis (SCORAD) index, or the incidence of AD as an outcome measure. Only 8 of 257 initially identified studies (3%) met selection criteria.
Synbiotics = Probiotics with Prebiotics
Atopic Dermatitis: Helpers
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.

www.SkinAndDiet.com
by KattaMD
• In a meta-analysis, the use of synbiotics showed promise in the treatment of atopic dermatitis in adults and children over the age of 1 year
• Many differences in study design
  – Different bacterial strains, dosages, duration
  – Different types of prebiotics
• Significant variability in individual response
PUFAs may improve skin barrier function

- Supplementation with flaxseed oil [source of PUFAs] for 12 weeks
- Resulted in less sensitivity to known irritant
- Less TEWL [trans-epidermal water loss]
- Smoother skin
DIET AND ECZEMA: FOODS THAT MAY HELP

PREBIOTIC FOODS
Prebiotic foods are substances such as plant fibers that support the growth of ‘good’ microbes in the gut. These microbes may help alleviate skin inflammation. Foods rich in plant fibers include legumes, vegetables, fruits, and whole grains.

PROBIOTIC FOODS
Probiotic foods contain live microbes that may provide health benefits, including reducing skin inflammation. These include foods with live, active cultures such as yogurt, kefir, lasu miso, kimchi, and sauerkraut.

HEALTHY FATS
Healthy fats, including omega-3 polyunsaturated fatty acids and monounsaturated fats, may help improve the skin barrier, reduce moisture loss, and improve skin sensitivity. Foods rich in healthy fats include fatty fish (such as salmon), avocados, nuts (such as walnuts), seeds (such as ground flax seeds), and others.

www.SkinAndDiet.com
by Rajani Katta MD
AD and Food Allergies

• Strongly correlated
• Overall estimated prevalence of food allergy in children with AD has ranged widely, from 20% to 80%
Food Allergens as an Exacerbating Factor in AD

• Clearly play a role in some patients
• However, prevalence unknown
• Studies indicate that those most likely to be impacted are infants and children with moderate to severe AD
Late eczematous reactions to food in children with atopic dermatitis.

Breuer K¹, Heratizadeh A, Wulf A, Baumann U, Constien A, Tetau D, Kopp A, Werfel T.

Author Information

Abstract

BACKGROUND: Food allergy is a common problem in patients with atopic dermatitis (AD), particularly in children. While immediate reactions to food are well characterized, the importance of food as a provocation factor for late eczematous reactions has been a subject of debate for several decades.

OBJECTIVE: To investigate the importance of food for the induction of late eczematous reactions in children with AD and to correlate the clinical outcome to the results of specific IgE determinations and atopy patch tests (APTs).

METHODS: One hundred and six double-blind placebo-controlled food challenges (DBPCFCs) to cow's milk, hen's egg, wheat and soy in 64 children with AD (median age 2 years) were analysed retrospectively. Total and food-specific IgE were determined by CAP RAST FEIA and APTs with native foodstuff were performed. The diagnostic values of specific IgE and APT results were calculated.
DIET AND ECZEMA:
TYPES OF FOOD ALLERGIES

TYPE 1 ALLERGIC REACTIONS
This type of allergy is known as immediate-type IgE-mediated allergy. One example is the immediate lip swelling that occurs in peanut allergy. Symptoms may also include rash, difficulty breathing, gastrointestinal symptoms, and others. These may occur minutes to hours later. In some patients, this reaction will worsen eczema.
TOP TRIGGERS: nuts, eggs, milk, wheat, soy, shellfish.

DELAYED ECZEMATOUS REACTIONS
In this reaction, a flare of eczema may occur a few hours to two days after eating the trigger food. Blood tests or skin tests are not always accurate, so confirmation requires a food challenge.
TOP TRIGGERS: nuts, eggs, milk, wheat, soy, shellfish.

SYSTEMIC CONTACT DERMATITIS
This type of allergy occurs a few hours to days after exposure to the trigger food. One example of SCD is allergy to foods related to fragrance additives. Confirmation requires patch testing.
TOP TRIGGERS: tomatoes, citrus, cinnamon.

www.SkinAndDiet.com
by Rajani Ratta MD
Recent Updates

- Medical records of 387,439 adults (mean age 43) with AD
- Compared to 1,528,477 matched controls
- Patients with severe AD
  - 20% increased risk of stroke
  - 40-50% increased risk of unstable angina, MI, Afib, and CV death
  - 70% increased risk of heart failure

Reduce risk of co-morbidities
- More research needed, but severe AD may be associated with higher risk of heart disease

Helpers
- Synbiotics in adults and children over the age of 1 year

Triggers
- 3 main types of foods allergies that may result in flare of AD
  - These include IgE-mediated, immediate-type hypersensitivity/ delayed eczematous reactions which may flare AD up to 48 hours later/ and systemic contact dermatitis, which may also lead to a delayed flare
Action Items

