Valerije Vrček

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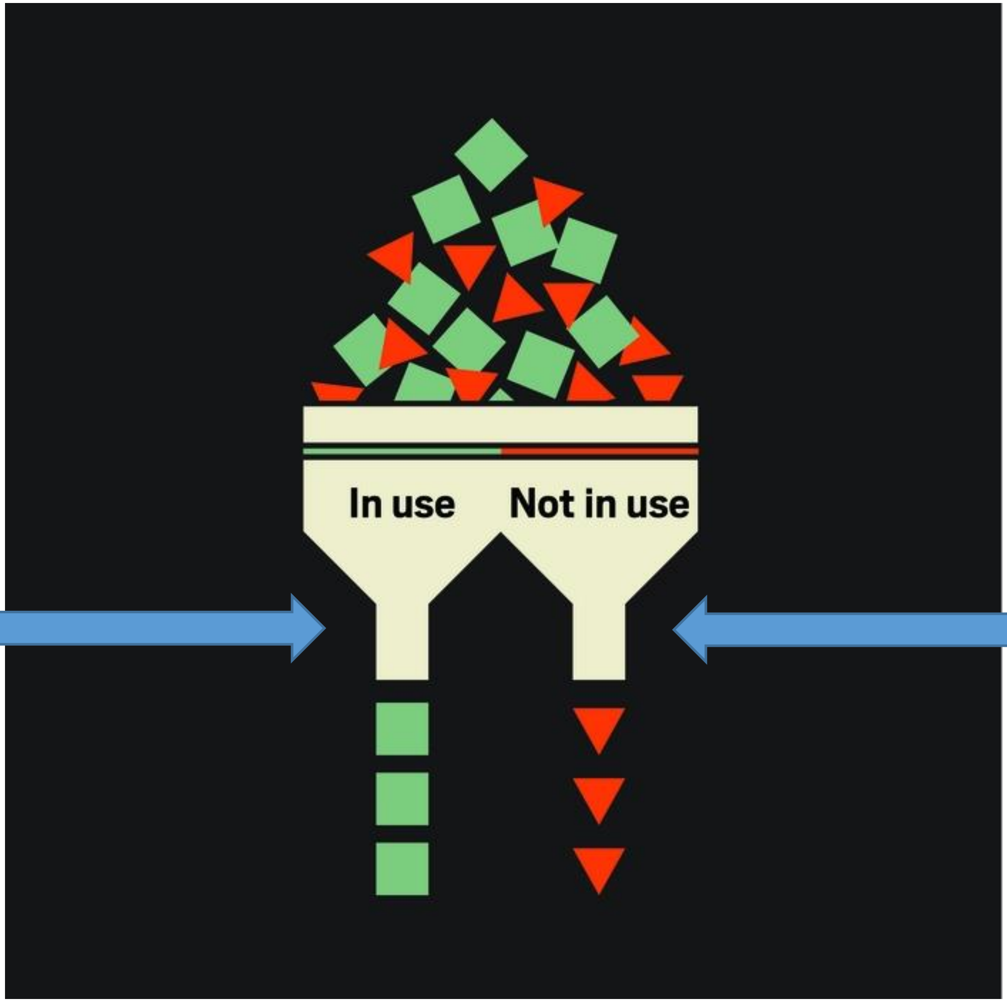
Kemikalizacija životnog prostora

Kemijska inventura: 85 000 vrsta kemikalija na tržištu ?



Int. J. Environ. Res. Public Health **2015**, *12*, 10549-10557; doi:10.3390/ijerph120910549

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ISSN 1660-4601
www.mdpi.com/journal/ijerph

Commentary

Effective Strategies for Monitoring and Regulating Chemical Mixtures and Contaminants Sharing Pathways of Toxicity

Arjun K. Venkatesan and Rolf U. Halden *

Center for Environmental Security, The Biodesign Institute, Global Security Initiative, Arizona State University, Tempe, AZ 85287, USA; E-Mail: avenka21@asu.edu

- *Toksikologija kemijskih koktela*
- *Sinergizam*
- *Paracelsusova paradigma*
- *U-krivulje = paradoks*
- *Timing - vrijeme izlaganja*
- *„Case by case” procjena štetnosti ?*

