

CHEMICAL HAIR STRAIGHTENING AND HEALTH RISKS ^[1]

Press release from the French National Academy of Medicine

June 6, 2024

Some procedures outside the field of medicine can have unexpected, sometimes severe, medical impacts. This is the case for some cosmetic interventions that can lead to medical complications.

Hair straightening using chemical agents is a very common hairstyling technique throughout the world and is known as the “Brazilian” procedure. It provides a smooth and shiny appearance of the hair which can last for several months (1). Originally, formaldehyde was used for this straightening but, classified as carcinogenic, it was replaced, in 2013, by derivatives of glycolic acid (used in facial “peelings”), notably glyoxylic acid (2). During these procedures, exposure to glyoxylic acid can occur by inhalation or through skin and eye contact.

In the United States, in 1998, the “Cosmetic Ingredient Review” (3) considered these agents to be “safe” for short-term use, as long as a concentration $\leq 30\%$ and a final formulation $\text{pH} \geq 3$ are respected, without however justifying these limits.

Recent scientific articles have warned of the health risks linked to the cosmetic use of this molecule.

In 2023, lesions of regressive acute renal failure with the presence of calcium oxalate crystals in renal biopsies were described in 26 young patients, after a “Brazilian-style” hair straightening procedure (4). This is confirmed by a recent observation reporting the case of a 26-year-old woman, without medical history, who suffered from three consecutive episodes of regressing acute renal failure after hair straightening (5). The product contained 10% glyoxylic acid. Acute renal failure was linked to the formation of oxalic acid crystals in the renal tubules, these crystals being induced by acid absorbed by the scalp and skin during straightening. This causal link was confirmed by the application to mice skin of a smoothing product containing 10% glyoxylic acid, inducing calcium oxalate crystals in the urine within 24 hours. No such deposit was observed in control mice to which a control cream was applied (5).

Glycolic acid, metabolized into glyoxylic acid (6), is also widely used for facial “peels” at concentrations most often close to 30%. The absorption of glycolic acid by the skin depends on the pH of the product, its concentration, the duration of the skin exposure and the lipophilic properties of the product. An observation of acute renal failure (7), in a kidney transplant patient 4 years earlier, was described after 5 facial “peels” with glycolic acid (at a concentration between 40 and 70%). Renal biopsy revealed the presence of oxalate crystals.

The use of these cosmetic products is clearly increasing in women, but also in men, and in particular among populations with curly hair (8).

Wishing to draw attention to a health risk that might be underestimated because it is little known, the French Academy of Medicine:

- Recommends to release alert and information messages to health professionals, hairdressing salons and businesses selling these acid-based cosmetic products, to make them aware of these risks of acute kidney failure manifesting within 24 to 48 hours after applying the product.
- Emphasizes the importance of informing users about the risks of frequent use of these straightening products, and about the signs of an acute kidney failure, especially acute abdominal pain, nausea, rapid onset vomiting.
- Emphasizes also the importance of not performing hair straightening or “peeling” in the event of scalp or facial skin damage, which increases the penetration of glyoxylic acid and glycolic acid.
- Recommends, taking into account the first alerts published, to develop cosmetovigilance to assess the frequency of risk linked to the use of products based on glyoxylic and glycolic acids, and to establish a profile of patients most at risk.

References

1 Method for straightening the hair using a composition containing glyoxylic acid and/or a derivative thereof. Google Patents, October 29, 2015 (<https://patents.google.com/patent/US20150305469A1/en>).

2 Boga C., Taddei P., Micheletti G., *et al.*, Formaldehyde replacement with glyoxylic acid in semipermanent hair straightening: a new and multidisciplinary investigation. *Int J Cosmet Sci* 2014; 36: 459-70.

3 Cosmetic Ingredient Review. Final report on the safety assessment of glycolic acid, ammonium, calcium, potassium, and sodium glycolates, methyl, ethyl, propyl, and butyl glycolates, and lactic acid, ammonium, calcium, potassium,

sodium, and tea-lactates, methyl, ethyl, isopropyl, and butyl lactates, and lauryl, myristyl, and cetyl lactates *Journ. Toxicol.* 17 (Suppl. 1): 1-3, 1998

4 Bnaya A., Abu-Amer N., Beckerman P., *et al.*, Acute kidney injury and hair-straightening products: a case series. *Am J Kidney Dis* 2023; 82(1): 43-52. e1.

5 Robert T., Tang E., Letavernier E. *et al.*, Kidney Injury and Hair-Straightening Products Containing Glyoxylic Acid. *New Eng J Med*, 2024; 390: 1147-1148

6 Glycolic acid: Priority Existing Chemical Assessment: National Chemicals Notification and Assessment Scheme (NICNAS) Report N° 12. Commonwealth of Australia 2000

7 Slavin J.W., Ritota P.C., Elfenbein I.B., Renal failure after glycolic acid skin treatments. *Aesthetic Surg J.* 1996:1675-1676

8 Cosmetic Ingredient Review. Safety Assessment of Alpha Hydroxy Acids as Used in Cosmetics. Panel Meeting Date: December 8-9, 2013; Release Date: November 15, 2013. Pp 1-498.
<https://www.cirsafety.org/sites/default/files/ahas.pdf>

CONTACT PRESS: Virginie Gustin +33 (0)6 62 52 43 42
virginie.gustin@academie-medecine.fr

ACADÉMIE NATIONALE DE MÉDECINE, 16 rue Bonaparte – 75272 Paris
cedex 06 Site : www.academie-me-decine.fr / Twitter : @Acadmed

¹ Press release from the Academy's Rapid Communication Platform.