

It is well-known that costs for medical problems associated with smoking, obesity, malnutrition, and sun damage are very high, making it extremely important to push the notion of prevention in all of these cases. Between 1995 and 1999, it has been estimated that the United States spent \$157 billion in healthcare costs.¹ The costs associated with medical costs in the United States attributed to inactivity alone are around \$75 billion.² Many medical issues are preventable, which an uninformed person may not realize. But information on the risks of smoking, obesity, or tanning is well-documented and readily available. Still today there are around 1.25 billion smokers who will die an average of 7 years earlier than their nonsmoking counterparts.³ About 30% of people worldwide are considered to be obese and the numbers have been increasing dramatically ever since the 1980s.^{4,5} Every year according to the World Health Organization (WHO),⁶ sun damage causes 60,000 premature deaths and the loss of 1.5 million disability-adjusted life years (DALYs); in addition almost 30 million Americans tan indoors every year.⁷ Health risks associated with these three high-risk factors have become common knowledge in many countries. Yet doctors see patients seeking healthcare related to damage done by one or more of these risks time and time again. The most difficult and expensive approach will always be to treat the complications related to a risky behavior after an accumulation of damage, thus – as with anything else in life – preventing a problem before it occurs is always the best option.

All three of these risky behaviors are preventable. Positive behavioral changes, even after damage, can be extremely beneficial to a person's future health.

2.1 Smoking

The dangers of smoking cigarettes have become well-known; though the damage to the skin has been less studied. The smoke released from burning cigarettes at temperatures of 830–900°C contains some 5,000 chemicals. Many of these are hydrophobic agents that can diffuse through many cell membranes, reaching to the far ends of the body's precious organs, including the skin.^{3,8} Many of the dangerous chemicals are in the form of free radicals and oxidants, which can cause the malfunction of many biological functions and create cell damage. Smoking has been shown to increase many symptoms associated with aging: altered hormone production, reduced fertility, cancer, cardiovascular and respiratory disease, and diseases of the lung, esophagus, pharynx, larynx, stomach, pancreas, bladder, uterine, cervix, and skin.^{3,8–10}

Smoking causes premature aging of the skin by affecting the color, tone, and wrinkling. Smoking can also increase the risk for developing psoriasis, melanoma, squamous cell carcinomas on lips and oral mucosa, acne, and hair loss. Smoking also causes poor wound healing due to reduction of oxygen and nutrients to the skin.^{9,11–14} Many of the mechanisms that can explain these findings are complex and inexact. Premature skin aging may be caused in part by the same mechanisms which seem to cause the entire body's aging process.¹⁵ The premature death of smokers follows similar old-age-related illnesses of non-smokers such as osteoporosis, cancers, macular

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degeneration, and cardiovascular diseases.¹² The acceleration of aging in smokers may be caused in part by actual damage to the body or from destruction of chemicals needed to prevent aging in the body by causing molecular malfunctioning, leading to an increase in tumor development and a reduction in wound healing.³ Another theory on the causation of premature wrinkling of the skin may be increased elastosis in the skin. It has been found that the amount of wrinkling is directly related with the amount and duration of cigarettes smoked. The mechanism by which wrinkling occurs on the skin may be the same as the mechanism by which collagen and elastin in the lungs are damaged. Lastly, there is an idea that the skin damage is caused by extended exposure to intense heat while smoking.¹² Smoking also affects the levels of antioxidants in the body, accounting for premature aging. Many of the chemicals in the cigarette smoke cause damage that has been shown to decrease cutaneous blood flow and immune responses in the blood and decrease the level of vitamin C, vitamin E, circulating levels of nitrous oxide, and plasma concentrations, while increasing lipid peroxidation.⁸

Health damage and premature deaths caused by smoking are in a large part preventable. An emphasis on preventing new smokers is important because quitting can be a difficult process. Every year almost 15 million smokers attempt to quit smoking in the United States, with around one million in specific cessation programs.¹³ This very small proportion of the actual smokers shows how difficult quitting can be. While people hear from everyone around them, including the media, that smoking is bad for their health, a health-care provider must always push further intervention. Talking to parents of pediatric patients and directly to pediatric patients as early as possible is the primary role of the physician. Increasing education in schools about the dangers of smoking can also be a powerful tool to reduce new smoking behavior. It has been shown that health education programs using negative images to discourage smoking is more effective than positive images.¹⁶ Actual, real-life, positive role modeling by older students, parents, and teachers may be just as effective. While young smokers imagine the typical smoker as smart, good-looking, and considerate, nonsmokers perceive smokers as dull, childish, and confused. Reinforcement of the nonsmokers' beliefs is important by positive role modeling.¹⁶ For youths who have already begun smoking, knowledge

that smoking may increase the rate of facial aging may increase their likeliness of quitting.¹³ Informing young smokers of the positive health benefits of quitting may be a powerful tool. It is known, for example, that the risk of psoriasis decreases with every year of smoking cessation and becomes insignificant 20 years after a smoker has quit.¹³

2.2 Obesity and Nutrition

Obesity is another preventable disorder that, if gone untreated, can lead to a number of medical complications including orthopedic and metabolic problems, disrupted sleep, weakened immune system, impaired mobility, increased blood pressure, and hypertension. Psychosocial consequences include low self-esteem and depression. Long-term consequences include cardiovascular disease, insulin resistance, type 2 diabetes, hyperlipidemia, gall bladder disease, osteoarthritis, and certain cancers. When looking at prevention, it is important to note that obese children tend to grow into obese adults.⁴