Kemikalije u nama – nacionalne inventure krvi i urina

Urinary Triclosan (2003 – 2010)

CAS Number 3380-34-5

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Categories (Survey Years)	Geometric Mean (95% conf. interval)	50th Percentile (95% conf. interval)	75th Percentile (95% conf. interval)	90th Percentile (95% conf. interval)	95th Percentile (95% conf. interval)	Sample Size
Total population (2003 - 2004)	13.0 (11.6-14.6)	9.20 (7.90-10.9)	47.4 (38.2-58.4)	249 (188-304)	461 (383-522)	2517
Total population (2005 - 2006)	18.5 (16.1-21.3)	15.1 (11.8-18.5)	76.2 (57.9-97.6)	334 (279-402)	655 (573-739)	2548
Total population (2007 - 2008)	15.3 (13.5-17.4)	12.1 (10.2-13.8)	57.2 (46.1-65.9)	225 (176-288)	494 (371-615)	2604
Total population (2009 - 2010)	14.5 (12.6-16.6)	10.7 (8.80-12.6)	51.2 (39.4-67.7)	238 (200-284)	483 (398-569)	2749
Age 6-11 years (2003 - 2004)	8.16 (6.20-10.8)	6.00 (4.00-8.50)	20.7 (14.3-31.6)	123 (36.4-163)	157 (113-380)	314
Age 6-11 years (2005 - 2006)	12.8 (9.89-16.7)	10.3 (8.30-17.2)	35.4 (23.9-65.8)	97.6 (67.4-181)	246 (99.5-462)	356
Age 6-11 years (2007 - 2008)	11.8 (7.57-18.2)	9.80 (6.70-13.9)	27.7 (14.8-52.2)	98.5 (40.5-364)	296 (67.4-826)	389
Age 6-11 years (2009 - 2010)	10.9 (9.35-12.8)	9.90 (7.10-11.9)	28.3 (22.1-35.5)	95.5 (71.5-117)	200 (114-474)	415
Age 12-19 years (2003 - 2004)	14.5 (11.0-19.1)	10.3 (8.20-13.1)	39.0 (26.5-86.4)	304 (134-566)	655 (310-890)	715
Age 12-19 years (2005 - 2006)	18.8 (14.9-23.8)	15.4 (11.0-21.0)	67.5 (45.3-100)	330 (174-461)	566 (389-707)	702
Age 12-19 years (2007 - 2008)	18.2 (13.8-23.8)	13.8 (9.40-20.1)	63.2 (38.7-110)	296 (144-395)	401 (308-853)	401
Age 12-19 years (2009 - 2010)	11.7 (9.89-13.8)	8.80 (7.30-10.9)	30.2 (24.3-40.6)	165 (56.7-289)	301 (220-431)	420
Age 20+ years (2003 - 2004)	13.6 (12.0-15.3)	9.60 (8.20-11.5)	51.7 (39.6-65.7)	261 (198-317)	472 (406-522)	1488
Age 20+ years (2005 - 2006)	19.3 (16.4-22.6)	15.5 (11.8-19.4)	84.3 (61.0-114)	366 (289-462)	738 (583-864)	1490
Age 20+ years (2007 - 2008)	15.4 (13.7-17.3)	12.3 (10.1-14.4)	60.1 (48.5-69.0)	225 (185-286)	504 (378-573)	1814
Age 20+ years (2009 - 2010)	15.5 (12.9-18.5)	11.1 (8.60-14.2)	61.8 (41.8-86.0)	262 (214-327)	544 (415-621)	1914
