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WHAT SHOULD WE DO WHEN THINGS ARE WRONG?

MARK JONES
CREATIVE DIRECTOR
MJPHD, LLC

11 November 2025

Mid-Michigan AIChE® American Institute of Chemical Engineers

Widely reported facts about plastics and microplastic are wrong.

Correction in the scientific literature is slow; correcting public perception even slower.

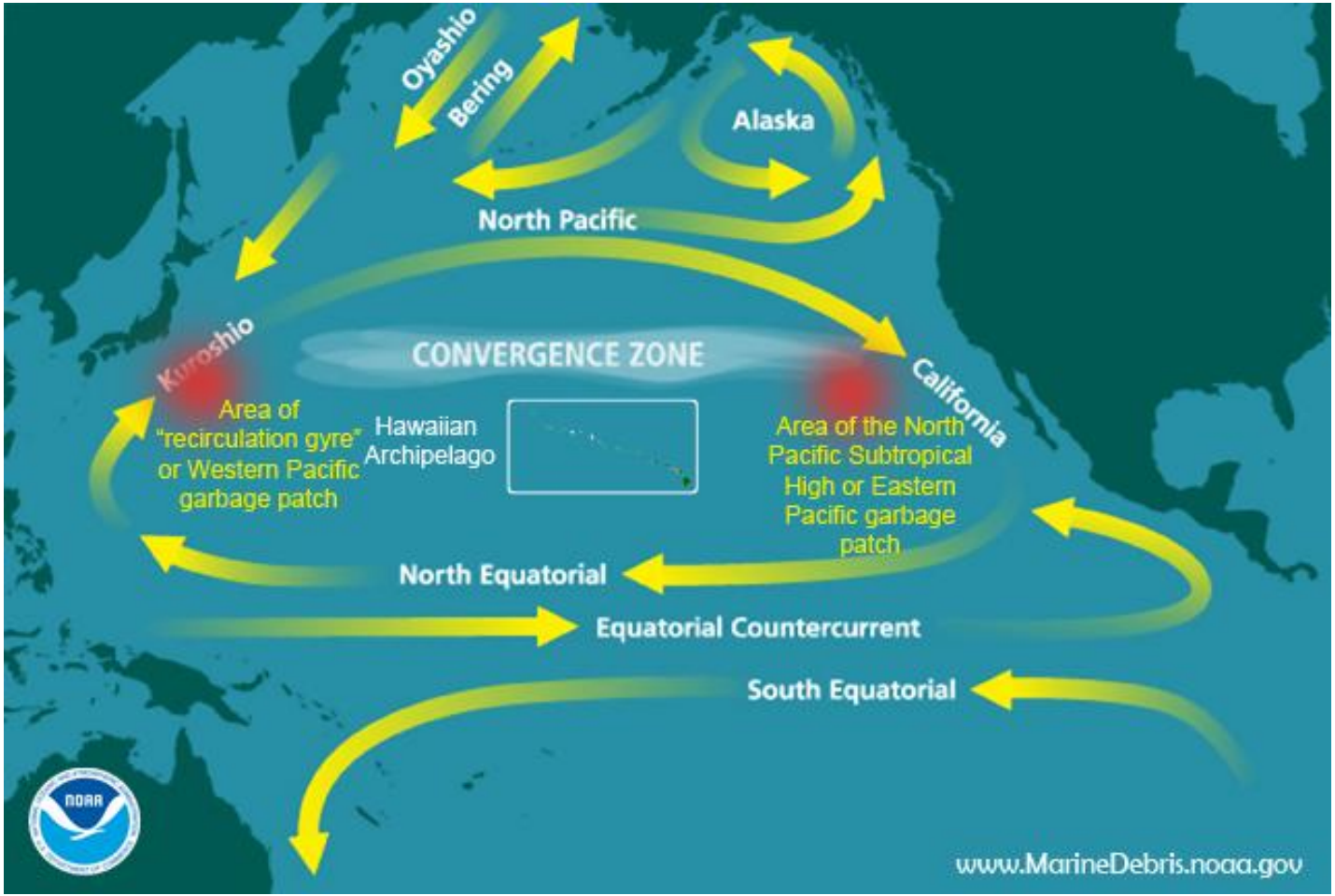
There are things you can do.

The Great Pacific Garbage Patch

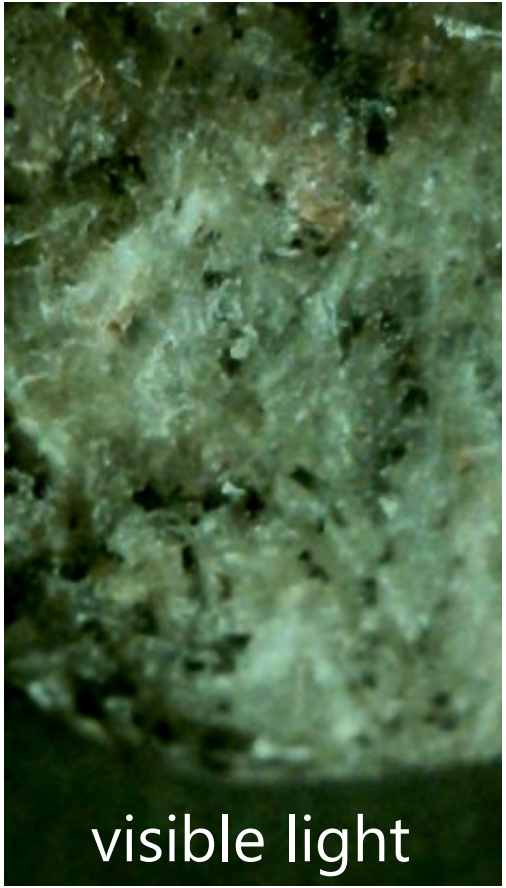
Caption:
A Part of the Great Pacific Garbage Patch

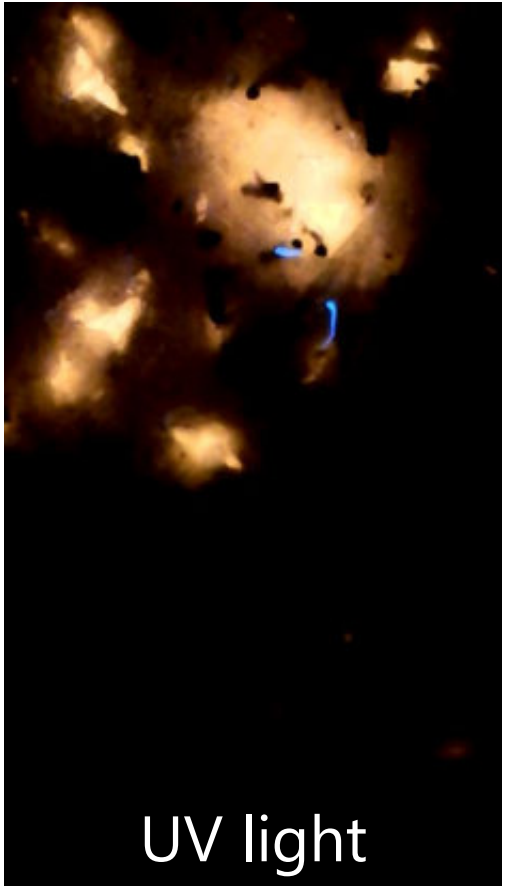
Article text:
"these patches are almost entirely made up of tiny bits of plastic, called microplastics."

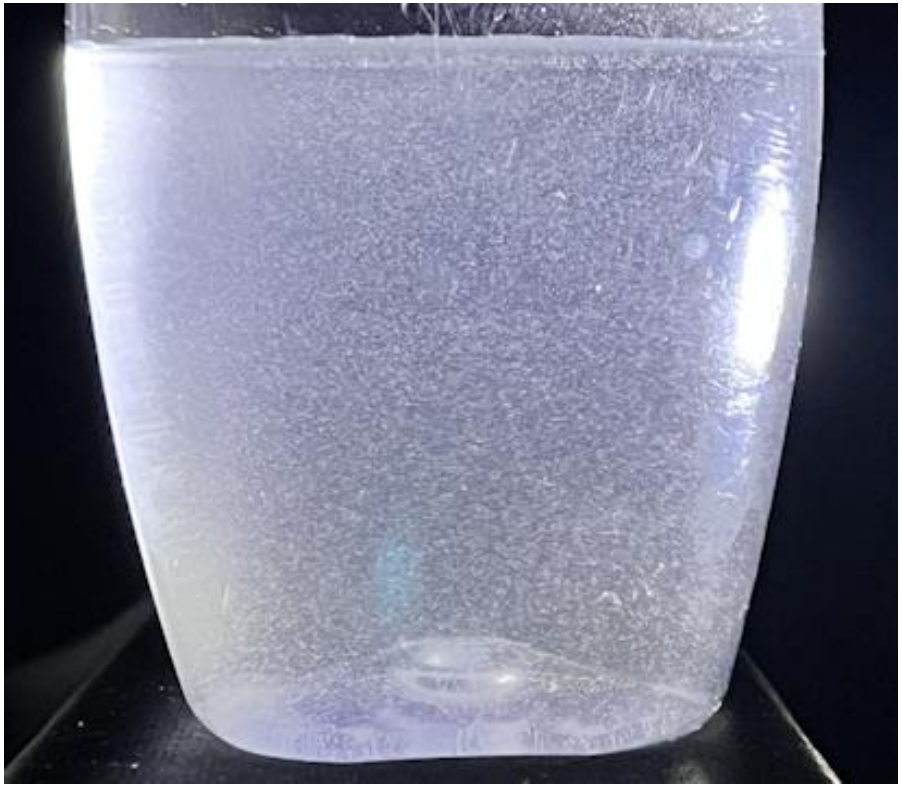
http://b.parsons.edu/~pany468/parsons/political_website/source2/index.html


Oyashio
Bering
Alaska
North Pacific
Kuroshio
CONVERGENCE ZONE
California
Area of "recirculation gyre" or Western Pacific garbage patch
Hawaiian Archipelago
Area of the North Pacific Subtropical High or Eastern Pacific garbage patch
North Equatorial
Equatorial Countercurrent
South Equatorial
NOAA
www.MarineDebris.noaa.gov

