

What Are We Growing in Our Makeup?

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To examine microorganism growth in makeup and possibly identify it as a potential nidus for infection, 19 samples of varying ages and brands were plated on sheep blood agar and incubated for 120 hours. Surprisingly, 6 of 19 makeup samples grew quantifiable bacteria and possible fungi, showing the high prevalence of these unwanted contaminants in beauty products. This study shows that seemingly innocent products often used on a daily basis could be a source of infection.

Cosmetic use has been practiced for centuries, and the booming billion dollar industry proves its continued use today. Even though the US Food and Drug Administration (FDA) has a role in the regulation of cosmetics guided by input from the Cosmetic Ingredient Review, it is the cosmetic industry that is responsible for insuring the safety of its products. Safety usually is achieved by following industry standards for good manufacturing practices and use of ingredients that have undergone safety testing.¹ In addition, the FDA provides online registration for cosmetic firms to file their formulations with the FDA, which is maintained in a database in case of an adverse event.² Although the newly manufactured

products might leave the factory safe for consumers, it is the accumulation of organisms over time that can pose potential problems. Certain factors can influence the growth of organisms such as manufacturing, packaging, water content, pH, and antimicrobial ingredients.³

METHODS

To examine the prevalence of organisms in makeup, the dermatology department at Baylor College of Medicine, Houston, Texas, conducted a small study involving 19 face powders and foundations collected from various subjects to observe their bacterial growth. To capture a representative cross section of real-world products, an array of brands, formulations, and ages of use were tested. Swabs of the makeup samples were incubated on sheep blood agar (Remel) and were allowed to grow at 37°C for 120 hours. Culture plates were examined for growth after 24, 48, and 120 hours. Representative colonies were further characterized by Gram stain.

RESULTS

Six of 19 samples were positive for bacterial and possibly fungal growth, including *Staphylococcus aureus*, *Staphylococcus* species (likely coagulase-negative *Staphylococci* such as *Staphylococcus epidermidis* or *Staphylococcus saprophyticus*) and *Streptococcus* species based on colonial appearance, hemolysis, and Gram stain (Table). One sample contained an organism that had the colonial and microscopic appearance of a fungus or mycelia-forming bacteria.

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Organisms Detected in Different Formulations and Brands of Foundation

Organism Isolated	Type of Foundation	Applicator Sponge Present	Brand
<i>Staphylococcus aureus</i>	Powder	Yes	Aveda
<i>Staphylococcus</i> species (likely <i>Staphylococcus epidermidis</i> or <i>Staphylococcus saprophyticus</i>)	Powder	No	L'Oreal
	Cream	Yes	MAX Factor
<i>Streptococcus</i> species	Cream	No	Joe Blasco
	Cream	Yes	MAC
Fungus or actinomycete	Liquid	No	Neutrogena

COMMENT

This experiment confirms that concealers and powders do provide an adequate environment for bacterial growth. Not only did this investigation identify the growth of organisms, but it demonstrated that potentially harmful organisms such as *S aureus* and fungi have the ability to flourish in makeup. The number of samples that grew bacteria or fungi was approximately one-third of those tested, showing a surprisingly high prevalence of growth. Clearly, a follow-up study with a larger sample size, different formulations represented, and the presence or absence of a sponge applicator is needed to further elucidate the conditions that are more prone to growth.

Although the isolated bacteria are part of the flora of normal skin, they are potentially dangerous for individuals who are in immunocompromised states or have a compromised skin barrier. For example, eczema is a common cause of barrier dysfunction, yet it is also important to remember that minor wounds, pimples, and even shaving-associated microtrauma are areas where the protective mechanism of the skin has been breached. In certain hospital settings, severe outbreaks linked to contaminated body lotions and perfumes have been described⁴ and a few nosocomial infections have been

associated with mouthwashes.^{5,6} Although the bacteria isolated in those case reports were not found in our study, the bacteria we isolated from the makeup samples are common causes of disease.

While many forms of makeup contain preservatives that work to slow bacteria growth, it has been shown that commonly used preservatives still do not eradicate bacterial growth.⁷ Although not specifically validated in our study, the US Department of Health and Human Services recommends the following suggestions to prevent organism growth⁸:

- Avoid sharing makeup.
- Keep makeup containers closed tight when not in use.
- Keep makeup out of the sun and heat. Instead, store in a cool dry place.
- Never add liquid to a product unless instructed to do so by the label.
- Discard makeup if the color or texture changes, or if it has an off odor.

Although many would have hypothesized the presence of bacterial growth in makeup, the high prevalence and bacterial species identified in our study were both

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unexpected and represent a possible hazard. The typical patient is likely unaware that the compact they use on a daily basis could be a source of a serious infection. This study serves to remind us of the unseen potential dangers incubating in seemingly harmless makeup.

REFERENCES

1. Ross G. A perspective on the safety of cosmetic products: a position paper of the American Council on Science and Health. *Int J Toxicol.* 2006;25:269-277.
2. Voluntary Cosmetics Registration Program. US Food and Drug Administration Web site. <http://www.fda.gov/Cosmetics/GuidanceComplianceRegulatoryInformation/VoluntaryCosmeticsRegistrationProgramVCRP/default.htm>. Accessed October 10, 2010.
3. Varvaresou A, Papageorgiou S, Tsirivas E, et al. Self-preserving cosmetics. *Int J Cosmet Sci.* 2009;31:163-175.
4. Alvarez-Lerma F, Maull E, Terradas R, et al. Moisturizing body milk as a reservoir of *Burkholderia cepacia*: outbreak of nosocomial infection in a multidisciplinary intensive care unit. *Crit Care.* 2008;12:R10.
5. Kutty PK, Moody B, Gullion JS, et al. Multistate outbreak of *Burkholderia cenocepacia* colonization and infection associated with the use of intrinsically contaminated alcohol-free mouthwash. *Chest.* 2007;132:1825-1831.
6. Molina-Cabrillana J, Bolanos-Rivero M, Varez-Leon EE, et al. Intrinsically contaminated alcohol-free mouthwash implicated in a nosocomial outbreak of *Burkholderia cepacia* colonization and infection. *Infect Control Hosp Epidemiol.* 2006;27:1281-1282.
7. Ravita TD, Tanner RS, Ahearn DG, et al. Post-consumer use efficacies of preservatives in personal care and topical drug products: relationship to preservative category. *J Ind Microbiol Biotechnol.* 2009;36:35-38.
8. Cosmetics and your health. US Department of Health and Human Services, Office on Women's Health Web site. <http://www.womenshealth.gov/faq/cosmetics-your-health.cfm>. Accessed March 15, 2011. ■



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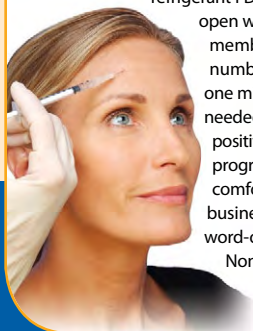
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