Males (2003 - 2004)	16.2 (13.4-19.6)	11.7 (9.30-14.8)	84.9 (50.6-111)	317 (231-433)	574 (461-716)	1229
Males (2005 - 2006)	21.3 (17.6-25.7)	17.6 (11.9-23.2)	103 (69.9-143)	446 (366-488)	738 (601-873)	1270
Males (2007 - 2008)	15.2 (12.9-17.9)	12.3 (9.50-15.3)	60.6 (45.8-72.8)	236 (159-338)	467 (367-636)	1294
Males (2009 - 2010)	14.8 (12.7-17.4)	10.9 (8.60-13.3)	55.1 (40.4-77.5)	243 (214-295)	455 (327-600)	1399
Females (2003 - 2004)	10.6 (9.29-12.1)	7.60 (6.10-9.10)	33.2 (27.1-39.4)	144 (96.5-250)	380 (258-430)	1288
Females (2005 - 2006)	16.2 (13.9-18.8)	12.6 (10.1-15.6)	58.7 (41.5-81.9)	226 (169-304)	513 (310-773)	1278
Females (2007 - 2008)	15.5 (12.6-18.9)	12.0 (9.90-14.1)	52.1 (37.1-74.4)	210 (133-367)	504 (285-648)	1310
Females (2009 - 2010)	14.2 (12.0-16.8)	10.5 (8.70-12.6)	50.0 (34.4-63.8)	235 (149-302)	488 (332-661)	1350
Mexican Americans (2003 - 2004)	14.6 (10.6-20.1)	8.80 (5.40-17.5)	65.4 (32.8-127)	357 (225-456)	597 (372-992)	613
Mexican Americans (2005 - 2006)	26.7 (21.2-33.7)	18.7 (13.5-25.5)	196 (99.4-269)	668 (475-759)	866 (750-1180)	637
Mexican Americans (2007 - 2008)	17.1 (12.9-22.6)	11.8 (8.40-17.8)	67.4 (42.5-106)	358 (208-474)	556 (363-856)	531
Mexican Americans (2009 - 2010)	14.9 (12.2-18.3)	10.2 (8.20-12.8)	54.7 (33.3-86.5)	345 (260-494)	691 (443-1180)	566
Non-Hispanic blacks (2003 - 2004)	14.4 (11.4-18.2)	11.1 (8.70-16.1)	37.6 (30.2-58.0)	203 (87.5-341)	450 (254-750)	652
Non-Hispanic blacks (2005 - 2006)	17.3 (13.3-22.4)	14.0 (10.4-19.0)	59.2 (37.7-98.3)	258 (138-460)	541 (273-1190)	678
Non-Hispanic blacks (2007 - 2008)	13.7 (11.7-16.1)	11.3 (8.80-13.9)	41.4 (28.9-49.6)	150 (93.5-265)	480 (190-757)	597
Non-Hispanic blacks (2009 - 2010)	12.8 (10.8-15.0)	9.30 (7.70-11.7)	34.3 (24.0-44.6)	168 (88.4-263)	451 (202-959)	516
Non-Hispanic whites (2003 - 2004)	12.9 (11.2-14.9)	9.20 (7.40-11.0)	49.2 (37.8-63.4)	245 (163-334)	461 (383-527)	1092
Non-Hispanic whites (2005 - 2006)	17.5 (14.9-20.6)	15.1 (10.9-19.0)	74.3 (54.1-90.3)	288 (231-366)	569 (462-693)	1038
Non-Hispanic whites (2007 - 2008)	15.0 (12.6-17.7)	12.3 (9.80-14.5)	59.6 (41.9-73.4)	197 (147-266)	408 (296-537)	1077
Non-Hispanic whites (2009 - 2010)	14.0 (11.8-16.7)	10.5 (8.30-12.9)	51.7 (33.1-79.2)	216 (174-266)	431 (301-565)	1206

