Results of the HERMOSA Study: Reducing teenagers' exposures to phthalates and phenols in personal care products

- **Research PI**: Kim Harley, UC Berkeley
- **Community PI**: Kimberly Parra, Clinica de Salud del Valle de Salinas
Potential Endocrine Disruptors in Personal Care Products

- Phthalates (fragrance)
- Parabens (preservative)
- Oxybenzone (sunscreen)
- Triclosan (antibacterial)
HERMOSA Study Aims

1) To characterize levels and sources of ED exposure from personal care products in young Latina women

2) To lower ED concentrations in the body by using alternate products

3) To empower local youth in scientific research methods

4) To work with local youth to develop health education and advocacy skills
Research Methods

- Enrolled 100 teen girls
- Pre-intervention visit:
  - Questionnaire about recent beauty product use
  - Urine sample
  - Education about EDs in make-up
- Gave low chemical products for 3 days
- Post-intervention visit:
  - Urine sample
Data Collection Activities

3-day intervention:
- No nail polish
- No perfume
- Only use the products we give you

- Home visit
- First office visit (urine sample)
- Follow-up office visit (urine sample)
“Low Chemical” Alternatives

• Identified through internet searches, drug/health food stores

• Prioritized locally available, affordable products. Prioritized brands that used fewer chemicals across the board.

• Parabens, triclosan, BP-3:
  ✓ Based on ingredients list

• Phthalates:
  ✓ Not listed on ingredients
  ✓ Chose brands that pledged not to use phthalates
  ✓ Chose options with no fragrance or parfum

We did not conduct independent tests for the presence of phthalates or phenols
The Beauty Bar

Girls Received:
• Shampoo
• Conditioner
• Body wash
• Liquid soap
• Lotion
• 1 Bar hand soap
• Deodorant
• Toothpaste (only for Colgate Total users)

Plus 4 extras from choice of: Liquid foundation, Powder foundation, Mascara, Eye liner, Lip stick, Lip gloss, Lip balm, Sunscreen
Chemical Analysis

- Conducted by the Environmental Health Laboratory Branch of CDPH
- Solid phase extraction, high-performance liquid chromatography-isotope dilution tandem mass spectrometry (LC/MS/MS)
- QA/QC:
  ✓ Precision
  ✓ Accuracy
  ✓ Method blanks
  ✓ Quality control samples
- Urinary dilution corrected with specific gravity
## Urinary Phthalate Metabolites

<table>
<thead>
<tr>
<th>Parent Compound</th>
<th>Metabolite</th>
<th>LOD</th>
<th>Detected Range (ng/mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diethyl phthalate (DEP)</td>
<td>mEP</td>
<td>0.46</td>
<td>100% 7.5 - 5049.2</td>
</tr>
<tr>
<td>Dibutyl phthalates (DBP)</td>
<td>mBP</td>
<td>0.91</td>
<td>97%&lt;LOD - 146.5</td>
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<tr>
<td></td>
<td>miBP</td>
<td>0.39</td>
<td>99%&lt;LOD - 301.6</td>
</tr>
<tr>
<td>Benzylbutyl phthalate (DBzP)</td>
<td>mBzP</td>
<td>0.20</td>
<td>100% 1.3 - 79.7</td>
</tr>
<tr>
<td>Dicyclohexyl phthalate (DCHP)</td>
<td>mCHP</td>
<td>0.10</td>
<td>3%&lt;LOD - 1.3</td>
</tr>
<tr>
<td>Di-2-ethylhexyl phthalate (DEHP)</td>
<td>mEHP</td>
<td>0.19</td>
<td>88%&lt;LOD - 90.4</td>
</tr>
<tr>
<td></td>
<td>mEHHP</td>
<td>0.19</td>
<td>98%&lt;LOD - 386.1</td>
</tr>
<tr>
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<td>mECP</td>
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<td>100% 2.0 - 713.7</td>
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<tr>
<td>Di-octyl phthalate (DOP)</td>
<td>mCPP</td>
<td>0.10</td>
<td>97%&lt;LOD - 42.4</td>
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<tbody>
<tr>
<td>Triclosan</td>
<td>TCS</td>
<td>0.2</td>
<td>93%</td>
<td>&lt;LOD – 2,360</td>
</tr>
<tr>
<td>Benzophenone-3</td>
<td>BP3</td>
<td>0.5</td>
<td>97%</td>
<td>&lt;LOD – 19,680</td>
</tr>
<tr>
<td>Methyl Paraben</td>
<td>MP</td>
<td>0.5</td>
<td>93%</td>
<td>&lt;LOD – 6,550</td>
</tr>
<tr>
<td>Ethyl Paraben</td>
<td>EP</td>
<td>0.5</td>
<td>55%</td>
<td>&lt;LOD – 738</td>
</tr>
<tr>
<td>Propyl Paraben</td>
<td>PP</td>
<td>0.2</td>
<td>90%</td>
<td>&lt;LOD – 1,716</td>
</tr>
<tr>
<td>Butyl Paraben</td>
<td>BP</td>
<td>0.2</td>
<td>49%</td>
<td>&lt;LOD – 115</td>
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<tr>
<td>Bisphenol A</td>
<td>BPA</td>
<td>0.2</td>
<td>81%</td>
<td>&lt;LOD – 19</td>
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Salinas: A Farmworker Community with Youth at Risk