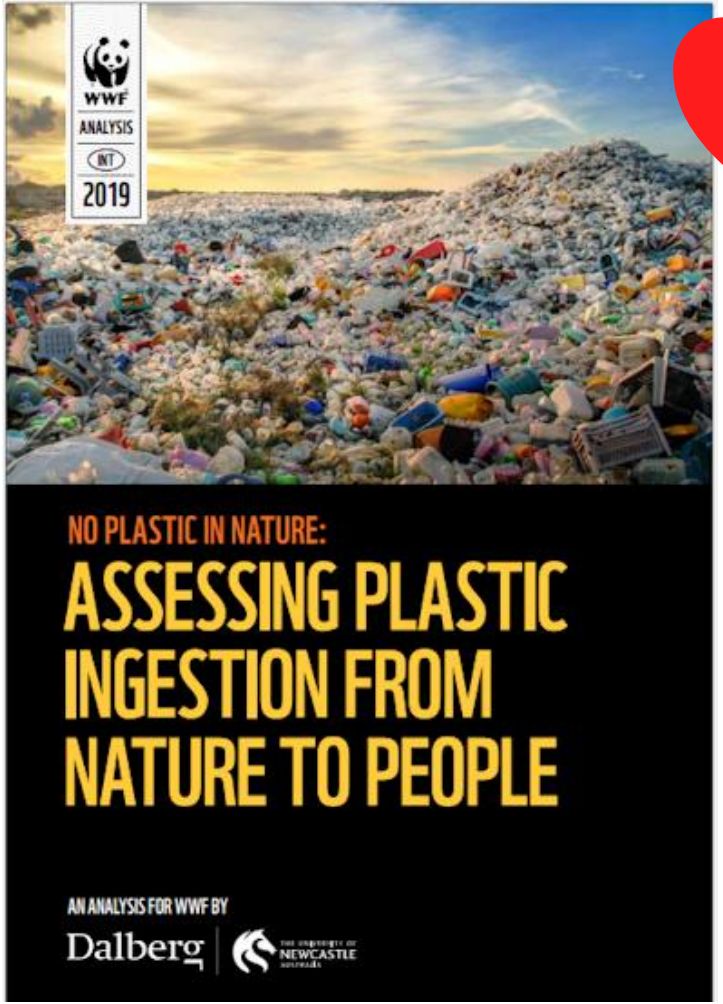

These are syenite, likely from near Marathon, ON.
They contain sodalite with some sulfide content.
Transported by glaciers, I find them in Michigan,
at night.
UV light
(365 nm filtered)


visible light


UV light



initial estimate ~0.17 g/L 200 mesh
measured <0.05 g/L



"A new study by the University of Newcastle, Australia suggests that an average person could be ingesting approximately 5 grams of plastic every week. The equivalent of a credit card's worth of microplastics. This summary report highlights the key ways plastic gets into our body, and what we can do about it."

wwfint.awsassets.panda.org/downloads/plastic_ingestion_web_spreads.pdf

wwf.panda.org/wwf_news/?348337/Revealed-plastic-ingestion-by-people-could-be-equating-to-a-credit-card-a-week

Journal of Hazardous Materials 404 (2021) 124004

Contents lists available at ScienceDirect

Journal of Hazardous Materials

journal homepage: www.elsevier.com/locate/jhazmat

Research paper

Estimation of the mass of microplastics ingested – A pivotal first step towards human health risk assessment

Kala Senathirajah [a], Simon Attwood [b], Geetika Bhagwat [c], Maddison Carbery [c], Scott Wilson [d], Thava Palanisami [a,*]

[a] Global Innovative Centre for Advanced Nanomaterials(GICAN), Faculty of Engineering and Built Environment, The University of Newcastle, Callaghan, NSW 2308, Australia
[b] The World Wide Fund for Nature (WWF), 354 Tanglin Road, Singapore, Singapore
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[d] Department of Environmental Science, Macquarie University, Sydney, Australia

ARTICLE INFO

Keywords:
Exposure pathways
Human health
Ingestion
Microplastics
Plastic pollution
Risk

ABSTRACT

The ubiquitous presence of microplastics in the food web has been established. However, the mass of microplastics exposure to humans is not defined, impeding the human health risk assessment. Our objectives were to extract the data from the available evidence on the number and mass of microplastics from various sources, to determine the uncertainties in the existing data, to set future research directions, and derive a global average rate of microplastic ingestion to assist in the development of human health risk assessments and effective management and policy options. To enable the comparison of microplastics exposure across a range of sources, data extraction and standardization was coupled with the adoption of conservative assumptions. Following the analysis of data from fifty-nine publications, an average mass for individual microplastics in the 0–1 mm size range was calculated. Subsequently, we estimated that globally on average, humans may ingest 0.1–5 g of microplastics weekly through various exposure pathways. This was the first attempt to transform microplastic counts into a mass value relevant to human toxicology. The determination of an ingestion rate is fundamental to assess the human health risks of microplastic ingestion. These findings will contribute to future human health risk assessment frameworks.

> “humans may ingest 0.1-5 g of microplastics weekly through various exposure pathways”

https://doi.org/10.1016/j.jhazmat.2020.124004

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Figure 2: Estimated microplastics ingested through consumption of common foods and beverages (particles (0-1mm) per week)

per week

whole card = 5 g

Observable
1769 particles/ 7L

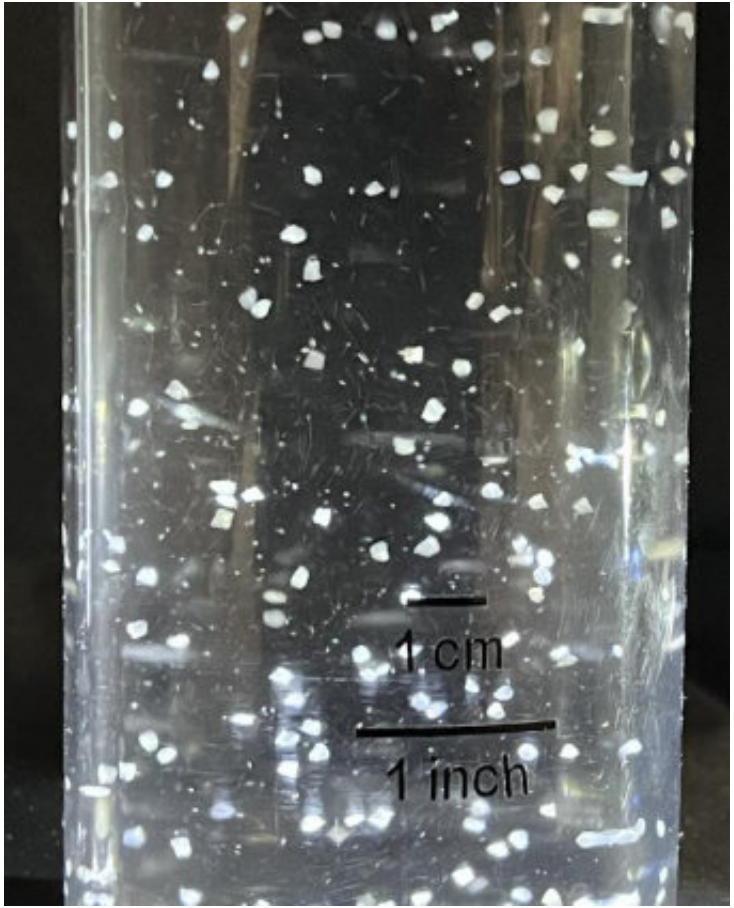
253 particles/L

Calculated
~4.5 g/ 7L

~0.6 g/L

~1.5 mm diameter PET sphere

Plastic microparticles, 0.65 grams consisting of 253 particles, in a liter of water equaling the concentration in order to ingest 5 grams per week. Such a high concentration is easily seen both in water and upon drying. The particles are cut from 1.5 mm plastic monofilament.



Environmental Science & Technology

pubs.acs.org/est

Article

Lifetime Accumulation of Microplastic in Children and Adults

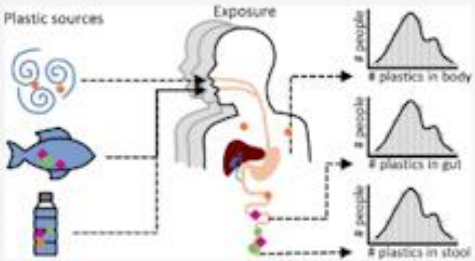
Nur Hazimah Mohamed Nor,* Merel Kooi, Noël J. Diepens, and Albert A. Koelmans

Cite This: *Environ. Sci. Technol.* 2021, 55, 5084−5096

Read Online

ACCESS | Metrics & More | Article Recommendations | Supporting Information

ABSTRACT: Human exposure to microplastic is recognized as a global problem, but the uncertainty, variability, and lifetime accumulation are unresolved. We provide a probabilistic lifetime exposure model for children and adults, which accounts for intake via eight food types and inhalation, intestinal absorption, biliary excretion, and plastic-associated chemical exposure via a physiologically based pharmacokinetic submodel. The model probabilistically simulates microplastic concentrations in the gut, body tissue, and stool, the latter allowing validation against empirical data. Rescaling methods were used to ensure comparability between microplastic abundance data. Microplastic (1−5000 μm) median intake rates are 553 particles/capita/day (184 ng/capita/day) and 883 particles/capita/day (583 ng/capita/day) for children and adults, respectively. This intake can irreversibly accumulate to 8.32×10^3 (90% CI, 7.08×10^2−1.91×10^6) particles/capita or 6.4 (90% CI, 0.1−2.31×10^3) ng/capita for children until age 18, and up to 5.01×10^4 (90% CI, 5.25×10^3−9.33×10^6) particles/capita or 40.7 (90% CI, 0.8−9.85×10^3) ng/capita for adults until age 70 in the body tissue for 1−10 μm particles. Simulated microplastic concentrations in stool agree with empirical data. Chemical absorption from food and ingested microplastic of the nine intake media based on biphasic, reversible, and size-specific sorption kinetics, reveals that the contribution of microplastics to total chemical intake is small. The as-yet-unknown contributions of other food types are discussed in light of future research needs.



