



Measuring Environmental Exposures with Wristbands

What Are Wristbands?

- Silicone wristbands are worn for 5 to 7 days to measure chemicals we are exposed to in our daily lives.
- When worn, silicone can absorb some of the same chemicals that a person is exposed to. These can be chemicals we breathe in the air or ones that touch our skin.
- Wristbands will not capture exposures from drinking water or diet.
- Researchers can test wristbands to find what chemicals someone was exposed to during wear. All of the chemicals that someone was exposed to makes up their “**exposome**”.
- Wristbands are a convenient way to measure chemicals in our everyday lives, including chemicals that may cause cancer.^{3, 4, 7, 8, 12-17}

How Can Wristbands Assess Cancer Risk?

Some chemicals in our environment, like tobacco smoke, are known to cause cancer. This means they are carcinogenic to humans. Many other chemicals have been identified that may also cause cancer but questions remain.

Some types of chemicals can be measured using wristbands. Chemicals that have unknown cancer risk can be compared across people and groups to find out if exposures are different in people who get cancer.

Over time, researchers can look for an association between wristband exposures and cancers that may develop. **This can help us understand if certain chemicals are more likely to cause certain cancers.**

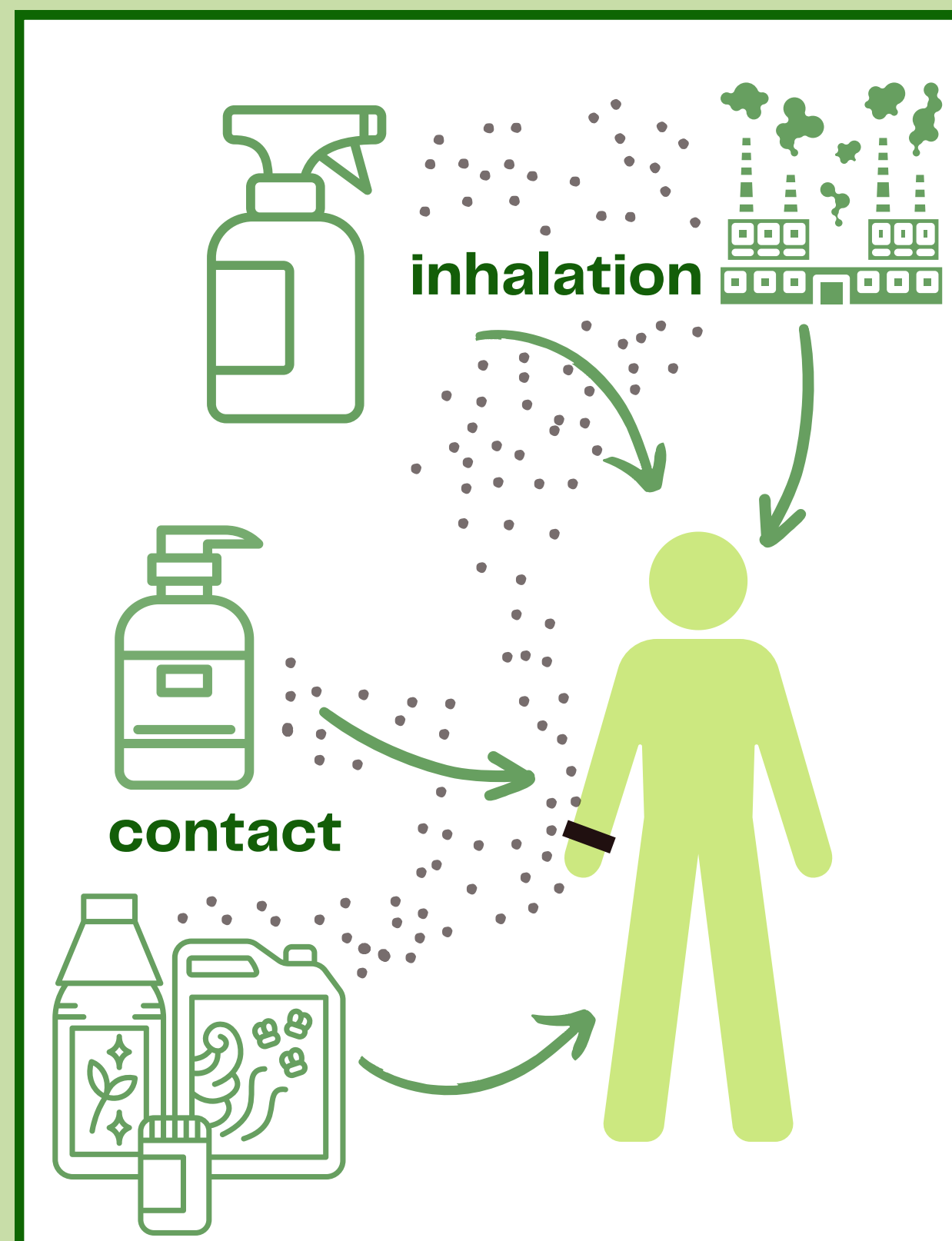


Figure 1. Silicone wristbands are exposed to and absorb the same chemicals we do. The chemicals that we inhale or come into contact with our skin can also be picked up by wristbands.