Limit of detection (LOD, see Data Analysis section) for Survey years 03-04, 05-06, 07-08 and 09-10 are 2.3, 2.3, 2.3, and 2.3 respectively.

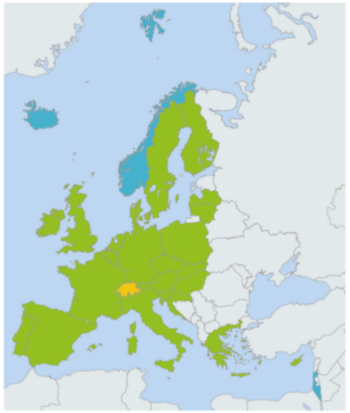
Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Triclosan_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Triclosan_FactSheet.html

Kemikalije u nama – nacionalne inventure krvi i urina

znanost i politika u službi zdrave budućnosti

Konzorcijski partneri



- Države članice EU-a
- Pridružene države
- Države pridružene programu Obzor 2020

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Email: stake-hbm4eu@umweltbundesamt.at

O projektu HBM4EU

U svakodnevnom životu izloženi smo složenom utjecaju različitih kemikalija iz okoliša, proizvoda široke potrošnje, hrane i vode za piće te na radnom mjestu.

Projekt HBM4EU temelji se na biološkom monitoringu ljudi u svrhu procjene izloženosti kemikalijama ljudi diljem Europe, boljeg razumijevanja povezanih zdravstvenih učinaka i kvalitetniju procjenu rizika od izloženosti kemikalijama. Na razini svakog pojedinca podaci dobiveni humanim biomonitoringom (HBM), bit će pokazatelj eventualne potrebe smanjenja izloženosti tijekom medicinskog liječenja ili praćenja.

Projektni partneri uspostavit će dijalog s političkim autoritetima i kroz rezultate projekta dati svoj doprinos razvoju novih i ocjeni postojećih politika te kreiranju mjera smanjenja izloženosti toksičnim kemikalijama.

Projektni rezultati omogućit će sigurno upravljanje kemikalijama i zaštitu ljudskog zdravlja u Europi.

Projekt HBM4EU financiran je u sklopu programa EU-a za istraživanje i inovacije Obzor 2020, prema ugovoru o stipendiranju br. 733032.

United Nations A/74/480
General Assembly
Distr.: General
7 October 2019
Original: English

ENVIRONMENT

Toxics exposure threatens human rights

Governments must protect populations, UN expert says

Environmental and human exposure to toxic substances is a global crisis, according to a report presented at the United Nations on Oct. 24.

Baskut Tuncak, the UN special rapporteur on hazardous substances and waste, presented the report to the General Assembly in New York, saying that "our incessant exposure to pollution and other sources of toxic substances poses a global threat to human rights, including to our right to reproductive health."

Though governments have the duty to protect their populations from exposure to the substances, Tuncak's report says, most are failing not only to prevent exposure but also "to acknowledge and understand the catastrophic impacts of their inaction on people both within and outside their jurisdictions."

The report lists places where plastic pollution, exposure to pesticides, air pollution, and heavy metal contamination of food have led to adverse health effects.

Tuncak, an attorney and chemist, is one of several dozen specialists who investigate and monitor human rights issues on behalf of the UN Human Rights Council.

In September, the council passed a resolution encouraging governments and businesses to ensure that workers are protected from the adverse effects of toxic substances. In that resolution, the UN urged "strengthening of the global regime for chemicals management to prevent and minimize unsafe exposure to hazardous substances, to promote the right of everyone, including workers, to the enjoyment of the highest attainable standard of physical and mental health and to just and favourable conditions of work."—PAULA DUPRAZ-DOBIAS, special to C&EN

Baskut Tuncak, the UN special rapporteur on hazardous substances and waste, presented the report on Oct. 24.

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United Nations A/74/480

General Assembly

Distr.: General
7 October 2019

Original: English

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World Health ■ 46th Year, No. 5, September–October 1993 3

Editorial

Toxic chemicals: the right to know

Knowledge is the most effective weapon in our arsenal against diseases caused by chemical exposure. At a global level, this "right-to-know" is fostered by the United Nations Environment Programme's International Register of Potentially Toxic Chemicals. The Register pulls together information from diverse international agencies, scientific institutions, government experts and industrial contacts around the world and brings these data to bear on local and national chemical-safety decisions.

Nine hundred years ago a great Islamic physician, Al-Asuli, wrote a medical pharmacopoeia in which he divided the illnesses of the world into two parts: diseases of the rich and diseases of the poor. If Al-Asuli were writing today, he might have to rethink this dichotomy taking account of the new and burgeoning class of human ailments caused by chemical contaminants in the environment.

The media are inordinately fond of sensational examples of chemical illness in the affluent parts of the world: the "sick building" syndrome, the exposure to chemicals in dry cleaning and photocopying busi-

Mrs Elizabeth Dowdeswell, Executive Director of the United Nations Environment Programme (UNEP).

nesses, and drug residues in beef, pork and poultry are but a few examples.