883 particles per person per day

583 ng/person/day

4 µg per week

https://pubs.acs.org/doi/full/10.1021/acs.est.0c07384

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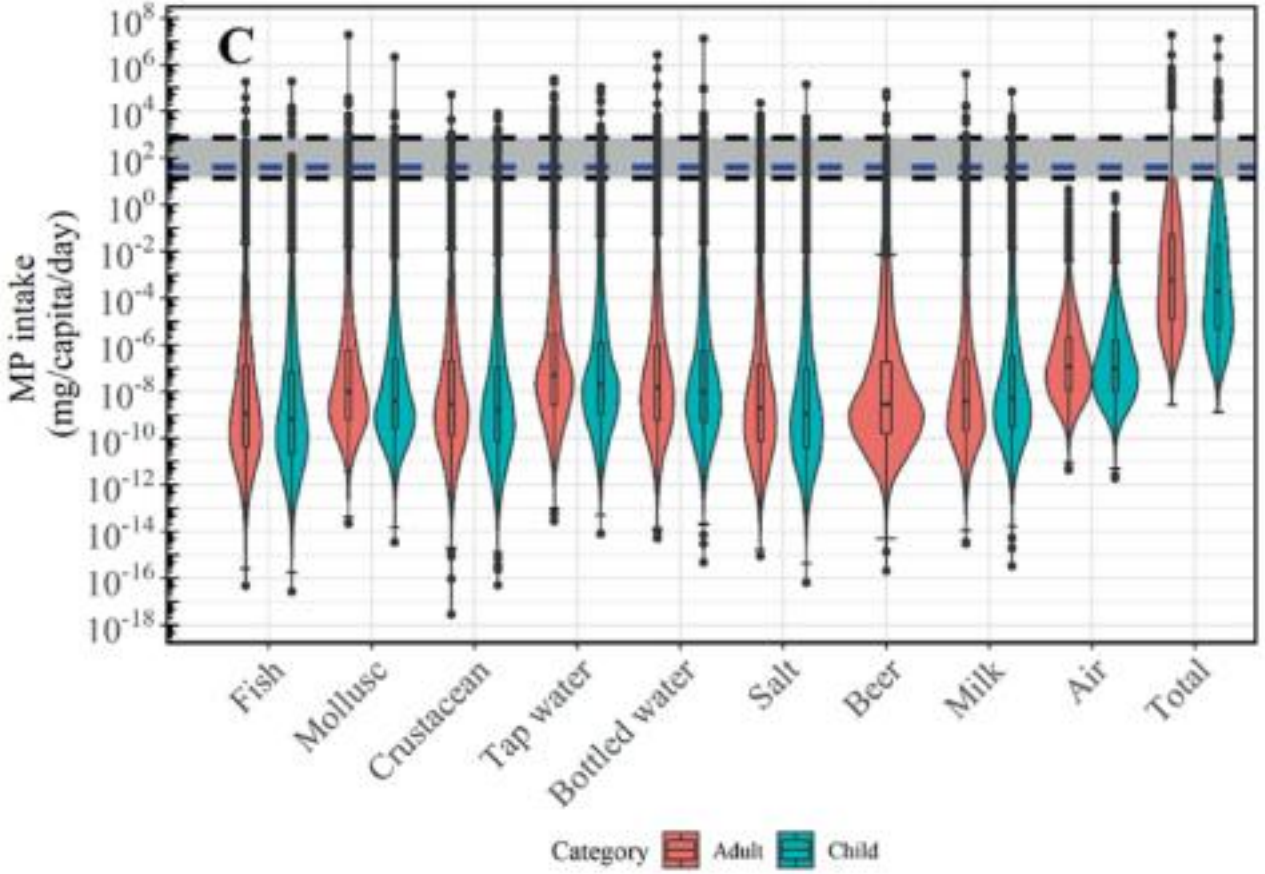


https://pubs.acs.org/doi/full/10.1021/acs.est.0c07384

Bert Koelmans makes point that a week's ingestion is like a grain of salt between chopsticks – mere micrograms.

Journal of Hazardous Materials Letters 3 (2022) 100071

Contents lists available at ScienceDirect

Journal of Hazardous Materials Letters

journal homepage: www.sciencedirect.com/journal/journal-of-hazardous-materials-letters

Ingested microplastics: Do humans eat one credit card per week?

Martin Pletz

Designing Plastics and Composite Materials, Department of Polymer Engineering and Science, Montanuniversitaet Leoben, Austria

ARTICLE INFO

Keywords:
Microplastics
Size distribution
Ingestion
Human health

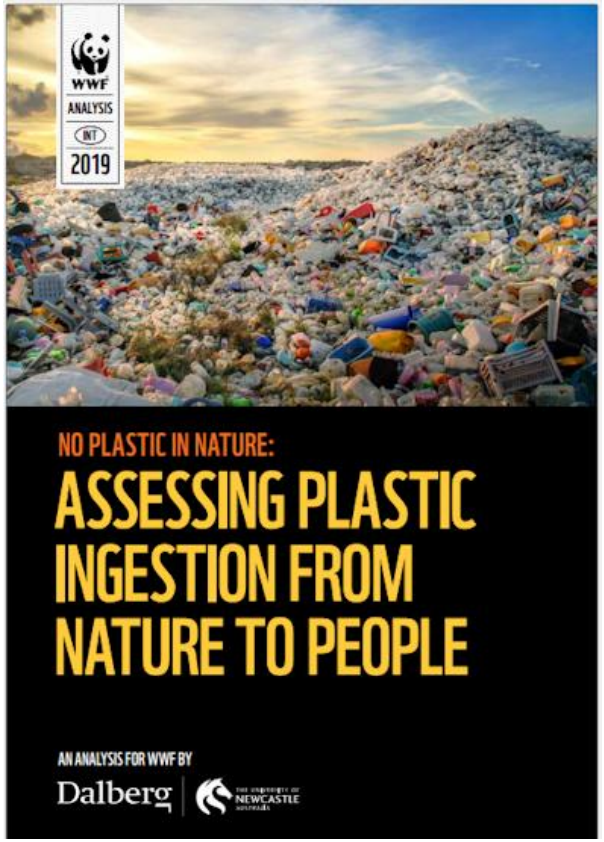
ABSTRACT

Ingested Microplastic (MP) particles can harm the human body. Estimations of the total mass of ingested MP particles correspond to 50 plastic bags per year (Bai et al., 2022), one credit card per week (Gruber et al., 2022), or a median value of 4.1 μg/week for adults (Mohamed Nor et al., 2021). The first two estimations are based on an analysis (Senathirajah et al., 2021) that predicts a total ingested mass of MP particles $m_{i,MP}$ of 0.1–5 g/week. This work revisits and evaluates this calculation and compares its results and methods to Mohamed Nor et al. (2021). Senathirajah combines data of averaged MP particle masses $\bar{m}_{MP}$ from papers that reported MP particle sizes and MP particle counts n_{MP} in shellfish, salt, beer, and water based on other papers that detected MP particles. Combined with the estimated weekly consumption of those consumables, they compute $m_{i,MP}$. This work raises some serious issues of Senathirajah in the way they combine data and they obtained particle sizes. It concludes that Senathirajah overestimates $m_{i,MP}$ by several orders of magnitude and that $m_{i,MP}$ can be considered as a rather irrelevant factor for the toxic effects of MP particles on the human body.

> a human eats a credit card worth of MPs not every week but every 23 thousand years.

https://www.sciencedirect.com/science/article/pii/S2666911022000247?via%3Dihub

Errors



> an average person could be ingesting approximately 5 grams of plastic every week.

- got diameter wrong
  - weight even more wrong
- reported as if statistical when actually different models

wwfint.awsassets.panda.org/downloads/plastic_ingestion_web_spreads.pdf

R&D WORLD

Microplastics are bad, but ignoring science is worse

By Mark Jones | March 20, 2024

We all know that 98.6° F is human body temperature … only it isn't. A new study reconfirms something extensively covered during the COVID pandemic: Normal human body temperature falls between 97.3° and 98.2° F — with 97.9° F as today's average.

And 5 grams per week is the amount of plastic every person consumes … only it isn't. Like outdated body-temperature assertions, this 5-g value (widely reported in many science and news circles) is flawed. The difference is that data manipulation and memes didn't give us the 98.6° F value … but they did help propel the 5-g-of-plastic assertion. It has shaken my faith in the scientific community.

Now, the world widely accepts the average person consumes 5 g of plastic per week — the weight of a credit card. Thanks to one now-quite-famous picture of a credit card between two chopsticks, a credit card's worth of plastic is now widely quoted unit for measuring microplastic exposure. In a 2023 article, National Geographic authors parrot the refrain: **Researchers estimate we unwittingly consume a credit card's weight in plastic each week**. Likewise, California Attorney General Rob Bonta (currently driving a lawsuit against the plastics industry) has stated, "**Every week, we consume the**

This is a World Wildlife Federation graphic from 2019 promoting a faulty assertion. Image: Grey.

> Models need to be tested to see if the results match the inputs. Checking the model results against the inputs shows the model giving 5 g per week is impossible.

Does it matter that 5 grams per week is wrong?

Journal of Hazardous Materials 404 (2021) 124004

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journal homepage: www.elsevier.com/locate/jhazmat

Research paper

Estimation of the mass of microplastics ingested – A pivotal first step towards human health risk assessment

Kala Senathirajah [a], Simon Attwood [b], Geetika Bhagwat [c], Maddison Carbery [c], Scott Wilson [d], Thava Palanisami [a,*]

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[d] Department of Environmental Science, Macquarie University, Sydney, Australia

https://doi.org/10.1016/j.jhazmat.2020.124004

Exposure and Health (2023) 15:33–51
https://doi.org/10.1007/s12403-022-00470-8

REVIEW PAPER

To Waste or Not to Waste: Questioning Potential Health Risks of Micro- and Nanoplastics with a Focus on Their Ingestion and Potential Carcinogenicity

Elisabeth S. Gruber[1] · Vanessa Stadlbauer[2,3] · Verena Pichler[4] · Katharina Resch-Fauster[5] · Andrea Todorovic[5] · Thomas C. Meisel[6] · Sibylle Trawoeger[7] · Oldamur Hollóczki[8] · Suzanne D. Turner[9,10] · Wolfgang Wadsak[3,11] · A. Dick Vethaak[12,13] · Lukas Kenner[3,14,15,16]

Received: 8 October 2021 / Revised: 30 December 2021 / Accepted: 11 February 2022 / Published online: 22 March 2022

Abstract
Micro- and nanoplastics (MNPs) are recognized as emerging contaminants, especially in food, with unknown health significance. MNPs passing through the gastrointestinal tract have been brought in context with disruption of the gut microbiome. Several molecular mechanisms have been described to facilitate tissue uptake of MNPs, which then are involved in local inflammatory and immune responses. Furthermore, MNPs can act as potential transporters ("vectors") of contaminants and as chemosensitizers for toxic substances ("Trojan Horse effect"). In this review, we summarize current multidisciplinary knowledge of ingested MNPs and their potential adverse health effects. We discuss new insights into analytical and molecular modeling tools to help us better understand the local deposition and uptake of MNPs that might drive carcinogenic signaling. We present bioethical insights to basically re-consider the "culture of consumerism." Finally, we map out prominent research questions in accordance with the Sustainable Development Goals of the United Nations.

Keywords Microplastic · Nanoplastic · Carcinogenesis · Human health · Bioethics issue

"Translated into more imaginable numbers, on average we ingest five grams of MPs per week per person (roughly corresponding to the mass of a credit card)."