Skin complications related to obesity include^{5,17,18}:

- Acanthosis nigricans
- Acrochordons
- Keratosis pilaris
- Hyperandrogenism and hirsutism
- Striae distensae
- Adiposis dolorosa and fat redistribution
- Lymphedema
- Chronic venous insufficiency
- Plantar hyperkeratosis
- Cellulitis
- Hidradenitis suppurativa
- Psoriasis
- Insulin resistance syndrome
- Tophaceous gout
- Changes in cutaneous sensation and temperature regulation
- Foot pain
- Candidiasis
- Intertigo
- Candida folliculosis
- Erythrasma
- Tinea cruris
- Folliculitis
- Necrotizing fasciitis

- Gas gangrene
- Leg ulcerations
- Plantar hyperkeratosis

Skin disorders attributed to malnutrition include scurvy, pellagra, ariboflavinosis, vitamin A deficiency, phrynodema, and kwashiorkor.^{19,20} Treatment of obese patients can also lead to a number of complications including difficulty in treating wounds and abnormal medicine dosages.⁵

Obesity prevention and nutritional education to the youth must be a powerful tool in the fight to prevent more obese adults. There are a number of factors that may be affecting the increased prevalence in obesity both in adults and in children. The list includes the individual's genetic makeup including psychological tendencies; the individual family's eating habits and amount of active behaviors while at school, school food, availability of vending machines, and cheap and readily available high-calorie, low-nutrition foods including fast foods. While many factors such as genetics and societal may not be readily changed, prevention will always be easier than treatment.

Treating at-risk overweight kids before they become obese is extremely important. Care must be taken in school-based obesity prevention programs to prevent stigmatizing overweight children or pushing already underweight children further in that dangerous direction.⁴ Prevention programs must promote exercise, how to eat healthily, and the dangers associated with becoming obese. The most effective prevention plans must be effective, sustainable, and not harm the participants. Extreme low-calorie diets (<700 daily calories) with a lack of fruits, vegetables, fish, and eggs can lead to a deficiency in many essential vitamins and cause malnutrition disorders, such as phrynodema, usually found in undeveloped nations. If detected early, diets rich in the missing vitamins and nutrients can be implemented to prevent these disorders.²⁰ Positive role modeling and education must be used by all those who teach or influence children from the earliest age possible, of the dangers and risks of not taking care of their bodies.

2.3 Sun Damage

Many societies today value the appearance of a dark, rich tan, causing many people to expose themselves to high levels of ultraviolet radiation (UVR) without

the necessary and available protection to prevent illnesses associated with sun damage. Many factors affect the level of UVR a person can receive yearly, from distal factors such as ozone levels, cloud cover, latitude, season, and lower atmospheric pollution, to proximal factors such as sun-seeking, sun-protecting behaviors, genetic skin pigmentation, and cultural dress and behaviors.⁶ UVR damage can suppress cell-mediated immunity in the body, have an adverse affect on the eyes and skin, and increase the risk of cancer. Absence of UVR can produce an insufficiency of vitamin D, increasing the risk of other complications including rickets, osteomalacia, osteoporosis, and tuberculosis.²¹

The skin is especially susceptible to damage from the sun; it is the first organ of the body to come in contact with UVR rays and covers the entire surface of the body. Specific damage to the skin caused by sun damage include malignant melanoma, cancer of the lip, squamous cell carcinoma, basal cell carcinoma, sunburn, photo-aging (wrinkles), psoriasis, and other photodermatoses such as solar urticaria, photoallergic contact dermatitis, actinic prurigo, polymorphic light eruption, and hydroa vacciniforme.²¹

Any skin damage caused by the sun is almost entirely preventable. For proper protection sunscreen with reapplications is necessary; wearing hats and long-sleeve shirts when in the sun is also recommended. Be aware of your risk category; people with lighter skin tend to burn more easily. People who spend their work days out-of-doors should be aware of the risks and take similar precautions.

A general risk that should be addressed by the physician is the fact that intentional sun damage to gain a tan, even if using sunscreen, is a risk for all the same skin damages caused by sun damage without sunscreen. Knowledge on the damages caused by the sun is well-known and yet ignored by too many of today's youth and adults.

2.4 Synergy of Risk and Integrating Prevention

It is clear that smoking, exposure to UVR rays, obesity, and poor nutrition can lead to a number of dermatological issues that are entirely preventable. It has been noted that persons who participate in one type of

risky behavior are more likely to participate in others. Therefore, it is necessary to consider that a combination of risk factors may be synergistic in nature, thus accelerating damage by just one risk factor. When looking at prevention, education in all of these risk factors must be addressed in part and as a whole. Positive role modeling by older peers, teachers, parents, and even physicians is extremely important in the battle of prevention. It has been noted that the more ambiguous a prevention plan is and the larger the number of possible options it offers, the more it is perceived with skepticism about its effectiveness and the more it is met with inaction.²²

Another tool in fighting the three risks simultaneously is directing education at those in the process of smoking cessation, as persons trying to change one aspect of their life may be more inclined to change other aspects of their life at the same time.²³ Finally, it is clear that action taken must be aimed at the younger populations to further educate persons on the risks associated with risky behaviors and the ease of preventing the harmful and deadly effects of smoking, malnutrition, obesity, and sun damage.

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<http://www.springer.com/978-1-84996-020-5>

Preventive Dermatology

Norman, R.A. (Ed.)

2010, XXIII, 260 p., Hardcover

ISBN: 978-1-84996-020-5