In fact, it is often the poor who are at greatest risk of chemical illness – migratory farm workers who absorb pesticides while harvesting crops, subsistence hunters and fishermen who eat tainted fish and animals, and the hungry who must eat whatever and whenever they can, even if they suspect the food is contaminated.

In my native Canada, indigenous peoples of the high Arctic – a thousand miles from the continent's prime agricultural regions – nevertheless show high levels of contamination from certain agricultural chemicals. They are exposed because the Earth's ecosystem is an extremely efficient circulator, and there is no such thing as a stationary contaminant. The air they breathe, the rain and snow they use for drinking-water, the migratory animals they eat – none of these is free from contamination.

Knowledge is the most effective weapon in our arsenal against diseases caused by chemical exposure. In the developed world in particular, such knowledge has been increasingly well served by community "right-to-know" regulations, which require industries that use dangerous chemicals to inform local citizens who can then monitor the toxic chemicals that have been discarded in their neighbourhoods.

At a global level, this "right-to-know" is fostered by the United Nations Environment Programme's International Register of Potentially Toxic Chemicals (IRPTC). The Register pulls together information from diverse international agencies, scientific institutions, government experts and industrial contacts around the world and brings these data to bear on local and national chemical-safety decisions.

In many ways, IRPTC represents a model for the "new" UNEP we are working to bring about. The Register is a management tool that stresses collaboration, consultation, and cooperation above fragmentation and duplication of effort. It empowers citizens and nations to become educated critics of chemical contamination, rather than leaving chemical safety decisions to industry experts. And it catalyses action by enlightened citizens and governments to reduce the adverse effects of chemical exposure, rather than promoting apathy, helplessness, and fear.

Collaboration is not new to UNEP; since 1980 we have been actively engaged with WHO in an International Programme on Chemical Safety, for example. Through this editorial WHO is fostering its vibrant partnership with UNEP, and I look forward to the fruits of our collaboration against chemical illnesses. ■

E. Dowdeswell

Elizabeth Dowdeswell

United Nations A/74/480

General Assembly

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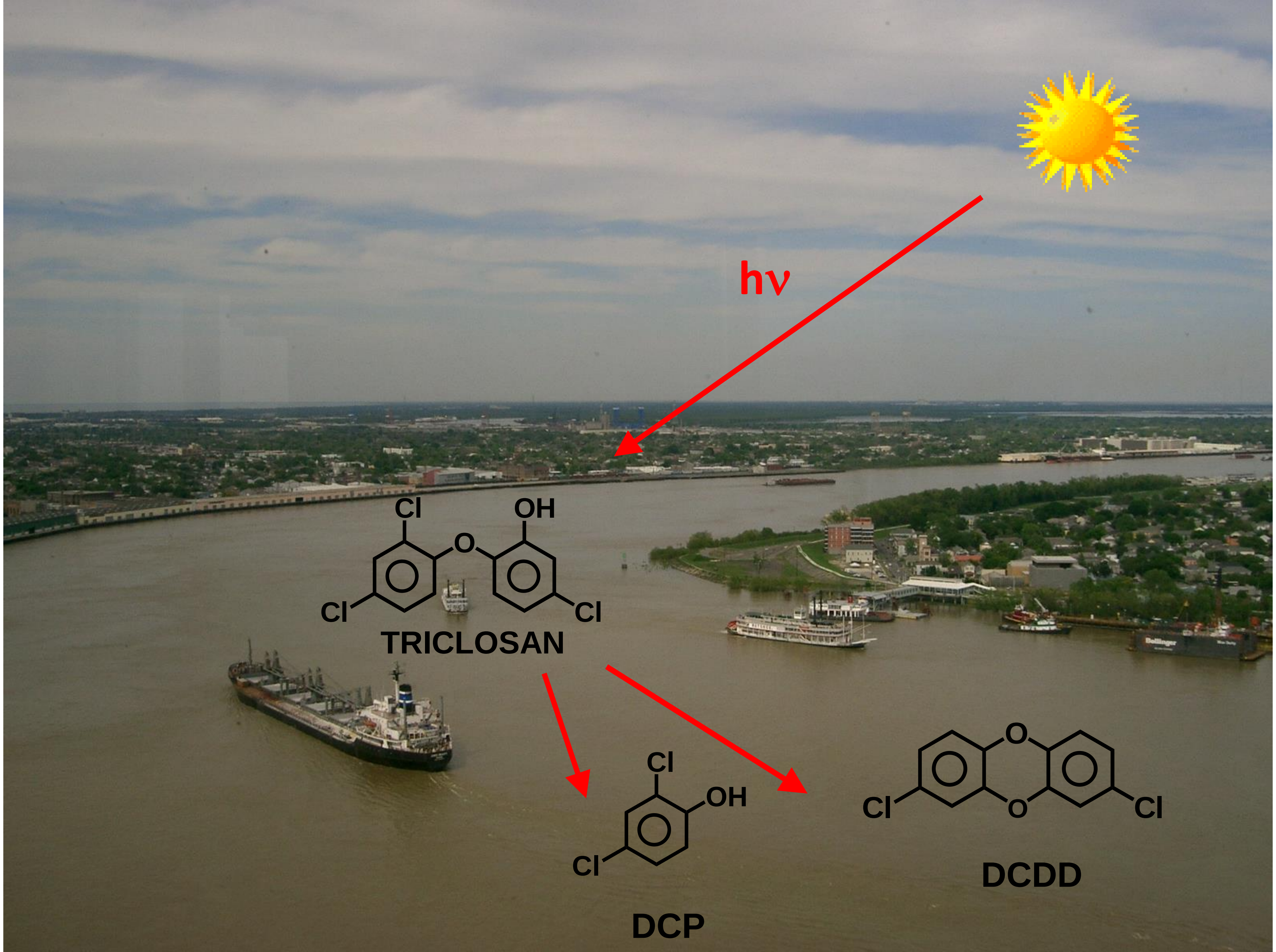
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1. TRIKLOZAN