https://link.springer.com/article/10.1007/s12403-022-00470-8

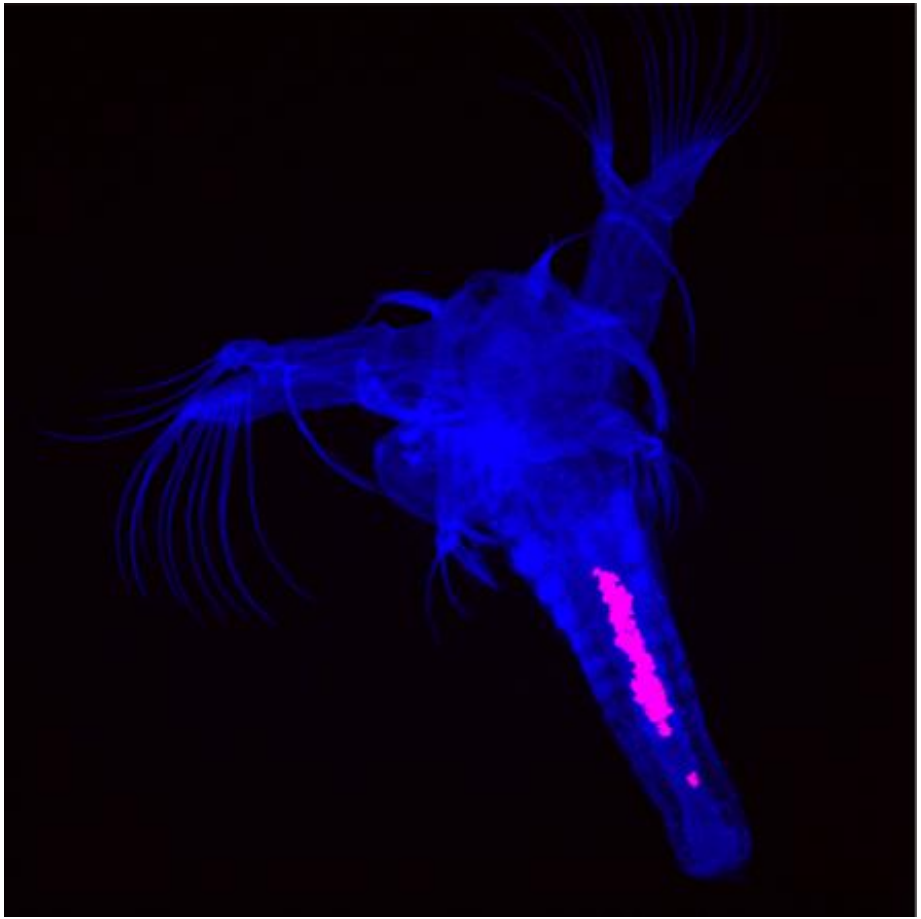

Figure 6. Image of polyurethane microplastics (<53µm) ingested by brine shrimp nauplii (Artemia sp., length ~500µm). Microplastics were present at a concentration of 100 mg/L. Fluorescent microplastics (pink) are evident at a high density within the shrimp's digestive tract. These were egested within 48 hr after cessation of exposure. *Some of the additives within the microplastics likely leached out of the plastic during its residence in the digestive tract and exposure water (see Figure 8).* Imaged on an OlympusFV1200 laser scanning confocal microscope. Credit: Hamish Small (VIMS) and Virginia Worrell (Virginia Governor's School).

Hale, Robert C., Meredith E. Seeley, Mark J. La Guardia, Lei Mai, and Eddy Y. Zeng. "A global perspective on microplastics." Journal of Geophysical Research: Oceans 125, no. 1 (2020): e2018JC014719. https://doi.org/10.1029/2018JC014719


UN Global Plastics Treaty

Streamed live on Apr 28, 2022

California Attorney General Rob Bonta makes a major announcement on the California Department of Justice's efforts to protect the environment from plastic pollution.

https://www.youtube.com/watch?v=fhaURS9U04s

ENVIRONMENTAL Science & Technology

pubs.acs.org/est

Cutting Boards: An Overlooked Source of Microplastics in Human Food?

Himani Yadav, Md Rakib Hasan Khan, Mohiuddin Quadir, Kelly A. Rusch, Partho Pritom Mondal, Megan Orr, Elvis Genbo Xu, and Syeed Md Iskander*

Cite This: Environ. Sci. Technol. 2023, 57, 8225−8235

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ABSTRACT: Plastic cutting boards are a potentially significant source of microplastics in human food. Thus, we investigated the impact of chopping styles and board materials on microplastics released during chopping. As chopping progressed, the effects of chopping styles on microplastic release became evident. The mass and number of microplastics released from polypropylene chopping boards were greater than polyethylene by 5−60% and 14−71%, respectively. Chopping on polyethylene boards was associated with a greater release of microplastics with a vegetable (i.e., carrots) than chopping without carrots. Microplastics showed a broad, bottom-skewed normal distribution, dominated by <100 μm spherical-shaped microplastics. Based on our assumptions, we estimated a per-person annual exposure of 7.4−50.7 g of microplastics from a polyethylene chopping board and 49.5 g of microplastics from a polypropylene chopping board. We further estimated that a person could be exposed to 14.5 to 71.9 million polyethylene microplastics annually, compared to 79.4 million polypropylene microplastics from chopping boards. The preliminary toxicity study of the polyethylene microplastics did not show adverse effects on the viability of mouse fibroblast cells for 72 h. This study identifies plastic chopping boards as a substantial source of microplastics in human food, which requires careful attention.

KEYWORDS: *polyethylene, polypropylene, human exposure, FTIR, toxicity*

DOI: 10.1021/acs.est.3c00924

> “cumulative annual release of 7.4–50.7 g of polyethylene. . . . from a polypropylene chopping board was 49.5 g”

ewg

Who We Are ⌄ Areas of Focus ⌄ Consumer Guides Research News & Insights ⌄

NEWS & INSIGHTS / NEWS / 2023 / 10

Making meals without microplastics: Tips for safer cutting boards

assuming 1 use per day, that's 0.14 g per use

50 grams per year – roughly equivalent to the weight of ten plastic credit cards

https://www.ewg.org/news-insights/news/2023/10/making-meals-without-microplastics-tips-safer-cutting-boards

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nature medicine

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nature > nature medicine > brief communications > article

Brief Communication | Open access | Published: 03 February 2025

Bioaccumulation of microplastics in decedent human brains

Alexander J. Nihart, Marcus A. Garcia, Eliane El Hayek, Rui Liu, Marian Olewine, Josiah D. Kingston, Eliseo F. Castillo, Rama R. Gullapalli, Tamara Howard, Barry Bleske, Justin Scott, Jorge Gonzalez-Estrella, Jessica M. Gross, Michael Spilde, Natalie L. Adolphi, Daniel F. Gallego, Heather S. Jarrell, Gabrielle Dvorscak, Maria E. Zuluaga-Ruiz, Andrew B. West & Matthew J. Campen

Nature Medicine **31**, 1114–1119 (2025) | Cite this article

An Author Correction to this article was published on 31 March 2025

This article has been updated

average 2024 brain with 4.763 mg plastic per gram of brain tissue

~ 7 g of plastic per brain

The Human Brain May Contain as Much as a Spoon's Worth of Microplastics, New Research Suggests

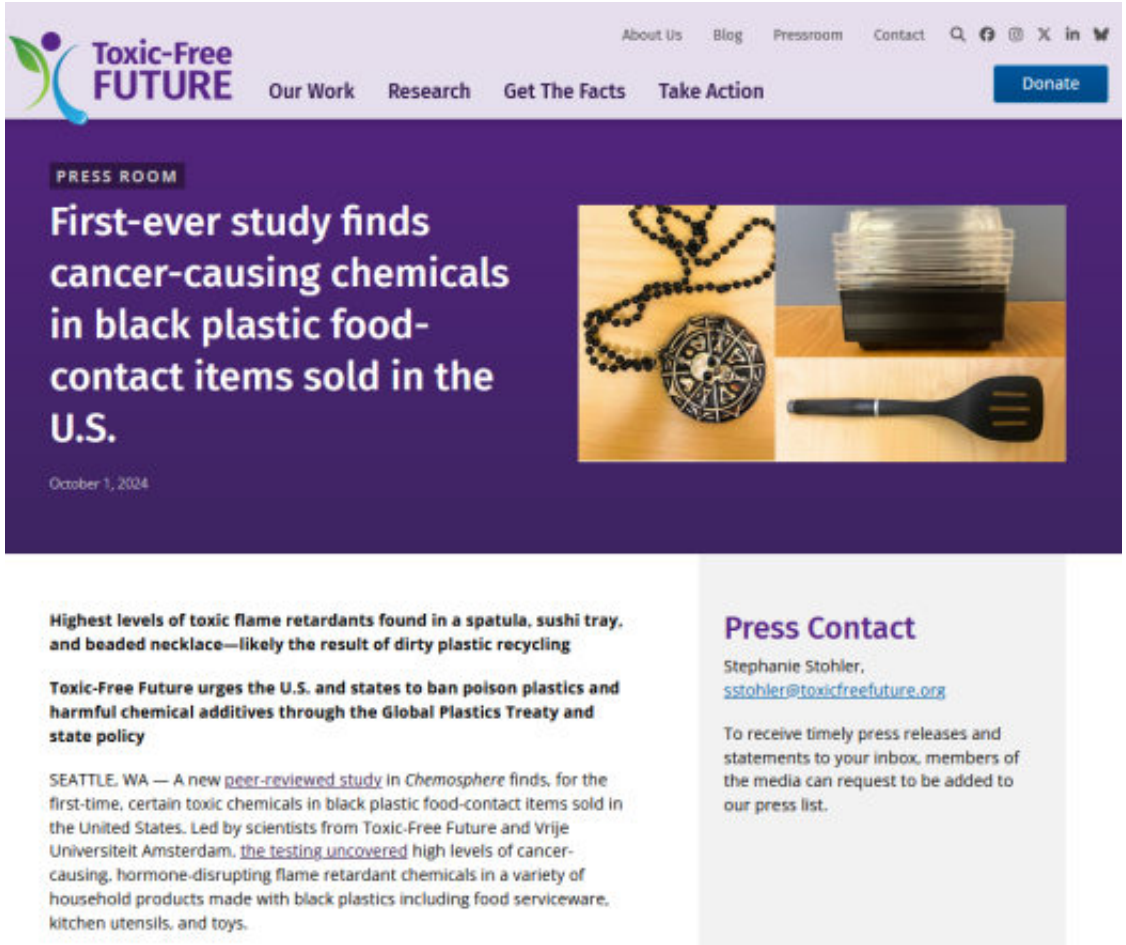
The amount of microplastics in the human brain appears to be increasing over time: Concentrations rose by roughly 50 percent between 2016 and 2024, according to a new study

Sarah Kuta - Daily Correspondent
February 4, 2025

FRONTIER LAB

Pyrolysis-GC/MS System for Microplastics Analysis

Picasso, 1955



Toxic-Free FUTURE

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PRESS ROOM

First-ever study finds cancer-causing chemicals in black plastic food-contact items sold in the U.S.

October 1, 2024

Highest levels of toxic flame retardants found in a spatula, sushi tray, and beaded necklace—likely the result of dirty plastic recycling

Toxic-Free Future urges the U.S. and states to ban poison plastics and harmful chemical additives through the Global Plastics Treaty and state policy

SEATTLE, WA — A new peer-reviewed study in *Chemosphere* finds, for the first-time, certain toxic chemicals in black plastic food-contact items sold in the United States. Led by scientists from Toxic-Free Future and Vrije Universiteit Amsterdam, the testing uncovered high levels of cancer-causing, hormone-disrupting flame retardant chemicals in a variety of household products made with black plastics including food serviceware, kitchen utensils, and toys.

Press Contact

Stephanie Stohler,
sstohler@toxicfreefuture.org

To receive timely press releases and statements to your inbox, members of the media can request to be added to our press list.

> testing uncovered high levels or cancer-causing, hormone-disrupting flame retardants chemicals in a variety of household products made with black plastics..... Toxic flame retardant chemicals were found in 85% of analyzed products

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R&D WORLD

Pull those black plastic spatulas out of the trash

https://www.rdworldonline.com/pull-those-plastic-spatulas-out-of-the-trash/

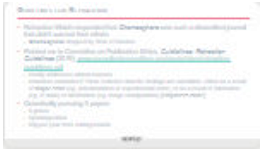
By Mark Jones, Ph.D. | January 23, 2025

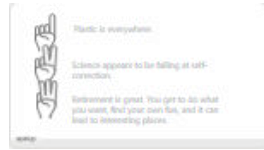
2024 was the year of spatulageddon. Plastic spatulas were trashed due to reports of dangers lurking within. The journal article that raised concern contained an error, **an obvious error**. A **correction was made** but there is more to the story.