1. Food diary and possible testing
   a. Issue of food allergies in eczema is very complex

2. Increased fiber in diet via fruits, vegetables, whole grains (if not allergic)

3. Consider synbiotics or increased consumption of fermented foods containing live, active cultures
Diet and Acne
The Treatment: A Low Glycemic Index Diet

• Focus on carbs that do not raise blood glucose levels as quickly
Dietary Change

• In RCT
  – 25% protein/ 30% fat/ 45% low GI carbs [NOT a low-carb diet]
  – Volunteers were asked to replace high GI carbs with protein such as fish and poultry
  – Used whole grain bread instead of white bread
The effect of a high-protein, low glycemic-load diet versus a conventional, high glycemic-load diet on biochemical parameters associated with acne vulgaris: A randomized, investigator-masked, controlled trial

Robyn N. Smith, BAppSc (Hons), a Neil J. Mann, BSc (Hons), BAppSc, PhD, a
Anna Braue, MBBS, MMed, b Henna Mäkeläinen, BAppSc, c
and George A. Vargos, MBBS, FACD, PhD d,e
Melbourne and Parkville, Australia; and Turku, Finland

**Background:** No previous study has sought to examine the influence of dietary composition on acne vulgaris.

**Objective:** We sought to compare the effect of an experimental low glycemic-load diet with a conventional high glycemic-load diet on clinical and endocrine aspects of acne vulgaris.

**Methods:** A total of 43 male patients with acne completed a 12-week, parallel, dietary intervention study with investigator-masked dermatology assessments. Primary outcomes measures were changes in lesion counts, sex hormone binding globulin, free androgen index, insulin-like growth factor-I, and insulin-like growth factor binding proteins.
A pilot study to determine the short-term effects of a low glycemic load diet on hormonal markers of acne: a nonrandomized, parallel, controlled feeding trial.

Smith R¹, Mann N, Makelainen H, Roper J, Braue A, Varigos G.

Abstract
Observational evidence suggests that dietary glycemic load may be one environmental factor contributing to the variation in acne prevalence worldwide. To investigate the effect of a low glycemic load (LGL) diet on endocrine aspects of acne vulgaris, 12 male acne sufferers (17.0 +/- 0.4 years) completed a parallel, controlled feeding trial involving a 7-day admission to a housing facility. Subjects consumed either an LGL diet (n = 7; 25% energy from protein and 45% from carbohydrates) or a high glycemic load (HGL) diet (n = 5; 15% energy from protein, 55% energy from carbohydrate). Study outcomes included changes in the homeostasis model assessment of insulin resistance (HOMA-IR), sex
Clinical and histological effect of a low glycaemic load diet in treatment of acne vulgaris in Korean patients: a randomized, controlled trial.

Kwon HH*, Yoon JY, Hong JS, Jung JY, Park MS, Suh DH

Abstract
Recent studies have suggested that dietary factors, specifically glycaemic load, may be involved in the pathogenesis of acne. The aim of this study was to determine the clinical and histological effects on acne lesions of a low glycaemic load diet. A total of 32 patients with mild to moderate acne were randomly assigned to either a low glycaemic load diet or a control group diet, and completed a 10-week, parallel dietary intervention trial. Results indicate successful lowering of the glycaemic load. Subjects within the low glycaemic group demonstrated significant clinical improvement in the number of both non-inflammatory and inflammatory acne lesions. Histopathological examination of skin samples revealed several characteristics, including reduced size of sebaceous glands, decreased inflammation, and reduced expression of stromal regulatory element-binding protein-1, and interleukin-6 in the low glycaemic load group. A reduction in glycaemic load of the diet for 10 weeks resulted in improvements in acne.
What do our patients believe?
**TABLE IIIA.** Dietary items believed by patients to aggravate acne, n (% n/N).

[Copyright: ©2016 Nguyen et al.]

<table>
<thead>
<tr>
<th>Item</th>
<th>n</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fried or greasy foods</td>
<td>35</td>
<td>71.4</td>
</tr>
<tr>
<td>Chocolate</td>
<td>26</td>
<td>53.1</td>
</tr>
<tr>
<td>Dairy products</td>
<td>23</td>
<td>46.9</td>
</tr>
<tr>
<td>Soda drinks</td>
<td>17</td>
<td>34.7</td>
</tr>
<tr>
<td>Caffeine</td>
<td>13</td>
<td>26.5</td>
</tr>
<tr>
<td>Refined carbohydrates</td>
<td>13</td>
<td>26.5</td>
</tr>
<tr>
<td>Spicy foods</td>
<td>10</td>
<td>20.4</td>
</tr>
<tr>
<td>Sugar</td>
<td>8</td>
<td>16.3</td>
</tr>
<tr>
<td>Other</td>
<td>5</td>
<td>10.2</td>
</tr>
<tr>
<td>N/A - diet Ø aggravate acne</td>
<td>1</td>
<td>2.0</td>
</tr>
</tbody>
</table>
But it’s not the chocolate--
it’s the sugar
Role of Dairy Unclear

- Epidemiologic studies suggest that it may play a role in some individuals
- Case series of whey protein supplements serving as a trigger
Whey protein precipitating moderate to severe acne flares in 5 teenaged athletes.

