The Epidemic of Para-Phenylenediamine Sensitization

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21st century problem

16th century solution

Henna is NOT black

- Henna is *lawsonia inermis*, a plant which contains 0.5% to 2% lawsone, a red-orange napthaquinone molecule which readily, harmlessly, stains keratin. Henna paste applied for 3 to 8 hours to hair or skin will leave an orange to dark brown stain.
- ‘Black Henna’ is created by applying para-phenylenediamine to skin.
- PPD at high concentrations stains skin black in 1 hour.

‘Black henna’ temporary tattoos are a major source of the epidemic of PPD sensitization.

- **‘Black henna’ is NOT henna, it is PPD.**
- **Of every 100 people who have a ‘black henna’ temporary tattoo, 50 will be sensitized, and 20 will be severely sensitized to PPD.**

- A patch test of 10% PPD will sensitize 100% of people in 5 or fewer applications. All ‘black henna’ temporary tattoo pastes contain more than 10% PPD – up to 80%
- In the UK, 25% of middle school children report having had a ‘black henna’ temporary tattoo.

Delayed hypersensitivity reactions mask the risk; the risk is unrecognized.

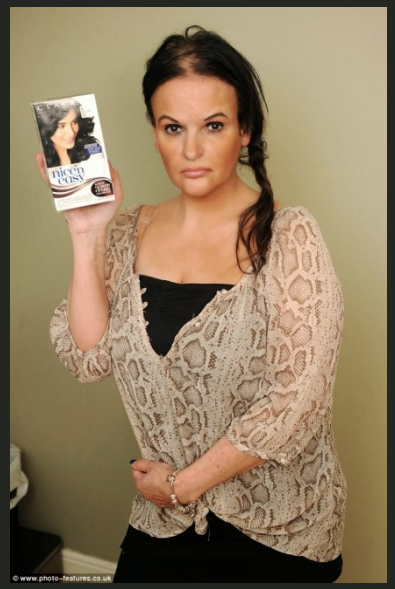
- 3 to 30 days after PPD application, people present to ER with massive blistering from ‘black henna’.
- Artists do not know ‘black henna’ has an extremely high PPD content.
- Patrons believe henna to be harmless and natural.
- Physicians’ diagnoses and treatments were often incorrect.

These large applications are increasing the number of people allergic to oxidative hair dye and the severity of their allergies .

- If a person has a ‘black henna’ temporary tattoo, that person has about a 50% chance of being sensitized to oxidative hair dye.
- These sensitized people have a 40% chance of a +++ (severe) reaction.
- People are sensitized to many related chemicals, and may need to avoid the entire group of aromatic amines.

Years after a child gets a ‘black henna’ tattoo on vacation, they grow up and decide to try hair dye: the result is unexpected and may be severe.

Hospitalizations and fatalities from oxidative hair dye becoming frequent.




Teenager left with face like 'Elephant Man'

HAIR DYE DID THIS TO ME

by SIOBHAN RYAN
Health Reporter

A TEENAGER was left with a "face like the Elephant Man" after suffering an allergic reaction to hair dye.

Bethany Rodd was temporarily blinded and suffered serious swelling and a rash

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- Every year in the west >20,000,000 'black henna' temporary tattoos are applied as souvenirs at beaches, festivals, and cultural events; this epidemic is going to be with us for the next half century.
- As of 2015, there were150,000,000 individuals sensitized to PPD through vacation 'black henna' temporary tattoos and a much larger number have been sensitized through the cultural use of 'black henna'.

2030: predicted crest of PPD sensitization epidemic in USA and Europe

- As of 2015, I estimated that there were 150,000,000 individuals sensitized to oxidative hair dye through vacation souvenir ‘black henna’ temporary tattoos; a larger number have been sensitized through cultural use.
- The rising consumer demand for ‘natural products’ may reflect the emerging PPD sensitization epidemic, including allergies to other aromatic amines.
- There are already calls for complete bans on PPD hair dye in the UK, Egypt, and Libya because of hospitalizations and fatalities.