[Adobe Stock]

How a recycling study spawned spatula hysteria

The study causing spatulageddon is "**From e-waste to living space:**





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ELSEVIER

Chemosphere

Volume 365, October 2024, 143319

From e-waste to living space: Flame retardants contaminating household items add to concern about plastic recycling

Megan Liu [a], Sicco H. Brandsma [b], Erika Schreder [a]

https://doi.org/10.1016/j.chemosphere.2024.143319

Refers to

Response to the letter to the editor

Chemosphere, Volume 385, September 2025, Pages 144547

Megan Liu, Sicco H. Brandsma, Erika Schreder

Letter to the editor

Chemosphere, Volume 385, September 2025, Pages 144542

Mark E. Jones

Referred to by

Corrigendum to 'From e-waste to living space: Flame retardants contaminating household items add to concern about plastic recycling'...

Chemosphere, Available online 3 July 2025, Pages 144552

Megan Liu, Sicco H. Brandsma, Erika Schreder

Corrigendum to 'From e-waste to living space: Flame retardants contaminating household items add to concern about plastic recycling'...

Chemosphere, Volume 370, February 2025, Pages 143903

Megan Liu, Sicco H. Brandsma, Erika Schreder

Harmful flame retardants (FRs) used in electronics were found in **black plastic household products**—including toys and kitchen utensils—likely due to recycled content.

Presumed FR Source

TBBPA, BDE-209, 2,4,6-TBP, DBDPE, TTBP-TAZ, BDP, RDP, & TPHP are or have been intentionally used in electronics.

FRs Detected

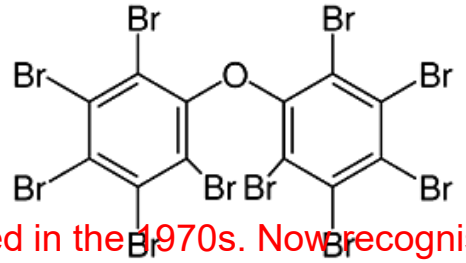
This study found ΣFR concentrations up to 22,790 mg/kg in food serviceware, hair accessories, kitchen utensils, and toys.

- 17 out of 20 products analyzed contained brominated and/or organophosphate FRs. 85%
- Most frequently detected compounds included TBBPA, BDE-209, 2,4,6-TBP, RDP, BDP, and DBDPE.
- Items containing polymers used in electronics had significantly higher FR levels.

Toxic-Free FUTURE VU VRIJE UNIVERSITEIT AMSTERDAM A-LIFE

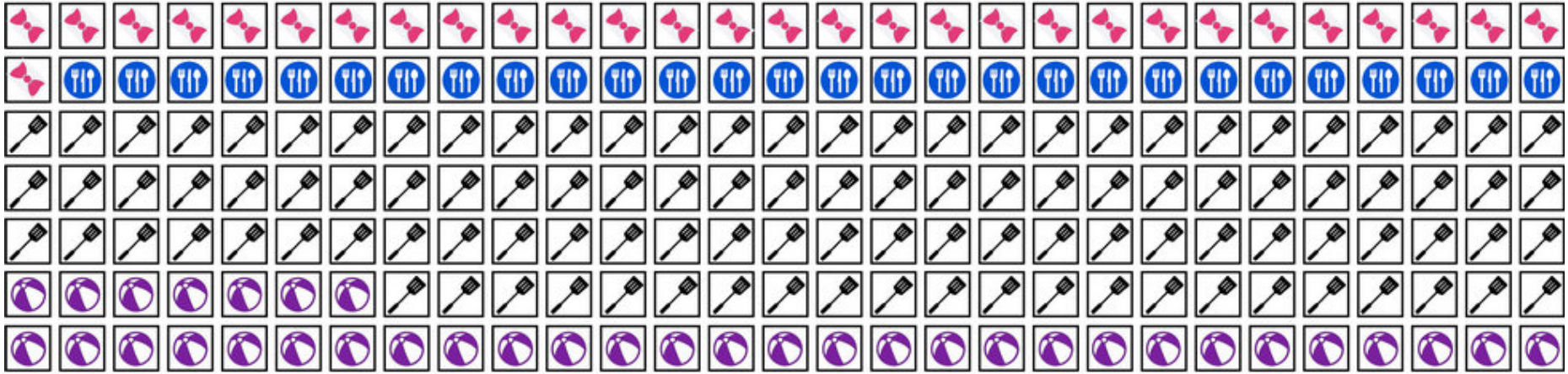
Calculation of Exposure to Brominated Flame Retardants

- Measure concentration present in object
- Use correlation to estimate exposure
- Compare exposure to some “safe” level, such as EPA reference dose
- BDE-209, one of the earliest banned flame retardants, became a focus



BDE-209

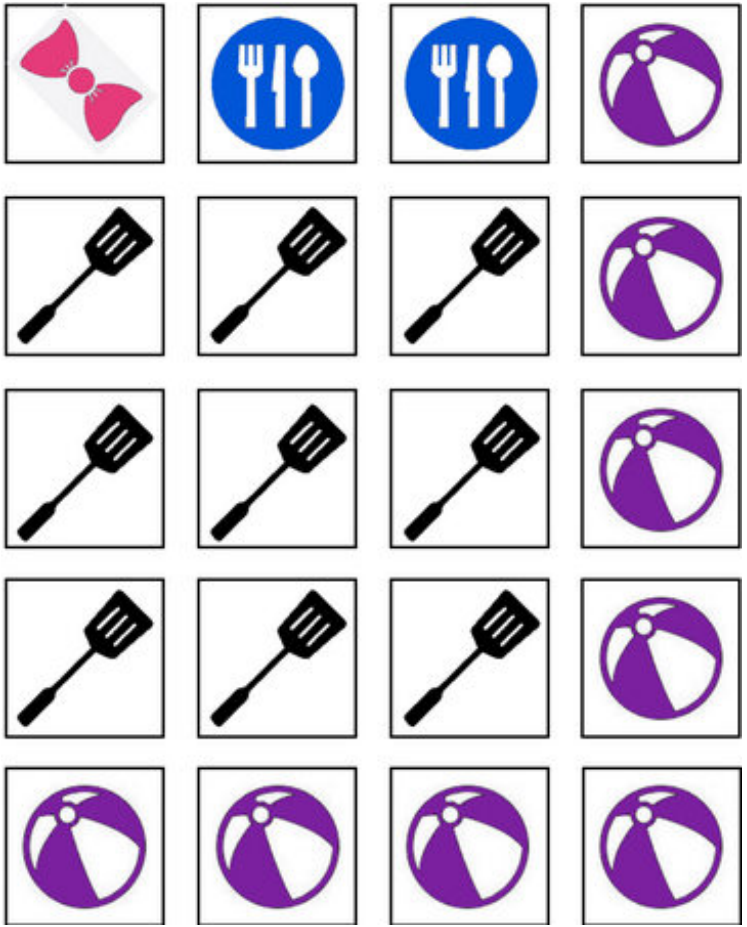
BDE-209 – decabromoether - commercialised in the 1970s. Now recognised as a hazardous and persistent pollutant under 2017 Stockholm Convention on Persistent Organic Pollutants meaning that treaty members must eliminate its production and use.



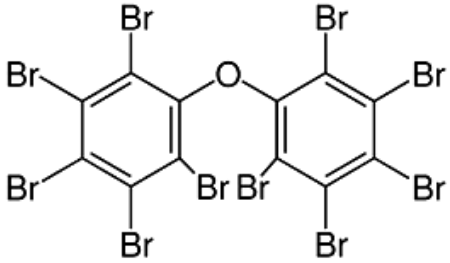
203 total items: 30 hair accessories, 28 food service, 36 toys, 109 kitchen items

XRF analysis

retain only top 20 highest Br levels



Compound-sensitive LC-MS method used to analyze compositions and concentrations present in 20 of the 203 items in the collected cohort, only those with highest Br levels measured by XRF.



BDE-209

reported median value of 34.7μg/day for kitchen items

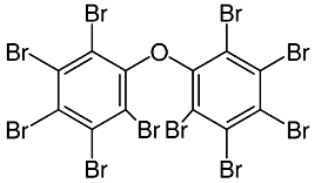
concluded too close to 42μg/day EPA reference dose

but they got it wrong - twice

CORRIGENDUM 1

- Miscalculated the reference dose by 10X
  - reported typical exposure as 42 μg/day rather than the correct value, 420 μg/day
  - last line of the abstract is “estimation of exposure to BDE-209 from contaminated kitchen utensils indicated users would have a median intake of 34,700 ng/day, exceeding estimates for intake from dust and diet.” was never true; now even more not true
- Authors stand by the paper’s conclusions

showing BDE-209 in ug/day



BDE-209

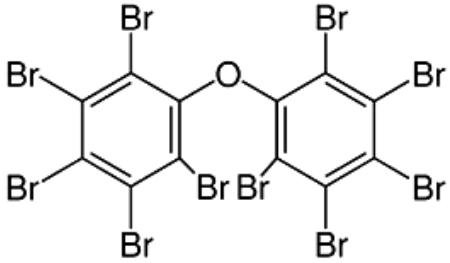
reported median value of 34.7μg/day

actual median 4.1 μg/day

average is 16 μg/day (24 ignoring BDL

reference dose is 420 μg/day

MJPhD



BDE-209

34.7μg/day is actually the average of all 20 measured samples with BDLs entered as zero

showing BDE-209 in ug/day

It Gets Worse

CORRIGENDUM 2

concentration → correlation → exposure

correlation from Kuang et al. $f(C) = E$

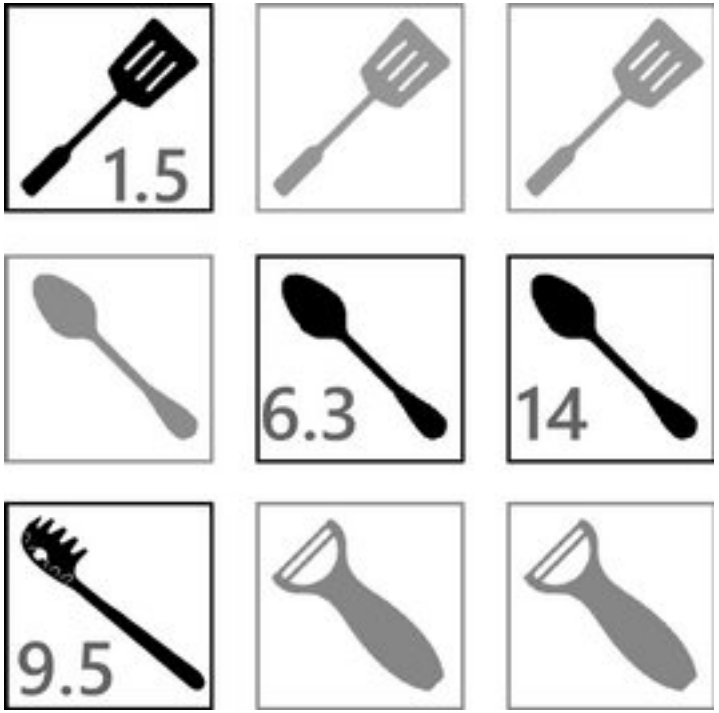
$E \propto C$

for immersion in hot oil for 15 minutes

conclude simple touching creates no exposure

Kuang J, Abdallah MA, Harrad S. Brominated flame retardants in black plastic kitchen utensils: Concentrations and human exposure implications. Science of The Total Environment. 2018 Jan 1;610:1138-46. doi.org/10.1016/j.scitotenv.2017.08.173.