Silverberg NB1.

Abstract
Acne vulgaris has been linked to milk ingestion, both whole and skim milk. The milk fraction that promotes acne is unknown. Five case reports are presented of male patients aged 14 to 18 years who experienced onset of acne shortly after initiation of whey protein supplementation; 3 teenagers used the supplement for muscle building in football training and the other 2 for attempting to gain weight. All 5 patients had poor response to acne treatment regimens of oral antibiotics, topical retinoids, and benzoyl peroxide. Lesions fully cleared in 4 patients after discontinuation of whey protein
Guidelines of care for the management of acne vulgaris.


Abstract
Acne is one of the most common disorders treated by dermatologists and other health care providers. While it most often affects adolescents, it can occur in adults and even in children. This evidence-based guideline addresses the general management of acne vulgaris, the role of diet, and guidelines for the use of topical and systemic therapies.

Table XII
Recommendations for the role of diet in acne

- Given the current data, no specific dietary changes are recommended in the management of acne

- Emerging data suggest that high glycemic index diets may be associated with acne

- Limited evidence suggests that some dairy, particularly skim milk, may influence acne
Counseling Patients

• Provide information
• For teenagers, consider feasibility
  – Reduce sugar-loaded sodas/sports drinks/ teas
• Emphasize that this is only one aspect of treatment
• However, it is completely under your control
SUMMARY

Helpers
- Low glycemic-index diet has been shown to result in clinical improvement, favorable serum hormone levels, change in sebum levels, and reduction in skin inflammation and sebaceous gland size (demonstrated by skin biopsy)

Triggers
- Role of dairy unknown; may be a trigger in some individuals
- Case series of whey protein supplements triggering severe acne resistant to treatment

More research needed
- Role of zinc, omega-3 fatty acids, fiber, probiotics, antioxidants
1. Educate on role played by sugar and processed carbs
2. For motivated individuals, consider further education on low glycemic index dietary recommendations
3. Emphasize that diet is only ONE aspect of therapy
4. Consider individual patient and feasibility of dietary change
5. Consider d/c of whey protein supplements
6. Explain that role of dairy remains unknown, but may possibly serve as a trigger in some individuals
DIET AND ACNE: FOOD TRIGGERS

LIMIT ADDED SUGARS
Foods high in added sugar can cause a rapid rise in blood sugar levels. This can then trigger changes in hormone levels. For some people, these hormone changes can lead to acne.

WATCH OUT FOR STEALTH SUGAR BOMBS:
Foods and beverages with surprisingly high sugar levels may include breakfast cereals, energy drinks, sweetened ice tea, juices (even 100% natural), and smoothies.

LIMIT REFINED CARBOHYDRATES:
Foods like white bread, white pasta, and white rice have had fiber and nutrients stripped away, which means they're digested more quickly. This causes more rapid rises in blood sugar.

LIMIT HIGH GLYCEMIC INDEX FOODS:
Foods with a high glycemic index (high GI foods) are those that are quickly digested and lead to rapid rises in blood glucose levels. This includes sugar, refined carbs, and also foods such as french fries.

FOR SOME PEOPLE DAIRY MAY BE A TRIGGER:
Studies have found that for some people (not all) dairy may worsen acne. Dairy products include milk, cheese, and ice cream.

WHEY PROTEIN SUPPLEMENTS MAY BE A TRIGGER:
Whey protein supplements are derived from dairy which may explain why in some people (not all) they may act as an acne trigger.

www.SkinAndDiet.com
by Rajani Katta MD
Diet and Psoriasis
“Modifying diet is an accessible and self-empowering method that many patients are eager to embrace in treating their disease.”
“With increasing awareness that psoriasis is associated with cardiovascular disease and metabolic syndrome, patients may also seek to improve diet to prevent these comorbidities.”
Reviews

Diet and psoriasis, part I: Impact of weight loss interventions

Maya Debbaneh, BA,1,2 Jillian W. Millisop, MD,2,3 Bhavna K. Bhatia, BA,1,2,4
John Koo, MD,5 and Wilson Liao, MD1
San Francisco and Irvine, California; Salt Lake City, Utah; and Chicago, Illinois

Please see the August and September issues for the second and third parts of this series.