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Journal of Photochemistry and Photobiology A: Chemistry 158 (2003) 63–66

Journal of Photochemistry and Photobiology A:Chemistry

www.elsevier.com/locate/jphotochem

Short communication

Photochemical conversion of triclosan to 2,8-dichlorodibenzo-*p*-dioxin in aqueous solution

Douglas E. Latch [a], Jennifer L. Packer [b], William A. Arnold [b,1], Kristopher McNeill [a,*]

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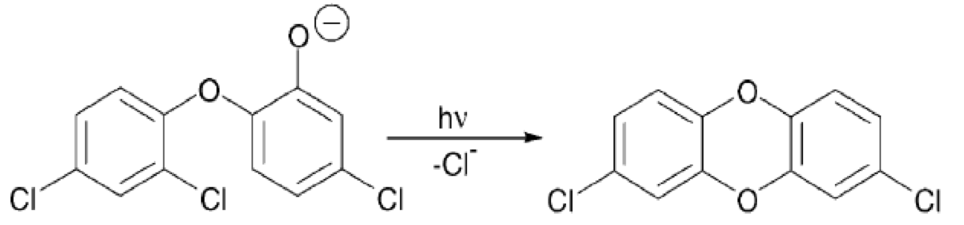


1. TRIKLOZAN

The New York Times

December 16, 2009

The New York Times

December 16, 2009

Albert Einstein: „*We cannot solve our problems with the same thinking we used when we created them*"

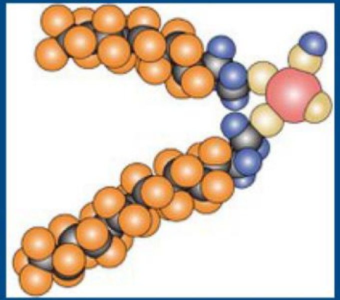
Published 12 Dec 2019 Last modified 21 Jan 2020

