What's on your face?

Guy German used to just sigh to himself when he saw shoppers in the cosmetics aisle, imagining that they were really on their way to cleaner, more youthful skin. “Is it real or is it snake oil?” he would wonder.

As a bioengineer with expertise in fluid and solid dynamics, he decided to find out whether there was more going on than marketing hype. “I’m interested in the underlying physics of it,” he says.

Most cleansers — from shampoo to floor cleaner to dish detergent — are based on surfactants. Hundreds of them fill products all over the house because they’re a handy way to remove dirt and oil.

Why is that? The surfactant creates a nice, foamy lather. It also works as an emulsifier. “Essentially, oil and water do not want to mix,” German explains. “When surfactants are added during washing, they will sit at oil-water interfaces. This reduces the surface tension at the interface of the two liquids and allows the oil drops to be suspended in the water.”

Voilà! You can then wash away the dirt or oil more easily.

But as your skin gets clean, it may also feel a bit tight. That’s because along with the dirt, you’re also washing away lipids and natural moisturizing factors that are present in healthy skin. That tight feeling, German says, is a mild form of drying that can lead to cracking and chapping.

Washing changes the chemical composition of the dead skin cells that form the outermost layer of skin, the stratum corneum. If you think that’s no big deal, German would like to remind you that this hard, crunchy shell is what protects the soft, tender living tissue — the rest of you — from dehydration and infection.

“You’ve got to thank the stratum corneum for allowing you to live on land,” says German, whose research gained him the nickname “Dead Skin Guy” during a post-doctoral stint at Yale University. “It works to slow down the water escaping from your body, which means we can live on land and not in the ocean.”

In a study funded by Unilever — the makers of Dove and Alberto VO5 products, among others — German developed a technique called high throughput correlation tracking to measure how much the stratum corneum dries out and stiffens after being treated with surfactants. This new technique will make it possible for researchers to test hundreds of surfactants in order to build a better soap.

In his study, German tested four surfactants — sodium cocoglycinate, sodium lauryl ether sulfate, cocomido propyl betaine and alkyl polyglucoside. (The last, known as APG, is more commonly used today in floor cleaners than in facial cleansers.) The APG showed the most deformation, while two others resulted in deformation similar to the control, simply treated with water.

Not all skin is the same, and neither are surfactants. Some surfactants will remove lipids and natural moisturizing factors that are supposed to be present in healthy skin tissue. Different surfactants remove different amounts and, therefore, cause different amounts of barrier damage.

Bottom line, German says: “Your choice of cleanser matters. Read the back of the label.”

His next project? Moisturizers: How do they really work? And do they repair all that damage caused by soap?

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- You’re flush from that promotion because you’re more productive.
- You’re saving money thanks to lower energy bills and fewer junk food purchases.
- Your skin is fresh and youthful.

If that doesn’t make you feel more attractive, then there’s only so much that research can do for you.

— Todd R. McAdam