One of the most frequently asked questions by patients with psoriasis is whether dietary changes can improve their condition. Included in this discussion is whether dietary weight loss can benefit their skin disease. Obesity has been associated with a proinflammatory state and several studies have demonstrated a relationship between body mass index and psoriasis severity. However, the question of whether weight loss interventions can impact psoriasis outcome is less clear. Here, we review the literature to examine the efficacy of weight loss interventions, both dietary and surgical, on psoriasis disease course. (J Am Acad Dermatol 2014;71:153-40.)

Key words: body mass index; diet; gastric bypass; nutrition; obesity; psoriasis; weight loss.
Can we play a role in protecting our psoriasis patients?
Psoriasis and comorbid diseases

Epidemiology

Juniko Takeshita, MD, PhD, MSCE, MS; Sunil Grewal, BS; Sinead M. Langan, MB, BCh, BAO; MRCP, MSc, PhD; Nehal N. Mehta, MD, MSCE; Alexis Ogdie, MD, MSCE; Abby S. Van Voorhees, MD; and Joel M. Gelfand, MD, MSCE

Philadelphia, Pennsylvania; London, United Kingdom; Bethesda, Maryland; and Norfolk, Virginia

See related articles on pages 393 and 531

Learning objectives
- After completing this learning activity, participants should be able to list at least five comorbidities that are associated with psoriasis, and discuss the supporting evidence and identify psoriasis patients who have the greatest risk of developing cardiovascular disease.

Disclosures
- Editors: The editors involved with this CME activity and all content validation/peer reviewers of the journal-based CME activity have reported no relevant financial relationships with commercial interests.

- Authors: The authors involved with this journal-based CME activity have reported no relevant financial relationships with commercial interests.

- Planners: The planners involved with this journal-based CME activity have reported no relevant financial relationships with commercial interests. The editorial and education staff involved with this journal-based CME activity have reported no relevant financial relationships with commercial interests.

Psoriasis is a common chronic inflammatory disease of the skin that is increasingly being recognized as a systemic inflammatory disorder. Psoriatic arthritis is a well-known comorbidity of psoriasis. A rapidly expanding body of literature in various populations and settings supports additional associations between psoriasis and cardiometabolic diseases, gastrointestinal diseases, kidney disease, malignancy, infection, and mood disorders. The pathogenesis of comorbid disease in patients with psoriasis remains unknown; however, shared inflammatory pathways, cellular mediators, genetic susceptibility, and common risk factors are hypothesized to be contributing elements. As additional psoriasis comorbidities continue to emerge, education of health care providers is essential to ensuring comprehensive medical care for patients with psoriasis. (J Am Acad Dermatol 2017;76:777-93.)

Key words: cardiovascular disease; chronic kidney disease; comorbidities; Crohn’s disease; depression; metabolic syndrome; nonalcoholic fatty liver disease; psoriasis; psoriatic arthritis; lymphoma; infection.
Psoriasis pts at risk

- Higher prevalence of comorbidities, including obesity, diabetes, hypertension, and dyslipidemia
- Meta-analysis of 27 observational studies: psoriasis is associated with both increased prevalence and incidence of diabetes.
Psoriasis pts with increased risk of MI

Study comparing MI risk in over 130,000 psoriasis patients (with over 500,000 controls)

Patients with psoriasis had increased adjusted relative risk for MI, even after adjusting for risk factors (including hypertension, diabetes, and hyperlipidemia)
Psoriasis

Dietary changes are a must to prevent systemic disease
## Psoriasis and Comorbid Diseases

**Armstrong et al. 2013**

<table>
<thead>
<tr>
<th>Risk of MI</th>
<th>Mild Psoriasis: 1.29</th>
<th>Severe Psoriasis: 1.70</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk of Stroke</td>
<td>Mild Psoriasis: 1.12</td>
<td>Severe Psoriasis: 1.56</td>
</tr>
<tr>
<td>Risk of CV Mortality</td>
<td>Mild Psoriasis: 1.03</td>
<td>Severe Psoriasis: 1.39</td>
</tr>
</tbody>
</table>

---

Evidence-based risk reduction

• Mediterranean diet for CV disease prevention
• DASH diet for prevention of HTN
Dietary interventions in psoriasis

• 55 studies meeting the inclusion criteria
• Represent 77,557 unique participants
  – 4,534 with psoriasis

Ford AR, Siegel M, Bagel J, et al. Dietary Recommendations for Adults With Psoriasis or Psoriatic Arthritis From the Medical Board of the National Psoriasis Foundation: A Systematic Review. JAMA Dermatol. Published online June 20, 2018.
• “Based on the literature, we **strongly recommend** dietary weight reduction with a hypocaloric diet in overweight and obese patients with psoriasis.