Chemicals

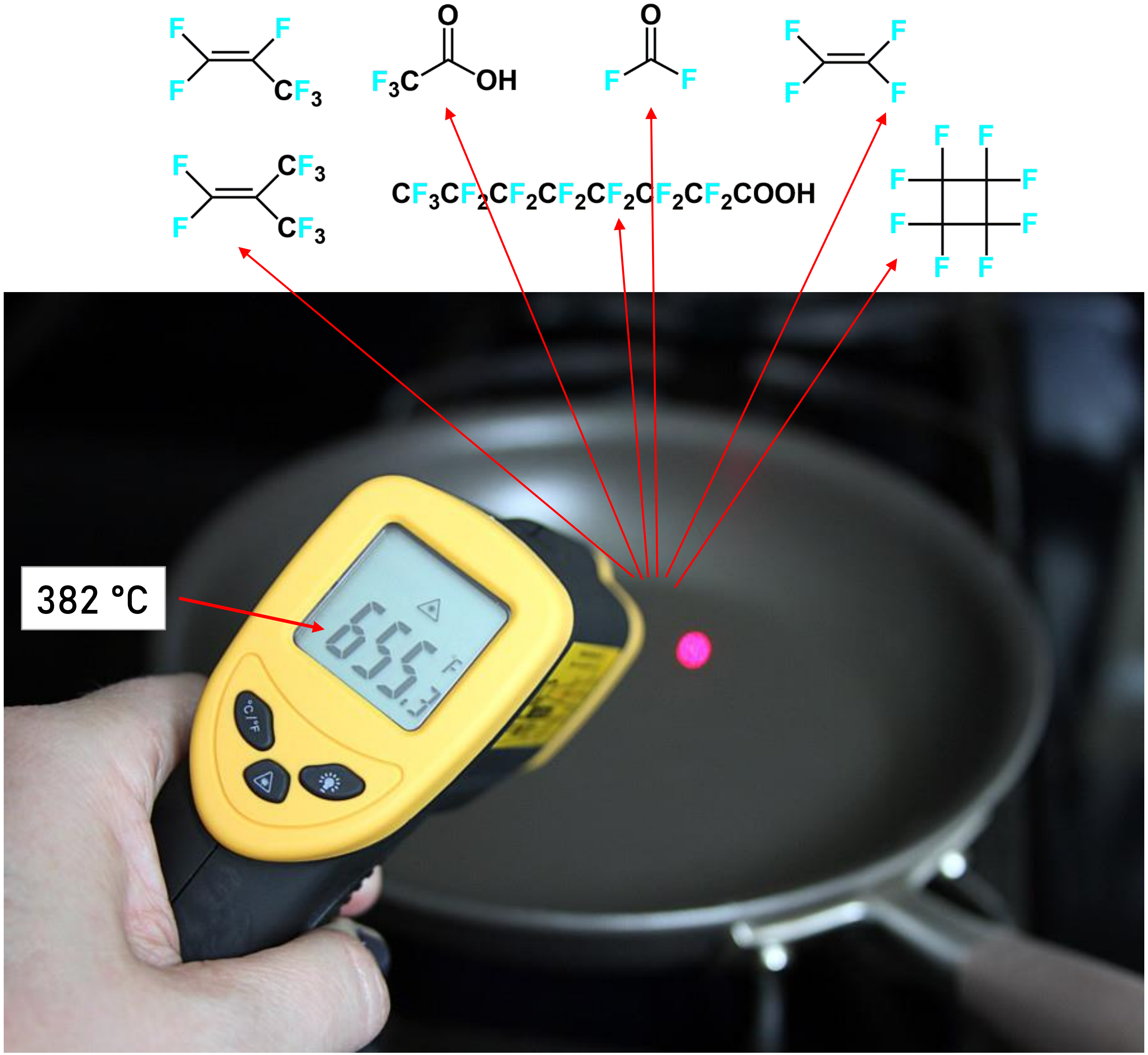
Emerging chemical risks in Europe — 'PFAS'

It is currently not possible to perform in-depth environmental and health risk assessments of all chemical substances in use in Europe because of the great variety of chemicals and their diverse uses. New and legacy chemicals continue to be released into Europe's environment, adding to the total chemical burden on Europe's citizens and ecosystems. Early identification of emerging risks is one of the activities of the European Environment Agency (EEA). This briefing summarises the known and potential risks to human health and the environment in Europe posed by a group of very persistent chemicals, the per- and polyfluorinated alkyl substances (PFAS).

- Comprising more than 4 700 chemicals, per and polyfluorinated alkyl substances (PFAS) are a group of widely used, man-made chemicals that accumulate over time in humans and in the environment.