These people are cross-sensitized to other aromatic amines

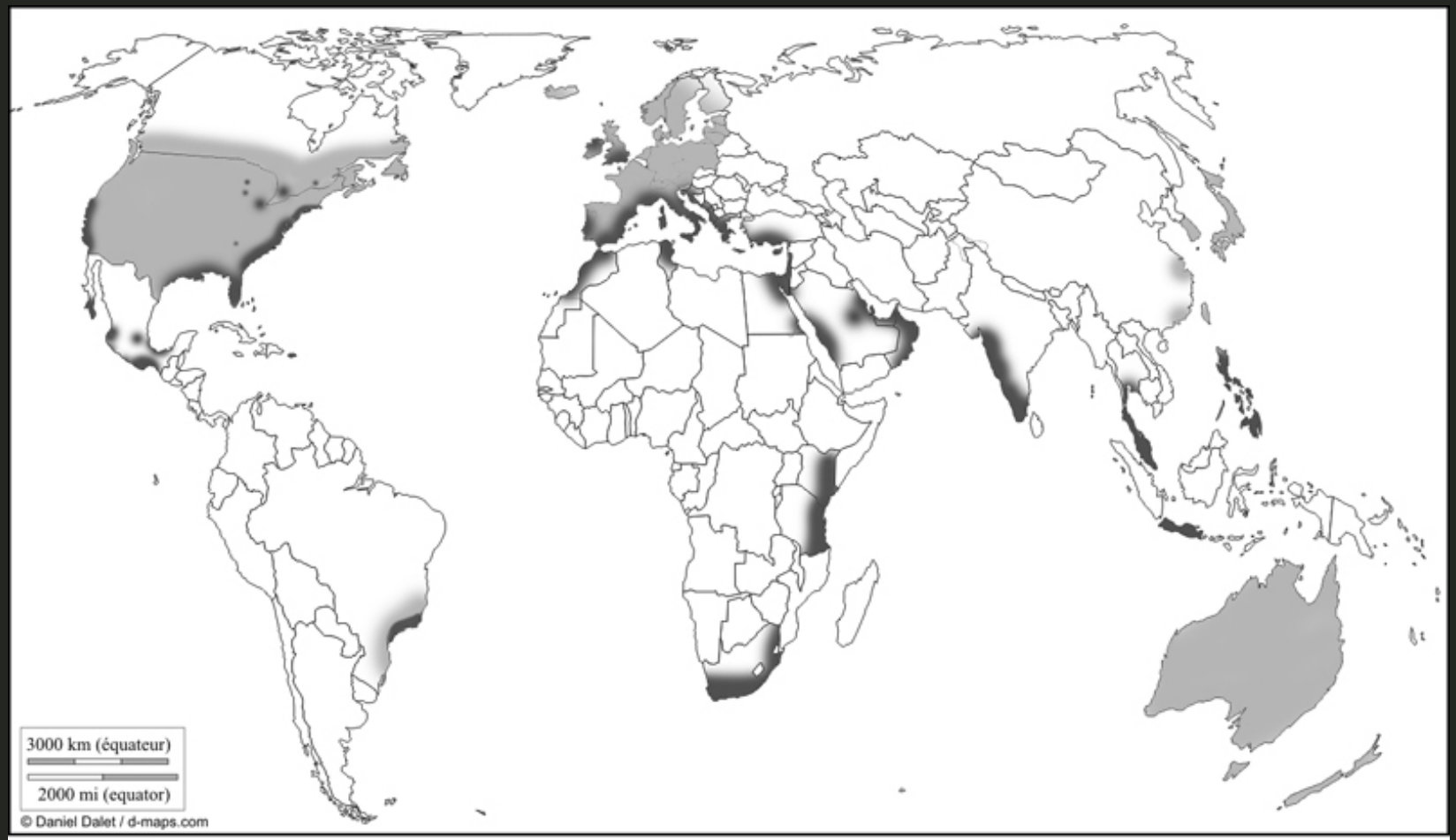
- Low-PPD and ‘no-PPD’ oxidative hair dyes will increase the risk of severe allergic reactions because people believe they are safe.
- People are also sensitized to fragrances, sunblocks, cosmetics, textile dyes, and rubber products.

- p-phenylenediamine, or paraphenylenediamine
- 4-phenylenediamine phenylenediamine
- p-diaminobenzene 4-aminoaniline
- 1,4-benzenediamine1,4-diaminobenzene
- Aniline yellow dyes such as p-aminoazobenzene or p-dimethylaminoazobenzene
- 4,4’-Methylenedianiline in some rubbers, plastics and epoxy resins
- Other aminobenzene-related compounds
- Disperse Orange dye 1-amino-2-methylanthraquinone
- p-toluenediamine

Black temporary tattoos are not the only source of sensitization

- Global trade of cheap, high PPD content hair dye has sensitized people.
- Many teenagers were sensitized through inept home applications of black hair dye through the ‘Goth’ and ‘Punk’ era.

Tourist areas with PPD black temporary tattoos



Areas where there is para-phenylenediamine 'black henna' activity in seasonal and informal economies.

Home areas of tourists who patronize para-phenylenediamine 'black henna' in seasonal and informal economies.

Map of PPD sensitization for 2030

- Light gray: <25% sensitized consumer base; <10% +++ sensitization
- Dark gray: >25% sensitized consumer base; >15% +++ sensitization
- White: no data

The $25 billion oxidative hair dye industry will lose $4 billion annually to sensitization by 2030. This customer base can be recovered by developing pure plant hair dyes.

- Educate consumers in recognizing symptoms of PPD sensitization so they can transition before injuries occur.
- In 2030 when 16% of graying clientele will not be able to use oxidative hair dye, henna will be not only economically viable but essential to growth of the hair dye industry.

Transition sensitized consumers at the first sign of allergy to PPD

- Many people who were sensitized with black temporary tattoos are cross sensitized to other aromatic amines.
- Henna, cassia and indigo can replace oxidative hair dye for sensitized consumers.
- At the first sign of sensitization, transition consumers to pure henna, indigo and cassia.
- These can be used directly over oxidative hair dye without cross-reactions or allergic reactions.

A 16th century hair dye technology can save lives

- The permanent, non-fading hair dye technology based on henna, partially fermented indigo, cassia, and fruit acids existed prior to oxidative hair dyes. These plant dyes are stable, safe, and reliable when used correctly.

Google images:
‘hair dye allergic reaction’

This is what the *beginning* of the epidemic sensitization to oxidative hair dye looks like.

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http://www.hennapage.com/henna/ccj/

Articles in academic publication

- "The Geographies of the Black Henna Meme Organism and the Epidemic of Para-phenylenediamine Sensitization: A Qualitative History.“ Kent State University 2015
- "Lawsonia inermis L. (henna): Ethnobotanical, phytochemical and pharmacological aspects," Ruchi Badoni Semwala, Deepak Kumar Semwala, Sandra Combrinck, Catherine Cartwright-Jones, Alvaro Viljoen. *Journal of Ethnopharmacology*, June 2014
- Henna Body Art in South Asia: Encyclopedia of Popular Culture in Asia and Oceania, *Greenwood Press/ABC-CLIO*
- Developing Guidelines on Henna: A Geographical Approach Master's Essay Kent State University 2015