• **We weakly recommend** a gluten-free diet only in patients who test positive for serologic markers of gluten sensitivity.”
Reviews

Diet and psoriasis, part I: Impact of weight loss interventions

Maya Debnath, BA, a,b Jillian W. Millsop, MD, a,c,e Bhavnit K. Bhattia, BA, a,d
John Koo, MD, a and Wilson Liao, MD a
San Francisco and Irvine, California; Salt Lake City, Utah; and Chicago, Illinois

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**Key words:** body mass index; diet; gastric bypass; nutrition; obesity; psoriasis; weight loss.
Psoriasis and Weight Loss

• Meta-analysis of 5 RCTs of weight loss interventions
  – Lifestyle intervention via diet or exercise in overweight/obese pts
  – Greater improvement in PASI scores in wt loss intervention groups
• Weight loss has also improved response to systemic tx
Does adding dietary change to systemic treatment impact outcomes?
Weight Loss Improves Response to CyA

• Prospective, randomized, controlled trial
  – Investigator-blinded
• [CyA + diet] vs [CyA alone]
• Low calorie diet
• Week 24
  – Weight loss of 7% vs 0.2%
Results

• PASI 75
  – 67% with adjunct treatment
  – 29% with CyA alone

Weight loss may improve response to treatment with other therapies as well

How does one achieve a weight loss goal of 7%?
AN UPDATE ON THE DIABETES PREVENTION PROGRAM

Robert E. Ratner, MD, FACE®, for the Diabetes Prevention Program Research Group†

Author information ► Copyright and License information ► Disclaimer
YMCA’s Diabetes Prevention Program can help you help your patients. Based on research from the National Institutes of Health, programs like YMCA's Diabetes Prevention Program reduce new cases of type 2 diabetes by 58% overall and 71% in individuals over age 60.

The program is a yearlong lifestyle change program that engages participants in 25 sessions throughout the year. With instruction and support from Lifestyle Coaches, participants learn how to incorporate healthier eating, moderate physical activity, and problem-solving and coping skills into their daily lives. The curriculum is CDC-approved and is part of the CDC-led National Diabetes Prevention Program.

The program focuses on small, measurable goals to give participants confidence they can make the necessary changes to reduce their risk for type 2 diabetes. The group support keeps participants motivated. You can feel confident that the patients you refer will spend a year surrounded by supportive people with common goals.
Certified DPP

Average weight loss over 5%
DPP

- Check database for certified programs near you
- Medicare coverage for those with prediabetes
Diet and psoriasis, part II: Celiac disease and role of a gluten-free diet

Bhavnit K. Bhatia, BA,⁎,† Jillian W. Milshop, MD,⁎,†,‡ Maya Debbaneh, BA,⁎,‡ John Koo, MD,⁎
Eleni Linos, MD,⁎ and Wilson Liao, MD⁎
San Francisco and Irvine, California; Chicago, Illinois; and Salt Lake City, Utah

Please see the September issue for the third part of this series.

Patients with psoriasis have been shown to have a higher prevalence of other autoimmune diseases including celiac disease, a condition marked by sensitivity to dietary gluten. A number of studies suggest that psoriasis and celiac disease share common genetic and inflammatory pathways. Here we review the epidemiologic association between psoriasis and celiac disease and perform a meta-analysis to determine whether patients with psoriasis more frequently harbor serologic markers of celiac disease. We also examine whether a gluten-free diet can improve psoriatic skin disease. (J Am Acad Dermatol 2014;71:550-8.)

Key words: antigliadin; celiac disease; celiac sprue; diet; gluten-free; nutrition; psoriasis.
Psoriasis and celiac disease

• Increased risk of celiac disease
  – In one study 2.2 fold higher risk
• Case reports describe resolution of psoriasis with gluten-free diet in patients with celiac disease
More Research Needed

• Small studies indicate that even patients without celiac disease may benefit from GFD, if they test positive for gluten antibodies
Psoriasis patients with antibodies to gliadin can be improved by a gluten-free diet.


Abstract

In a previous screening study, 16% of patients with psoriasis had IgA and/or IgG antibodies to gliadin (AGA). The aim of the present study was to evaluate the effect of a gluten-free diet (GFD) in 33 AGA-positive and six AGA-negative psoriasis patients. Of the 33 AGA-positive patients, two had IgA antibodies to endomysium (EmA) and 15 an increased number of lymphocytes in the duodenal epithelium, but in some this increase was slight. Two patients had villous atrophy. A 3-month period on a GFD was followed by 3 months on the patient's ordinary diet. The severity of psoriasis was evaluated with the psoriasis area and severity index (PASI). The examining dermatologists were unaware of the EmA and duodenal biopsy results throughout the study. Thirty of the 33 patients with AGA completed the GFD period, after which they showed a highly significant decrease in mean PASI. This included a significant decrease in the 15 AGA-positive patients with normal routine histology in duodenal biopsy specimens. The AGA-negative patients were not improved. After GFD, the AGA values were lower in 82% of those who improved. There was a highly significant decrease in serum eosinophil cationic protein in patients with elevated AGA. When the ordinary diet was resumed, the psoriasis deteriorated in 18 of the 30 patients with AGA who had completed the GFD period. In conclusion, psoriasis patients with raised AGA might improve on a GFD even if they have no EmA or if the increase in duodenal intraepithelial lymphocytes is slight or seemingly absent.
Psoriasis and Gluten Antibodies