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Some Chemicals Detected by Wristbands (Figure 2)

Polycyclic aromatic hydrocarbons (PAHs) include some carcinogens which can form when burning fossil fuels, wood, and tobacco.³

Volatile organic compounds (VOCs) such as benzene or formaldehyde are found evaporated in the air.¹

Flame retardants are used in many household materials to reduce fire spread.

Many are banned but still found in wristband studies today.⁹

Endocrine disruptors (EDCs) such as phthalates are found in many household products.

Some pesticides used in agriculture are carcinogenic.¹⁴

The levels of these chemicals are **higher** when the wristband is **worn for more time**.⁷

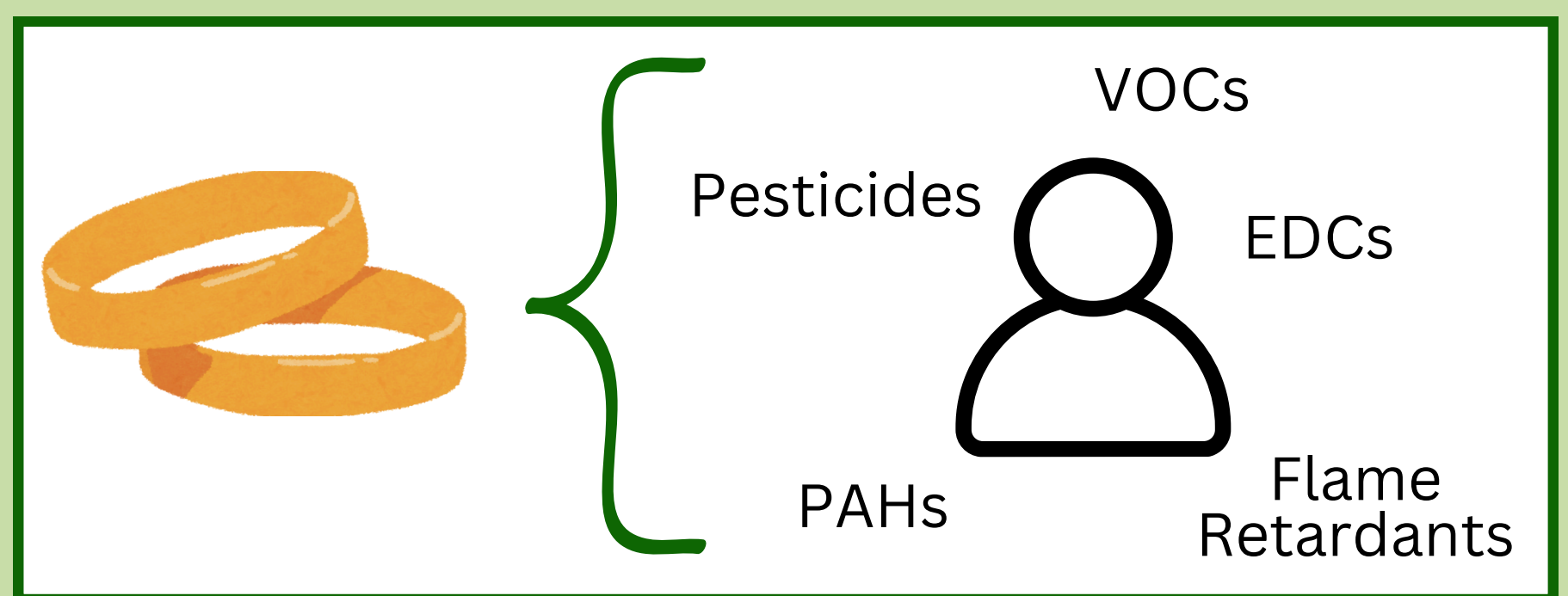


Figure 2. Common types of chemicals that have been measured by wristbands (adapted from NIEHS)¹¹

Special Populations

Wristbands can reflect unique increased exposures that certain populations experience.

Researchers must compare across populations to identify who has increased environmental exposures.⁷ Some groups such as firefighters, natural disaster survivors, and office workers can have increased exposures to certain chemicals.^{10,15,18}

Wristbands and Other Exposure Measures

Urine levels are traditional exposure measures. Studies show wristbands are useful at detecting some of the same chemicals found in urine.⁹

Wristbands have been proven to correctly represent phthalates (a type of EDC), flame retardants, and PAHs that were found in urinary specimens.¹³ Wristbands can also predict urinary levels for some pesticides such as DEET and permethrin.¹⁶

One study found that wristbands had better represented three cosmetic product exposures than what a urine sample showed.^{5,8}

References



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