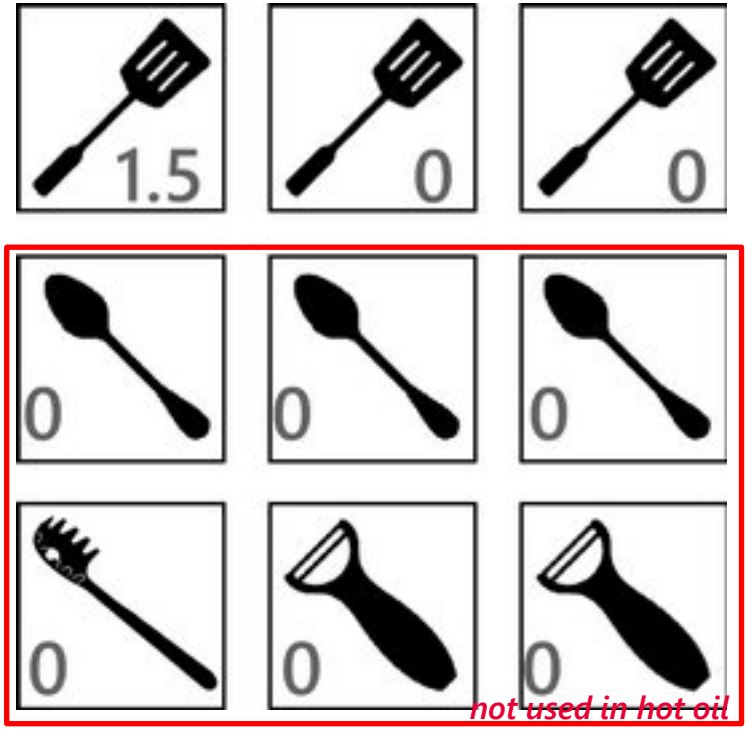
author's treatment



average = 7.9 μg/day (was 34.7)
= 4.5 μg/day ex. peelers

showing BDE-209 in ug/day

more correct



0.17 μg/day = 1.5/9

reference dose is 420 ug/day

MJPhD

would be 4.5 excluding only peelers

even more correct

$$\text{average exposure} = \frac{1.5 \text{ ug/day}}{109 \text{ samples}}$$

$$= 14.5 \text{ ng/day}$$

reference dose is 420,000 ng/day

It Gets Even Worse

In Corrigendum 2, state they only sampled handles.

The KitchenAid spatula shown in the paper has a nylon blade and ABS handle.

average exposure ~0

Egregious Errors

- Incorrectly converted concentration to exposure
  - used an incorrect correlation to determine exposure
    - correlation for leaching when submerged in hot oil used for all items
  - overstated exposure by at least a factor of 800X
- How did they mess up the math?
  - collected 203 items and analyzed by XRD retaining only the 20 highest for their analysis
    - “FRs were found in 85% of analyzed products” while analysis ignored 183 items
  - incorrectly reported median value for kitchen items (only 9 of 20) when the value was average value for all 20 subjected to more thorough analysis
  - second correction ignores all samples below the detection limit
- They didn’t sample the parts touching hot oil
  - exposures are correctly zero!
- Authors stand by the paper’s conclusions

Guidelines for Retraction

- Retraction Watch responded that *Chemosphere* was such a discredited journal that didn't warrant their efforts
  - *Chemosphere* dropped by Web of Science
- Pointed me to Committee on Publication Ethics, *Guidlelines: Retraction Guidelines* (2019). www.councilscienceeditors.org/assets/docs/retraction-guidelines.pdf
  - mostly addresses ethical reasons
  - retraction warranted if "clear evidence that the findings are unreliable, either as a result of **major error** (eg, miscalculation or experimental error), or as a result of fabrication (eg, of data) or falsification (eg, image manipulation) [**emphasis mine**]

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Article correction | Expressions of concern | Article withdrawal | Article retraction | Article removal | Article

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Elsevier recognizes the importance of the integrity and completeness of the scholarly record to the scientific community and attaches the highest importance to maintaining trust in the authority of its published articles.

https://www.elsevier.com/en-gb/about/policies-and-standards/article-withdrawal

Elsevier Guidelines for Retraction

- They have clear evidence that the findings are unreliable, either as a result of major error (e.g., miscalculation or experimental error), or as a result of fabrication (e.g., of data) or falsification (e.g., image manipulation).
- It constitutes plagiarism.
- The findings have previously been published elsewhere and the authors have failed to provide proper attribution to previous sources or disclosure to the editor, permission to republish, or justification (i.e. redundant publication).
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- There is evidence of any other breach of the journal's publishing policies and the editor has therefore lost confidence in the validity or integrity of the article.

Chemosphere 385 (2025) 144542

Contents lists available at ScienceDirect

Chemosphere

journal homepage: www.elsevier.com/locate/chemosphere

Letter to the editor

Dear Chemosphere Editors,

The two corrections born by the paper "From e-waste to living space: Flame retardants contaminating household items add to concern about plastic recycling" (Liu et al., 2024), still fail to completely correct the math and methodological errors present in the study. The restated median potential exposures in the second corrigendum are still overstated. The errors are sufficient to warrant a restating of the abstract, sections of the paper and conclusions, if not a retraction. The results show that, while there is potential for contamination coming from recycled content, the levels of phased-out flame retardants are low and the chance for significant exposure is similarly low.

The paper states that the reason for the study was "to determine whether black plastic household products sold on the U.S. market contained emerging and phased-out flame retardants (FRs) and whether polymer type was predictive of contamination." The abstract and math work. Calculated exposure was only 80 % of the reference does. Corrigendum 1 reduced the exposure to only 8%, deemed insufficient to retract the study. The value reported for exposure, 34,700 ng/day has layers of errors. It is reported as the median intake from kitchen utensils. It is, in fact, the mean of all 20 samples subjected to MS analysis. These samples include hair care, toy and serving ware. The second correction lowers this dose to 7.9 μg/day, less than 2 % of the expected intake from dust and diet. These errors were again deemed insufficient to retract the study. Analysis presented here show the value is 527 ng/day or lower, over 65 times lower than the original report and approximately 0.1 % of the intake from dust and diet. The measured value is now 800 times lower than the expected intake. This constitutes a major methodological and mathematical error. A major restatement of the abstract, conclusions and several sections of the paper is required, if not a full retraction of the study.

ELSEVIER

Chemosphere

Volume 365, October 2024, 143319

From e-waste to living space: Flame retardants contaminating household items add to concern about plastic recycling

Megan Liu [a], Sicco H. Brandsma [b], Erika Schreder [a]

https://doi.org/10.1016/j.chemosphere.2024.143319

Refers to

Response to the letter to the editor

Chemosphere, Volume 385, September 2025, Pages 144547

Megan Liu, Sicco H. Brandsma, Erika Schreder

Letter to the editor

Chemosphere, Volume 385, September 2025, Pages 144542

Mark E. Jones

Referred to by

Corrigendum to 'From e-waste to living space: Flame retardants contaminating household items add to concern about plastic recycling'...

Chemosphere, Available online 3 July 2025, Pages 144552

Megan Liu, Sicco H. Brandsma, Erika Schreder

Corrigendum to 'From e-waste to living space: Flame retardants contaminating household items add to concern about plastic recycling'...

Chemosphere, Volume 370, February 2025, Pages 143903

Megan Liu, Sicco H. Brandsma, Erika Schreder

Conclusion

These results show that when toxic additives are used in plastic, they can significantly contaminate products made with recycled content, that do not even require flame retardancy. Products found in this study to contain hazardous flame retardants included items with high exposure potential, including food-contact items as well as toys. Regulatory bodies have begun to address the use of certain classes of flame retardants but more regulation is needed to end the use of hazardous additives and ensure that replacements are made with safer materials and chemicals.

Conclusion – If I Got To Reword It

These results show that previously used plastic additives can contaminate products made today with recycled content, even when those products do not require flame retardancy. Products were found in this study to contain hazardous flame retardants, including food-contact items as well as toys. Most products did not contain significant levels and those that did are unlikely to result in a significant additional exposure. This study shows that that current practice is responsibly keeping flame retardant chemicals out of applications where exposure is likely.

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From e-waste to living space: Flame retardants contaminating household items add to concern about plastic recycling

Chemosphere (2024) - 4 Comments
doi: 10.1016/j.chemosphere.2024.143319 issn: 0045-6535 pubmed: 39271080 issn: 1879-1298

Megan Liu, Sicco H. Brandsma, Erika Schreder

#1 ***Actinopolyspora biskrensis*** comment accepted December 2024

Some concerns: https://nationalpost.com/news/canada/black-plastic

Correction apparently pending, although I'm not sure I agree with the author's statement:

"However, it is important to note that this does not impact our results," Liu told National Post. "The levels of flame retardants that we found in black plastic household items are still of high concern, and our recommendations remain the same."

Viral paper on black plastic kitchen utensils earns second correction

The authors of a paper that went viral with attention-grabbing headlines urging people to throw out their black plastic kitchen tools have corrected the work for a second time.

