

# How Wrinkles Occur



## Aging

As a person ages, the skin undergoes significant changes. The cells divide more slowly, and the inner layer of skin (dermis) starts to thin. Fat cells beneath the dermis begin to diminish. In addition, the ability of the skin to repair itself diminishes with age, so wounds are slower to heal.

The underlying network of elastin and collagen fibers, which provides scaffolding for the surface skin layers, loosens and unravels. Skin then loses its elasticity. The sweat- and oil-secreting glands atrophy, depriving the skin of their protective water-lipid emulsions and their ability to retain moisture. The skin becomes dry and scaly.

Frown lines and crow's feet appear to develop because of permanent small muscle contractions. Habitual facial expressions also form characteristic lines. Gravity exacerbates the situation, contributing to the formation of jowls and drooping eyelids.

## Ultraviolet (UV) Radiation

The role of the sun cannot be overestimated as the most important cause of prematurely aging skin (called *photoaging*) and skin cancers. Overall, exposure to UV radiation emanating from sunlight accounts for about 90% of the symptoms of premature skin aging, and most of these effects occur by age 20.

Even small amounts of UV radiation trigger the process that can cause wrinkles. Both UVA and UVB rays penetrate the layers of the skin and cause cell damages leading to wrinkles, lower immunity against infection, aging skin disorders, and even cancer.

Sunlight damages collagen fibers (the major structural protein in the skin) and causes accumulation of abnormal elastin (the protein that causes tissue to stretch). In response to this sun-induced elastin accumulation, large amounts of enzymes called metalloproteinases are produced.

The normal function of these metalloproteinases is generally positive, to remodel the sun-injured tissue by manufacturing and reforming collagen.

This is an imperfect process, however, since sunlight-induced metalloproteinases also degrade collagen. The result is an uneven formation of disorganized collagen fibers called solar scars. Repetition of this imperfect skin rebuilding over and over again causes wrinkles.

An important event in this process is the over-production of oxidants, also called free radicals.

Sunlight can produce excessive amounts of free radicals and damage the body's cells and even alter their genetic material. Oxidation may specifically contribute to wrinkling by activating the specific metalloproteinases that degrade connective tissue.

There is a possible upside to wrinkles and sun exposure. A recent study reported that people with more wrinkles were less likely to develop basal cell carcinomas suggesting that people prone to wrinkles may respond to UV rays with mechanisms that protect against basal cell carcinoma.

## Other Factors

Cigarette smoking produces oxygen-free radicals, which are known to accelerate wrinkles and aging skin disorders and increase the risk for nonmelanoma skin cancers. Studies also suggest that smoking produce higher levels of collagen-degrading metalloproteinases.

Ozone, a common air pollutant, may be a particular problem for the skin. One study reported that it might deplete the amount of vitamin E in the skin; this vitamin is an important antioxidant.

If weight loss occurs too rapidly, the volume of fat cells that cushion the face are also decreased before chemicals in the skin can react. This not only makes a person look gaunt, but can cause the skin to sag and produce deep wrinkles.

## Potent Anti-Wrinkle Agents

### Vitamin A

promotes epithelialization

### Pullulan (SkinTight AP)

stimulates collagen synthesis, tightens skin

### Coenzyme Q10

stimulates collagen synthesis, antioxidant

### Ceramide-3 (Lacto-Ceramide)

replenishes skin ceramides

### Metalloproteinase Inhibitor (Collagen Protector)

prevents collagen degradation

### Hyaluronic Acid

deeply moisturizes skin

### Hydroxyproline & Palmitic Acid (SkinLift DPHP)

stimulates collagen synthesis

### Argireline

relaxes skin muscle nerves

### Soy Peptides & Yeast Enzymes

improves skin microcirculation

### Tripeptide-5

stimulates collagen synthesis

### Pentapeptide-3 (Vialox)

relaxes skin muscle nerves