Teen birth rate is double CA average

Highest youth homicide rate in CA

16% of Latina girls drop out of school
Preparing the next generation of Environmental Health Leaders

The CHAMACOS Youth Council
Learning about Chemicals in Personal Care Products
Designing the Study
Devising a Name and Logo

Health and Environmental Research on Make-up of Salinas Adolescents
Trying Out Alternate Products
Conducting the Data Collection
Recruiting & Interviewing

HERMOSA STUDY
Health and Environmental Research on Make-up Of Salinas Adolescents

Are you a teen girl in Salinas?
Are you interested in learning about the chemicals in your personal care products?
Are you interested in earning $100?

If you answered “Yes!” call or text us at (831) 417-8610 or email us at hermosastudy@gmail.com to learn how you can join the Hermosa Study.
Analyzing the Data

Field Trip to the CA Department of Public Health Laboratories
Results
HERMOSA Participants

- Mexican or Mexican-American
- Most spoke Spanish at home and English with friends
- 58% were living below poverty
Percent of Participants with Detectable Analyte Concentrations

- Triclosan
- BP3
- BP
- MP
- EP
- PP
- MEP
- MBP
- MiBP

Percent > LOD

Parabens

Phthalates
Triclosan Concentrations Differ by Colgate Total Use

Number of times used Colgate Total Today and Yesterday

P-value = 0.0001
Triclosan Concentrations by Hand Soap Type

P-value = 0.07

Geometric Mean TCS Levels (ng/ml)

No

Yes

Liquid Soap Today or Yesterday
Triclosan Concentrations by Hand Soap Type (2)

The chart shows the geometric mean TCS levels (ng/ml) for liquid soap and bar soap today or yesterday, with 'Yes' indicating the presence of triclosan and 'No' indicating its absence.

- **Liquid Soap Today or Yesterday**
  - P-value = 0.07
- **Bar Soap Today or Yesterday**
  - P-value = 0.38
Triclosan Concentrations by Hand Soap Type (3)

P-value = 0.07

P-value = 0.38

P-value = 0.74

Geometric Mean TCS Levels (ng/ml)

No

Yes

Liquid Soap Today or Yesterday

Bar Soap Today or Yesterday

“Antibacterial” Soap Today or Yesterday
BP-3 Concentrations by Sunscreen Use

P-value = 0.006

Geometric Mean BP3 Levels (ng/ml)

Used Sunscreen?

No

Yes
BP-3 Concentrations by Sunscreen Use (2)

**P-value = 0.006**

**P-value = 0.57**

<table>
<thead>
<tr>
<th>Sunscreen Use</th>
<th>Geometric Mean BP3 Levels (ng/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Yes</strong></td>
<td>400</td>
</tr>
<tr>
<td>No</td>
<td>100</td>
</tr>
</tbody>
</table>

**Used Sunscreen?**

**Used Foundation?**
BP-3 Concentrations by Sunscreen Use

- **Used Sunscreen?**
  - No: Geometric Mean BP3 Levels (ng/ml) 100
  - Yes: Geometric Mean BP3 Levels (ng/ml) 400
  - P-value = 0.006

- **Used Foundation?**
  - No: Geometric Mean BP3 Levels (ng/ml) 150
  - Yes: Geometric Mean BP3 Levels (ng/ml) 180
  - P-value = 0.57

- **Used Lipbalm?**
  - No: Geometric Mean BP3 Levels (ng/ml) 120
  - Yes: Geometric Mean BP3 Levels (ng/ml) 200
  - P-value = 0.28
Phthalate (MEP) Concentrations by Product Use

P = 0.83

Geometric Mean MEP Levels (ng/ml)

<table>
<thead>
<tr>
<th>Perfume or Fragrance</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>80</td>
<td>70</td>
</tr>
</tbody>
</table>

P = 0.83
Phthalate (MEP) Concentrations by Product Use (2)

- Geometric Mean MEP Levels (ng/ml)
  - No Perfume or Fragrance: P = 0.83
  - Yes Perfume or Fragrance: P = 0.03
  - No Solid Deodorant
  - Yes Solid Deodorant
Phthalate (MEP) Concentrations by Product Use (3)

Geometric Mean MEP Levels (ng/ml)

