Contribution to the BPA public consultation by Swiss Federal Office of Public Health

Dermal exposure to BPA

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Publication

Dermal penetration of bisphenol A in human skin contributes marginally to total exposure
Toxicology Letters 213(3), 305-8 (2012)
Demierre A.-L., Peter R., Oberli A., Bourqui-Pittet M.

Study
• According to OECD guidelines TG428
• Under GLP conditions

Results
• 8.6% of BPA passed through the skin after 24h
• 35.5% of BPA absorbed but blocked by the skin
#1: Monitoring study in cashiers

“The CEF Panel is aware of an ongoing study on BPA pharmacokinetic and dermal exposure in cashiers sponsored by the National Institute of Environmental Health Sciences (NIEHS) under the National Toxicology Program (NTP).“

- A first planned monitoring study (transversal) in cashiers has been withdrawn last year
- New study ongoing on kinetics of BPA after dermal and oral exposures
- Eventually also new study planned on BPA monitoring in cashiers (longitudinal)
#2 : Absorption rate underestimated

“All (dermal absorption) studies show increasing penetration with time and no study was conducted over a large enough time span to reach the maximum absorption. Thus, the determined absorption fractions (in the human and pig skin in vitro studies that range between 10 and 47 %) may underestimate the actual absorption.”

- Real exposure time for both consumers and cashiers should be shorter (hands washed)
- Absorption fractions may also be overestimated due to continuous exposure to BPA for already 24h
#3: Rate based on Biedermann study

“In the light of the in vitro studies failing to provide a reliable upper boundary for dermal absorption, the study of Biedermann et al. (2010) was used for the dermal exposure assessment.”
#3: Summary of Biedermann study

- **Principle:**
  - Dermal exposure of volunteers
  - Application of BPA on fingers (for example by touching thermal papers) and calculation of BPA recovered after washing in an extraction solution

- **Aims:**
  - Determination of BPA transferred to the skin after touching thermal paper in different conditions
  - Calculation of BPA no more available after the transfer

#3: Rate based on Biedermann study

“In the light of the in vitro studies failing to provide a reliable upper boundary for dermal absorption, the study of Biedermann et al. (2010) was used for the dermal exposure assessment.”

• Several weaknesses in the study from Biedermann:
  • Only one volunteer
  • Small numbers of repetitions
  • Unreliable method…

• 2 studies done according to OECD TG (Demierre et al, 2012, Mørck et al, 2010), with similar results (~10% passed through and 25-35% of BPA in the skin), in a similar range than the Biedermann study (~30% no more available)

• Fate of this BPA stopped by the skin is not clear so these 30% represent a worst case
#4: Exposure based on Lassen study

“Thermal paper exposure assessment based on Lassen et al., 2011 (Most extensive study available)”

• Reproduces almost the Biedermann study:
  • Migration and transfer rates on finger in the same range
  • Same weaknesses
  • High variation
→ Confirms the results published by Biedermann and the weak reliability of the method.
• Most study available but not used or even commented for the dermal absorption
#5 : Representativity of Lassen study

“In this exposure assessment it was assumed that children, teenagers and adults come into contact with thermal paper from shopping/canteen receipts, credit card receipts, bus tickets or parking tickets (taken from a use study by Lassen et al. (2011))”

• Other weaknesses of the Lassen study:
  • Number of contacts based only on the credit card receipts (not representative as in other countries shopping receipts are main source of exposure)
  • Handling of paper evaluation based only on ten consumers.
Summary

For assessment of chemicals, it’s important consider reliable studies, if possible based on OECD guidelines, to keep clear lines not only for regulators but also for the industry.

Thanks for your attention!