• 16% of pso pts with IgA and/or IgG to gliadin (AGA)
• Of 33 AGA, 30 completed a GF diet for 3 mos
  – Resulted in significant decrease in mean PASI
  – This included 16 pts with normal histology on duodenal bx
• When resumed ordinary diet, 18/30 worsened
• 6 patients neg for AGA did NOT improve
Food For Thought
TNF-alpha Inhibition

• Biologic therapies such as TNF-alpha inhibitors have changed the landscape of psoriasis treatment
• Are there other ways to reduce TNF-alpha levels?
Adipocytes?

- Adipocytes produce pro-inflammatory cytokines
- Including TNF-alpha, IL-6
The Dietary Inflammatory Index

• Researchers looked at over 1900 studies
• Studied effects of foods and nutrients on 6 major biomarkers of inflammation
  – If increased levels of IL-1B, IL-6, TNF-alpha, or CRP
  – OR decreased levels of IL-4 or IL-10
• Was considered pro-inflammatory
The researchers combined the results of the different research studies.

They then created a score called the dietary inflammatory index (DII). The DII tells us whether a food is anti-inflammatory (fights inflammation) or pro-inflammatory (worsens inflammation).

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

Reduce risk of co-morbidities (CV disease, DM, HTN, other)
- Diets supported by evidence to reduce risk: Mediterranean diet, DASH diet

Helpers
- Weight loss to improve response to therapy
- Weight loss to improve PASI scores

Triggers
- Increased risk of celiac disease
- Gluten-free diet may help those with gluten antibodies
ACTION ITEMS

1. Screen during history and physical
   - BMI
   - History of GI symptoms (gluten allergy/hypersensitivity)
2. Educate on increased risk of co-morbidities
3. Eval by primary MD
4. All pts >45 should be screened for DM
   - Consider HgA1C to indicate 3mo of BS
   - Screen at younger age if overweight/obese/ family history/ certain ethnic groups/ other risk factors
5. If overweight/obese
   - and with pre-diabetes, refer to diabetes prevention program for both diabetes prevention and weight loss
   - Consider referral to nutritionist
DIET FOR PSORIASIS: FACTS AND MYTHS

WHOLE FOODS DIET:
A whole foods diet (Mediterranean, DASH, other) is recommended for all patients with psoriasis, as these reduce the risk of high blood pressure, diabetes, and heart disease. Research has found a higher risk of these in patients with psoriasis.

DIET LEADING TO WEIGHT LOSS:
Research has shown that for some patients with psoriasis, a diet and exercise plan that leads to weight loss may improve the skin symptoms of psoriasis.

GLUTEN-FREE DIET:
Patients with psoriasis have a slightly elevated risk of gluten allergy. Research estimates that 3 in 1000 psoriasis patients will have celiac disease and 1 in 7 will have gluten antibodies. For those with GI symptoms (stomach pain, diarrhea), a blood test for gluten antibodies is recommended. If positive, a gluten free diet may help.

www.SkinAndDiet.com
by Rajani Katta MD
Diet and Skin Aging
Diabetes impairs wound healing. Does this impact collagen in other ways?
Why do some elderly individuals who eat a healthy diet appear younger?

– Even after controlling for co-variables such as degree of sun exposure, BMI, weight, smoking, other
Can you actually increase an individual’s MED? (Minimal Erythema Dose)
UVR Exposure Causes:

- DNA damage
- Direct damage to proteins (collagen, elastin), lipids (cell membranes)
- Triggers production of free radicals
  - Results in loss of endogenous antioxidants
- Triggers inflammatory pathways
  - Induces overexpression of MMPs, including collagenase
  - Contributes to alterations in collagen remodeling
  - Activates pathways that result in production of pro-inflammatory cytokines
    - Including (IL)1β and IL18 cytokines, IL-6, TGF-beta, others
- Induces immunosuppression
- And other downstream effects
Effects

- Photoaging
  - Rhytides
  - Textural changes
  - Solar elastosis
  - Pigmentary changes
  - Loss of elasticity
  - Sagging

- Tumorigenesis
• Each of the steps in these pathways may be impacted by diet
• Dietary patterns/ foods/ nutrients/ compounds
Population Cohort Study

- Over 2700 elderly Dutch
  - Wrinkles measured digitally in photographs
  - Diet assessed by food frequency questionnaire
- Better adherence to Dutch healthy guidelines significantly associated with fewer wrinkles in women
• In women, a pattern dominated by red meat and snacks associated with more facial wrinkles
A healthy diet in women is associated with less facial wrinkles in a large Dutch population-based cohort.