- Perfume or Fragrance
  - No: P = 0.83
  - Yes: P = 0.03

- Solid Deodorant
  - No: P = 0.02
  - Yes: P = 0.03

- Lotion/Moisturizer
  - No: P = 0.02
  - Yes: P = 0.03
Higher Propyl Paraben Concentrations in Girls who Wear Makeup More Often

![Bar Graph]

- **Geometric Mean Propyl Paraben Levels (ng/ml)**
- **How often do you wear make-up?**
  - Rarely/Never
  - Once a week or less
  - 2-6 Times a week
  - Everyday

*P-value < 0.01*
Propyl Paraben Concentrations by Makeup Use

- **Foundation**
  - No: Geometric Mean Propyl Paraben Levels (ng/ml) = 5
  - Yes: Geometric Mean Propyl Paraben Levels (ng/ml) = 45

- **Blush**
  - No: Geometric Mean Propyl Paraben Levels (ng/ml) = 15
  - Yes: Geometric Mean Propyl Paraben Levels (ng/ml) = 40

- **Mascara**
  - No: Geometric Mean Propyl Paraben Levels (ng/ml) = 5
  - Yes: Geometric Mean Propyl Paraben Levels (ng/ml) = 35

P-values:
- Foundation: P-value < 0.01
- Blush: P-value = 0.05
- Mascara: P-value < 0.01
Did Levels Go Down During the Intervention?
Triclosan Concentrations: Pre and Post-intervention

\[ p < 0.01 \]
BP-3 Concentrations:
Pre and Post-intervention

p < 0.01
Phthalate Concentrations: Pre and Post-intervention

- MEP: Pre \( \gg \) Post, \( p < 0.001 \)
- MBP: Pre \( \approx \) Post, \( p = 0.07 \)
- MiBP: Pre \( \approx \) Post, \( p = 0.96 \)
Paraben Concentrations: Pre and Post-intervention

![Graph showing paraben concentrations pre and post intervention with p-values for each paraben type.](image-url)
### Urinary Concentrations of Other Phthalates and Phenols did not Change

<table>
<thead>
<tr>
<th>Substance</th>
<th>Pre-intervention GM (ng/ml)</th>
<th>Post-intervention GM (ng/ml)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBzP</td>
<td>13.0</td>
<td>12.3</td>
<td>0.78</td>
</tr>
<tr>
<td>MEHP</td>
<td>4.2</td>
<td>4.0</td>
<td>0.10</td>
</tr>
<tr>
<td>MEHHP</td>
<td>14.0</td>
<td>11.3</td>
<td>0.83</td>
</tr>
<tr>
<td>MECPP</td>
<td>25.9</td>
<td>22.6</td>
<td>0.48</td>
</tr>
<tr>
<td>MEOHP</td>
<td>10.9</td>
<td>9.1</td>
<td>0.79</td>
</tr>
<tr>
<td>MCPP</td>
<td>3.7</td>
<td>3.7</td>
<td>0.48</td>
</tr>
<tr>
<td>BPA</td>
<td>2.3</td>
<td>3.1</td>
<td>0.40</td>
</tr>
</tbody>
</table>
Participant’s Attitudes

- Learned something new about chemicals in cosmetics: 86%
- Has checked ingredient list of cosmetics: 30%
- Will buy beauty products without EDs: 93%
Returning Results to Study Participants

Phthalate Levels

- Phthalates are often listed on ingredient lists as "fragrance" or "parfum."
- They are commonly found in perfume, lotions, shampoo, nail polish, and other cosmetics.
- In HERMOSA, girls who used lotion more often had higher phthalate levels.
- On average, phthalate levels went down during the HERMOSA intervention.

Summary:
Before the intervention, your phthalate levels were about the same as most U.S. girls, and were about the same as the pre-intervention levels for most HERMOSA girls.

After using the low chemical personal care products for three days, your phthalate levels were about the same as most U.S. girls, and were about the same as the post-intervention level for most HERMOSA girls.

Your personal phthalate levels were 32% lower post-intervention than pre-intervention.
Advocacy and Outreach Activities

Educational Materials

DIY Shampoo =

You will need:
2 tablespoons olive oil
1 egg
1 tablespoon lemon juice
1 teaspoon apple cider vinegar

Instructions: Combine all ingredients in a blender. Blend until well combined. Use like regular shampoo. Discard any leftovers.

Community Events

Social Media

◎ Twitter @ hermosa_study
◎ Instagram @ hermosa_study
◎ Facebook: Teens For Safe Cosmetics
Summary

- Reduced ED concentrations by 25-45% by switching products for 3 days
- Difficult to reduce phthalate levels
- Able to empower youth by training them to be scientific researchers
- Youth have developed educational materials and are informing their community about our findings
Thanks to our Staff and Collaborators
And thanks to our Funder

Community Research Collaborative
Award 18BB-1800