But a letter accompanying the correction suggests the latest update still fails "to completely correct the math and methodological errors present in the study," according to Mark Jones, an industrial chemist and consultant who has been following the case. "The errors are sufficient to warrant a restating of the abstract, sections of the paper and conclusions, if not a retraction."

https://mubi.com/en/us/films/and-now-for-something-completely-different

scientific reports

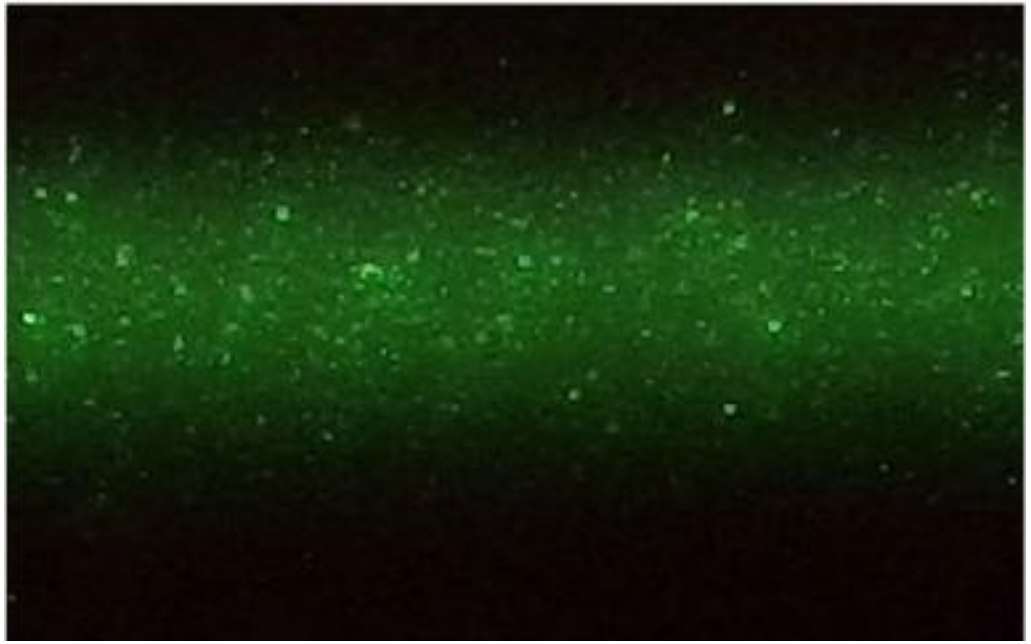
OPEN

Detection of nanoparticles suspended in a light scattering medium

Yan Ye[1,2✉] & David Y. H. Pui[2]

Intentionally intensifying the light scattering of medium molecules can allow the detection of suspended nanoparticles under conditions not suitable for conventional optical microscopies or laser particle counters. Here, we demonstrate how the collective light scattering of medium molecules and nanoparticles is imaged in response to the power, frequency, and oscillating direction of the incident light wave electric field, and how this response can be used to distinguish between nanoparticles and microparticles, such as viruses or bacteria. Under conditions that the medium light scattering is intensified, suspended nanoparticles appear as magnified shiny moving dots superimposed on the quasi-steady background of medium light scattering. Utilizing the visual enlargement resulted from the enhanced light scattering and possible light interference, we can detect directly suspended nanoparticles that are much smaller than visible light wavelengths even in unopened water bottles or other large containers. This suggests new approaches for detecting nanoparticles with many potential applications.

https://www.nature.com/articles/s41598-021-99768-x



https://www.nature.com/articles/s41598-021-99768-x

Observations and Hypothesis

- Observations:
  - it is impossible to find water free of particles
  - water with the same lot numbers and in the same cases/packages contain different amounts of plastic particles
  - bottles on the outside of cases/packages can, but don't always, contain more particles than those in the center of the case/package
  - there are particles produced from processing equipment present

- Hypothesis: impacts and flexing of polymer containers creates microplastic particles

Water Bottle Abuse

- half-filled commercial water bottle
- drop from approx. 2 feet 1500, 3000 or 4500 times
- use 66 cm diameter, cylindrical, baffled tumbler operating at 50 revolutions per minute
- half-filled to allow more distortion, to overcome centripetal force and to limit equipment damage

Water Bottle Abuse

- set on air dry (no heat)
- operate for 30 minutes for one, two, or three cycles

Abused Water Bottles

6 November 2024

Abuse Options

Abuse Options

- moved to 50 ml per container
- either never completely empty bottle or minimum triple rinse
- 50 mL filled and saved as blank

PET Water Bottles

August 2025

Widely reported facts about plastics and microplastic are wrong.

- exposure is frequently over-reported
- reality checks are omitted

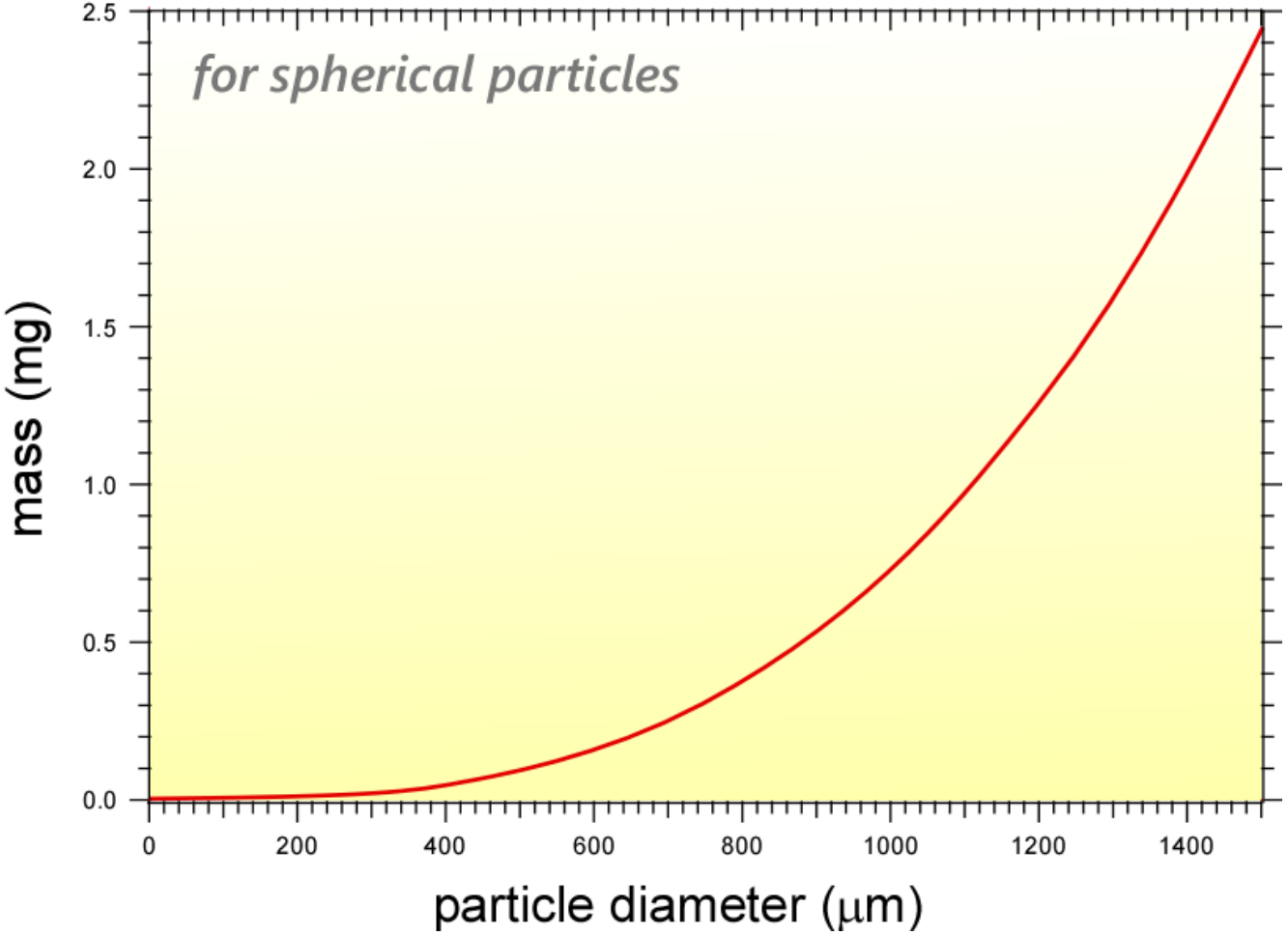
Correction in the scientific literature is slow; correcting public perception even slower.

- retractions don't benefit those directly involved
- zombie facts

There are things you can do.

- support PubPeer and Retraction Watch
- act when you find something wrong

MJPHD.net


for spherical particles
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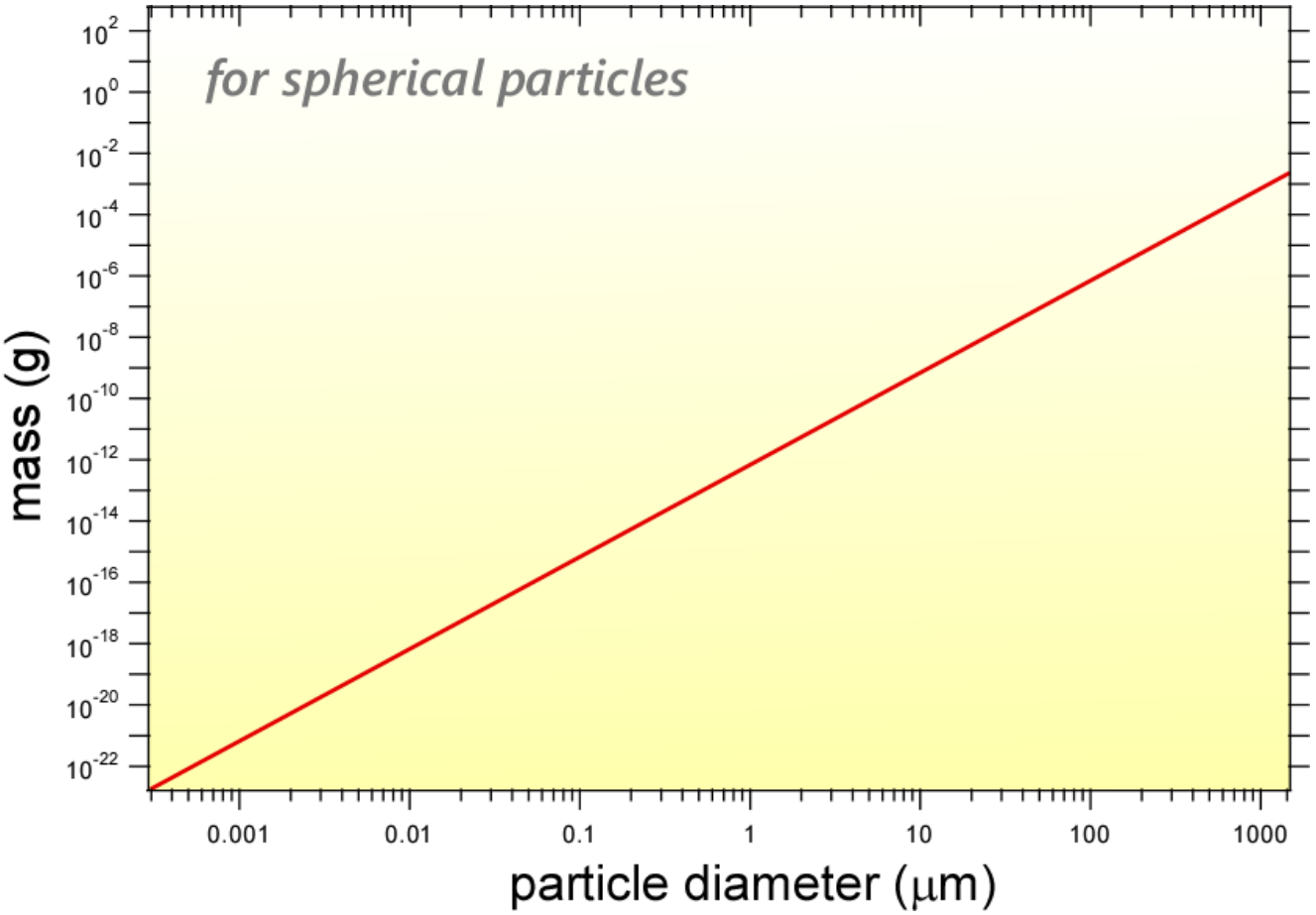
particle diameter (μm)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particle diameter (μm)