@ Author information

Abstract

BACKGROUND: Little is known about the effects of different dietary patterns on facial wrinkling.

OBJECTIVE: We aimed to investigate the association between diet and facial wrinkles in a population-based cohort of 2753 elderly participants of the Rotterdam study.

METHODS: Wrinkles were measured in facial photographs by digitally quantifying the area wrinkles occupied as a percentage of total skin area. Diet was assessed by the Food Frequency Questionnaire. Adherence to the Dutch Healthy Diet Index (DHDl) was calculated. In addition, we used principal component analysis (PCA) to extract relevant food patterns in men and women separately. All food patterns and the DHDl were analyzed for an association with wrinkle severity using multivariable linear regression.
• Over 500 non-diabetic patients
• Measurement of glucose levels
• Estimated age of subjects
  – Mean of 60 independent assessors scores based on photographs
• Even after taking into account other factors such as weight, degree of sun damage, and smoking:
• As blood glucose levels increased, perceived age increased
Noordam R, Gunn DA, Tomlin CC, Maier AB, et al. Leiden Longevity Study Group. High serum glucose levels are associated with a higher perceived age. Age 2013 Feb 1; 35(1): 189-95
Three Major Processes That Age The Skin

• Oxidation
• Major and minor inflammation
• Glycation
Aging Skin

• Multiple points to impact this process
• 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
• “Triggers”: Dietary patterns, foods, or nutrients that promote aging of the skin
• “Helpers”: Dietary patterns, foods, or nutrients that combat aging of the skin
Oxidation
Some dietary antioxidants limit cellular damage induced by UV radiation
Tomato paste rich in lycopene protects against cutaneous photodamage in humans in vivo: a randomized controlled trial.

Rieven M¹, Rodriguez-Blanco J, Harboffe A, Birch-Machin MA, Watson RE, Rhodes LE

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 VII) ingested 55 g tomato paste (16 mg lycopene) in olive oil, or olive oil alone, daily for 12 weeks. Pre- and postsupplementation, UVR erythermal 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 (pcI), 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 W², Heinrich U, Wiseman S, Eichler O, Stoe 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.
Dietary antioxidants

• Neutralize free radicals/ reactive oxygen species
• Upregulate genes encoding enzymes that act to neutralize ROS
• Replenish AOs that are naturally present in the skin
Antioxidants that combat photoaging in laboratory studies

- Lycopene-tomatoes
- Ellagic acid-raspberries
- Genistein-soy
- Curcumin-turmeric
- Quercetin-onions
- Resveratrol-grapes
- Polyphenols-green tea
Oral Photoprotection: Effective Agents and Potential Candidates

Concepción Parrado, Neena Phillips, Yolanda Olalde, Anneles Juarranz, and Salvador González

Abstract

This article has been cited by other articles in PMC.
**Table 3**
Photoprotective effects of Botanical compounds and their molecular targets.

