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## ASK THE DOCTOR

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**Q:** *I have read a great deal about glycation and the damage it causes inside the body. Can you explain what effect, if any, glycation can have on my skin?*

**A:** As with dietary fat, Americans have been misled about which carbohydrates to eat and which to avoid. We eat far too many breads, cereals, pasta, potatoes, baked goods, chips, snack foods, and sugar. These “high glycemic” carbohydrates convert rapidly to sugar in the bloodstream, creating inflammation at the cellular level, raising insulin levels, and causing the body to store fat. Thus, it is no surprise that we can lay claim to being one of the most overweight nations on Earth.



### Glycation, Cross-linking, and Leathery Skin

No one is immune to the negative effects of these carbohydrates. Even a healthy body is damaged by sugar in a phenomenon known as glycation. When foods rapidly convert to sugar in the bloodstream, they cause an immediate browning, or glycating, of the protein in the body’s tissues. Glycation is a process long known to discolor and toughen food in storage. It can occur in skin as well, creating detrimental age-related changes to collagen—and that means deep wrinkles.



When glycation occurs in the skin, the sugar molecules attach themselves to collagen fibers, where they trigger a series of spontaneous chemical reactions. These reactions culminate in the formation and gradual accumulation of irreversible cross-links between adjoining collagen molecules. This extensive cross-linking of collagen causes skin to lose its elasticity. Healthy collagen strands normally slide over one another, which keeps skin elastic. When young people smile or frown, creating lines in the face, the skin will snap back and be smooth again when they stop smiling or frowning. For a person whose collagen has been cross-linked from years of eating carbohydrates and sugars with high glycemic indices, the skin does not snap back and smooth out. Those deep grooves remain, because the sugar molecules have attached to collagen, making the fibers stiff and inflexible.

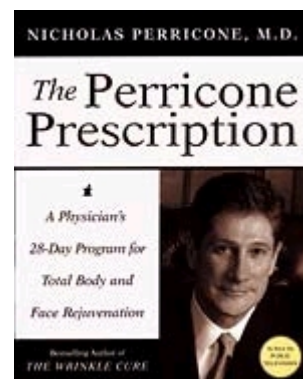
The bond between the sugar and collagen generates large numbers of free radicals, leading to more inflammation. When glycation occurs in the skin, the ultimate effect is not unlike tanning a leather hide. Over time, skin begins to resemble a cross between beef jerky and an old boot, unevenly discolored and heavily striated with deep lines and grooves.

### The Best Carbohydrate Choices

Brightly colored fruits and vegetables are packed with vitamins, minerals, and antioxidants, nature’s anti-inflammatories. They also contain water, helping hydrate the skin and body. These include blueberries, cantaloupe, kiwi, dark green leafy lettuce and other greens, and broccoli. Many charts are available that list the best carbohydrate choices for slowing or reversing the signs of aging while supplying essential energy.

Limit carbohydrates from grains to include only whole grains, non-instant oatmeal, and legumes like lentils and beans. These foods are absorbed slowly and will not provoke an inflammatory reaction from a surge in blood sugar levels. Keeping skin youthful and supple requires a slow, steady release of insulin into the bloodstream.

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