Bloomberg US Edition

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Green | Greener Living

Bottled Water Contains More Plastic Particles Than Previously Thought

Researchers found hundreds of thousands of plastic particles in one-liter bottles of water sold in the US, 90% of them small enough to enter the human bloodstream.

https://www.bloomberg.com/news/articles/2024-01-08/bottled-water-contains-previously-undetected-nanoplastics

U.S. ›

Bottled water contains up to 100 times more plastic than previously estimated, new study says

By **Aliza Chasan**
Updated on: January 9, 2024 / 7:52 PM EST / CBS News

Science of the Total Environment 756 (2021) 143470

Contents lists available at ScienceDirect

Science of the Total Environment

journal homepage: www.elsevier.com/locate/scitotenv

Review

Nanomaterials in the environment, human exposure pathway, and health effects: A review

Arindam Malakar [a], Sushil R. Kanel [a,b,*], Chittaranjan Ray [a], Daniel D. Snow [c], Mallikarjuna N. Nadagouda [d]

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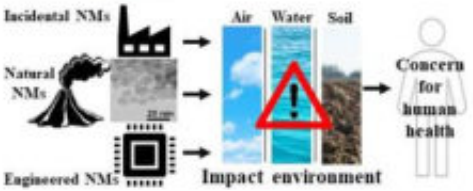
[b] Department of Chemistry, Wright State University, Dayton, OH 45435, USA
[c] School of Natural Resources and Nebraska Water Center, part of the Robert B. Daugherty Water for Food Global Institute, 202 Water Sciences Laboratory, University of Nebraska, Lincoln, NE 68583-0844, USA
[d] Department of Mechanical and Materials Engineering, Wright State University, 3640 Colonel Glenn Hwy., Dayton, OH 45435, USA

HIGHLIGHTS

- The ubiquitous presence of natural and synthetic nanomaterials in the environment
- Nanomaterials influence on the natural ecosystem.
- Exposure pathways and life cycle of nanomaterials in the human body
- Nanotoxicity of nanomaterials on human health

GRAPHICAL ABSTRACT



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ABSTRACT

Nanomaterials (NMs), both natural and synthetic, are produced, transformed, and exported into our environment daily. Natural NMs annual flux to the environment is around 97% of the total and is significantly higher than synthetic NMs. However, synthetic NMs are considered to have a detrimental effect on the environment. The extensive usage of synthetic NMs in different fields, including chemical, engineering, electronics, and medicine, makes them susceptible to be discharged into the atmosphere, various water sources, soil, and landfill waste. As ever-larger quantities of NMs end up in our environment and start interacting with the biota, it is crucial to understand their behavior under various environmental conditions, their exposure pathway, and their health effects on human beings. This review paper comprises a large portion of the latest research on NMs and the environment. The article describes the natural and synthetic NMs, covering both incidental and engineered NMs and their behavior in the natural environment. The review includes a brief discussion on sampling strategies and various analytical tools to study NMs in complex environmental matrices. The interaction of NMs in natural environments and their pathway to human exposure has been summarized. The potential of NMs to impact human health has been elaborated. The nanotoxicological effect of NMs based on their inherent properties concerning to human health is also reviewed. The knowledge gaps and future research needs on NMs are reported. The findings in this paper will be a resource for researchers working on NMs all over the world to understand better the challenges associated with NMs in the natural environment and their human health effects.

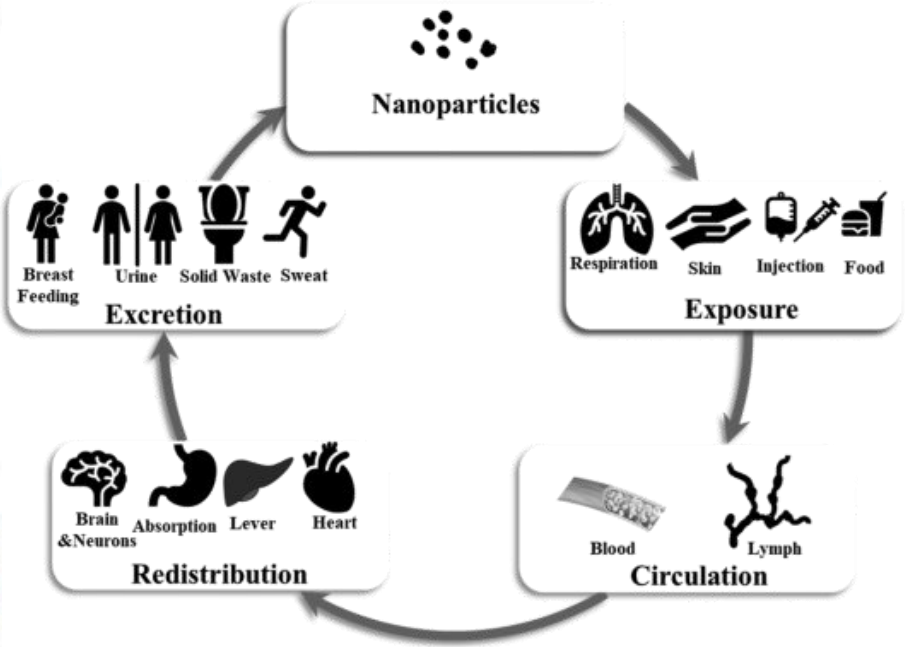


Fig. 7. Exposure pathway, circulation, redistribution, and final excretion of nanomaterials inside the human body.

https://doi.org/10.1016/j.scitotenv.2020.143470

frontiers in Chemistry

ORIGINAL RESEARCH
published: 11 September 2018
doi: 10.3389/fchem.2018.00407

Synthetic Polymer Contamination in Bottled Water

Sherri A. Mason, Victoria G. Welch and Joseph Neratko*

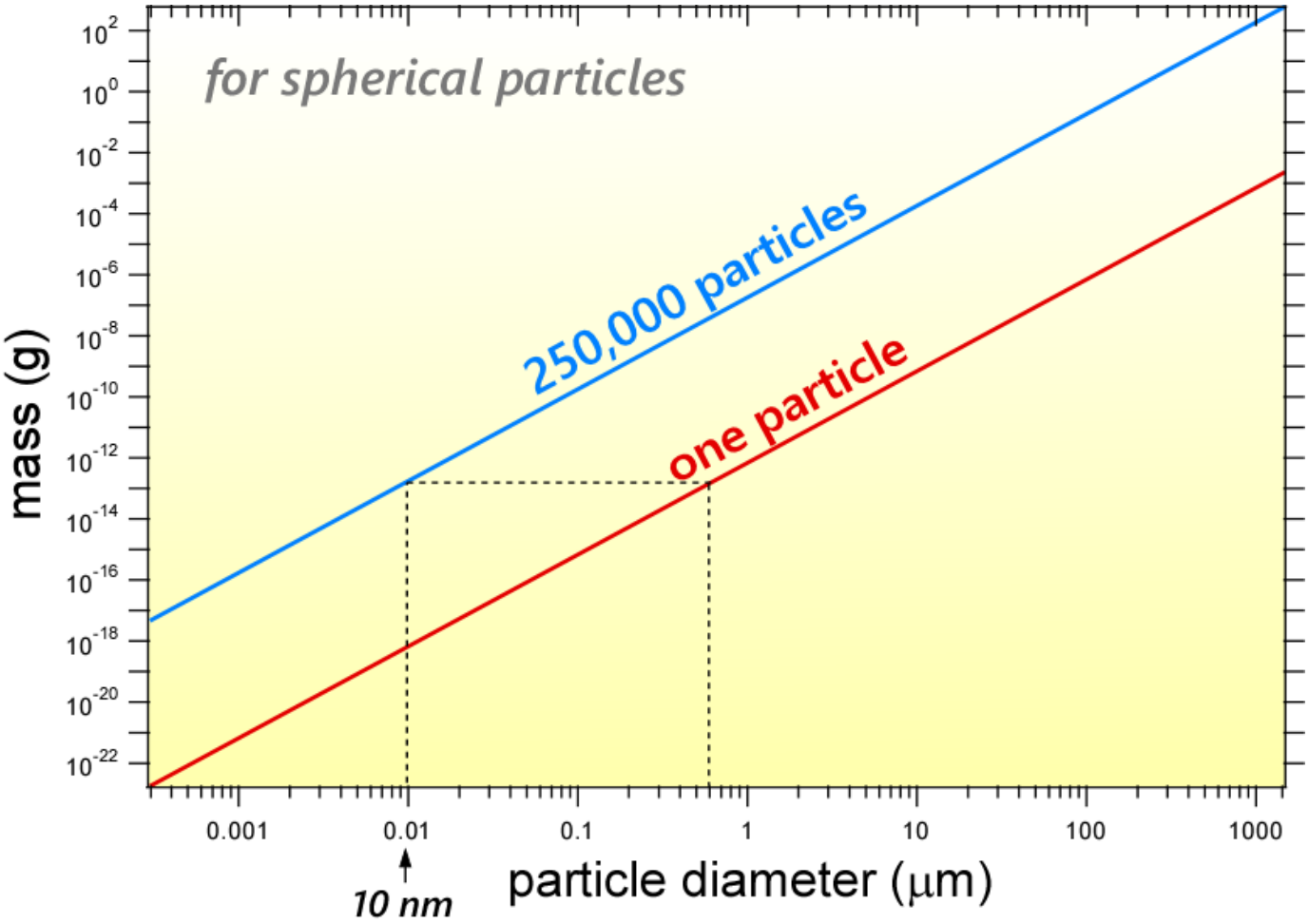
Department of Chemistry, State University of New York at Fredonia, Fredonia, NY, United States

Eleven globally sourced brands of bottled water, purchased in 19 locations in nine different countries, were tested for microplastic contamination using Nile Red tagging. Of the 259 total bottles processed, 93% showed some sign of microplastic contamination. After accounting for possible background (lab) contamination, an average of 10.4 microplastic particles >100 um in size per liter of bottled water processed were found. Fragments were the most common morphology (66%) followed by fibers. Half of these particles were confirmed to be polymeric in nature using FTIR spectroscopy with polypropylene being the most common polymer type (54%), which matches a common plastic used for the manufacture of bottle caps. A small fraction of particles (4%) showed the presence of industrial lubricants. While spectroscopic analysis of particles smaller than 100 um was not possible, the adsorption of the Nile Red dye indicates that these particles are most probably plastic. Including these smaller particles (6.5–100 um), an average of 325 microplastic particles per liter of bottled water was found. Microplastic contamination range of 0 to over 10,000 microplastic particles per liter with 95% of particles being between 6.5 and 100 um in size. Data suggests the contamination is at least partially coming from the packaging and/or the bottling process itself. Given the prevalence of the consumption of bottled water across the globe, the results of this study support the need for further studies on the impacts of micro- and nano- plastics on human health.

OPEN ACCESS

Edited by:
Teresa A.P. Rocha-Santos, University of Aveiro, Portugal

Reviewed by:
Grant Ongley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250,000 particles
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