<table>
<thead>
<tr>
<th>UV Effects</th>
<th>Tissue/cellular/molecular target</th>
<th>Compound(s)</th>
<th>Results</th>
<th>Models</th>
<th>References</th>
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<tr>
<td>Erythema</td>
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<td>Green tea</td>
<td>Decrease erythema</td>
<td>Human</td>
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<td>Polyphenols</td>
<td><em>Green tea catechin</em> + <em>Vitamin C</em></td>
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<td>Cocoa extract</td>
<td>Decreases erythema Increases MED</td>
<td>Human</td>
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<td>Decreases erythema Increases MED</td>
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<td>Citrus – Rosemary</td>
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<td></td>
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<td>PL</td>
<td>Enhances anti-oxidant plasma capacity</td>
<td>Mouse</td>
<td>(19)</td>
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<td>Pomegranate</td>
<td>Inhibits lipid peroxidation Inhibits hydrogen peroxide</td>
<td>Mouse</td>
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<td>DNA damage</td>
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<td>Green tea polyphenols</td>
<td>Decrease CPD</td>
<td>Mouse</td>
<td>(21, 22)</td>
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<td>Increase NER genes</td>
<td>Mouse</td>
<td>(22)</td>
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<td></td>
<td></td>
<td>PL</td>
<td>Reduces 8-oxoG</td>
<td>Mouse</td>
<td>(23)</td>
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<td>Reduces number of DNA mutations</td>
<td>Mouse</td>
<td>(23)</td>
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<td>Inhibits CPD</td>
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<td>Reduces common mitochondrial deletions</td>
<td>Human</td>
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<td>Inhibits CPD</td>
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<td>(25)</td>
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<td>Forskolin</td>
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<td>Green tea polyphenols</td>
<td>Induce the secretion of IL-12</td>
<td><em>in vitro</em></td>
<td>(27)</td>
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<td>Inhibit AP-1, NF-κB</td>
<td>Mouse</td>
<td>(28)</td>
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<td>Inhibit 12-Lipoxygenase metabolites</td>
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<td>PL</td>
<td>Inhibits TNF-α, NO, AP-1 NF-κB expression</td>
<td><em>in vitro</em></td>
<td>(29)</td>
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<td>Increases IL-10 expression</td>
<td><em>in vitro</em></td>
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<td>Inhibits leukocyte extravasation</td>
<td>Mouse</td>
<td>(101)</td>
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<td>Decreases mast cell and macrophages</td>
<td>Mouse</td>
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<td>Decrease mast cells</td>
<td>Human</td>
<td>(33, 102)</td>
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<td>Inhibits COX-2, PGF2</td>
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<td>(33)</td>
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<td></td>
<td>Human</td>
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<td>(34)</td>
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<td>Immuno-suppression</td>
<td>Photoprotective effects of Botanical compounds and their molecular targets.</td>
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<tr>
<td>Pomegranate</td>
<td>Decrease keratinocyte apoptosis</td>
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<td>PL</td>
<td>Protect against the development of NMIBC (tumor incidence, tumor multiplicity, tumor size)</td>
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<tr>
<td>PL</td>
<td>Reduce CD81 and VROF expression</td>
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<tr>
<td>PL</td>
<td>Reduce tumor development (number of tumors, tumor volume)</td>
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<tr>
<td>PL</td>
<td>Inhibit PCNA + epithelial cells</td>
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<td>PL</td>
<td>Increases the number of p33(+)-cells</td>
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<td>PL</td>
<td>Delays skin tumor development</td>
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<td>PL</td>
<td>Increases the clearance of ARs. Decrease the recurrence rate of ARs</td>
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<td>Increase MBD in familial MMF</td>
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<td>PL</td>
<td>Inhibit epidermal keratinization</td>
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<td>PL</td>
<td>Decrease PCNA, Cyclin D1 expression</td>
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<td>PL</td>
<td>Inhibit skin tumor formation</td>
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<td>Indirubin (Dimethin)</td>
<td>Inhibit PCNA expression</td>
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<td>Pomegranate</td>
<td>Inhibit NF-kappa B expression</td>
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<td>Resveratrol</td>
<td>Inhibit TGF-beta expression</td>
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<td>Furanolactone</td>
<td>Reduces sunburn cells</td>
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<td>Green tea polyphenols</td>
<td>Reduce MMSP-2 MMSP-9 Enhance TSP</td>
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<td>Cocoa extract</td>
<td>Attenuates skin wrinkling. Decreases catalase G Improves Serum B6c</td>
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<td>PL</td>
<td>Increases type I, III, and V collagens</td>
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<tr>
<td>PL</td>
<td>Inhibit MMSP-1</td>
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<td>Increases TSP</td>
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<tr>
<td>PL</td>
<td>Decrease MMSP-1 after VLB-IR radiation</td>
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</tbody>
</table>
Antioxidants

• Physiologic doses
  – Ideal
  – Doses found in whole foods

• Extreme doses
  – Found in supplements
  – Large human studies found no evidence for NMSC prevention with supplementation of vitamin C, vitamin E, beta-carotene, selenium
  – At high doses, some AOs become pro-oxidant
Diet and Skin Cancer: The Potential Role of Dietary Antioxidants in Nonmelanoma Skin Cancer Prevention

Roiani Katto 1, 2 and Danielle Nicole Brown 2

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Glycation
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 stress attributable to glycation. Multiple factors mediate cutaneous senescence, and these factors are generally characterized as endogenous (e.g., telomere shortening...
**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

Rajani Katta MD
• Avoid production of AGEs to limit wrinkling/loss of elasticity
• That means avoid sugar spikes
Everybody’s different
Personalized Nutrition by Prediction of Glycemic Responses.


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 universal dietary recommendations may have limited utility. We devised a method...
Avoid consumption of pre-formed AGEs

• Browned meats
• Broiled, grilled, fried
Concentration of AGE per Standard Serving Size

- Fried Bacon: 1900
- Broiled Beef Hot Dog: 10100
- Boiled Beef Hot Dog: 6700
- Pan Fried Beef: 9000
- Grilled Beef: 6700
- Roasted Beef: 6700
- Roasted BBQ Chicken: 7900
- Poached Chicken: 1000
- Broiled Salmon: 3000
- Boiled Salmon: 1000
- Whipped Butter: 100
- Tub Margarine: 900
- Peanut Oil: 500
- Vegetables (grilled): 200
- Vegetables (raw): 50
- Bread: 10
- Whole Milk: 5
- Juice: 12
- 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
Recommendation?

• Anti-Inflammatory Diet

• “Eat Power”
GLOW
The Dermatologist's Guide to a Whole Foods
Younger Skin Diet

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.

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Rajani Katta MD
Action Items

• Anti-inflammatory Diets
  – Heritage diets
  – 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