Box 1: PFAS are a group of organic chemicals that contain a stable (unreactive) fluoro-carbon segment. Polyfluorinated PFAS contain both fluoro-carbon and hydro-carbon segments where the non-fluorinated part can degrade and ultimately form perfluorinated PFAS acids, such as PFOA and PFOS. While the long-chain PFAS accumulate in humans, animals and sediment/soil, the short-chain PFAS accumulate in the environment (German EPA, 2017, 2018) due to their persistency and high mobility in air and water. The OECD provides further information on groups of PFAS.


CF3CF2CF2CF2CF2CF2CF2COOH
382 °C

Thermolysis of fluoropolymers as a potential source of halogenated organic acids in the environment

David A. Ellis*, Scott A. Mabury*, Jonathan W. Martin† & Derek C. G. Muir‡

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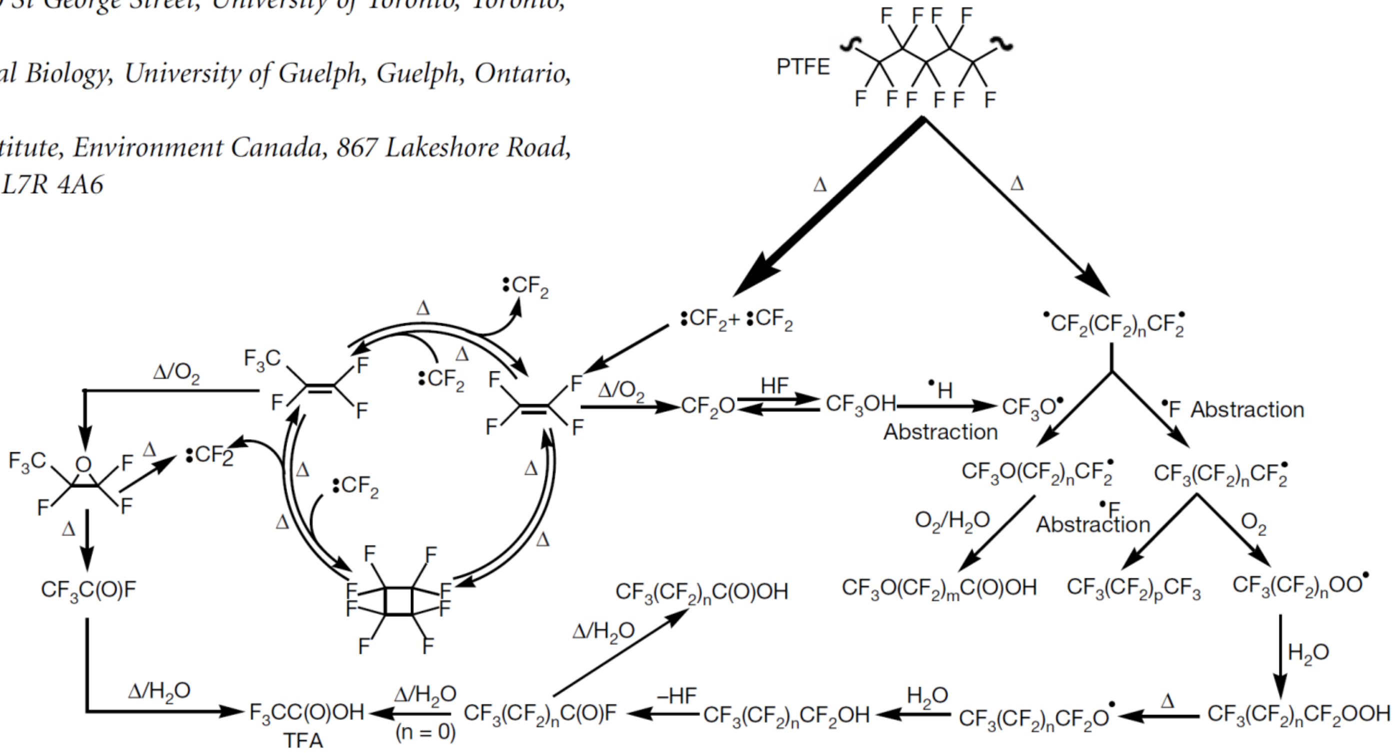
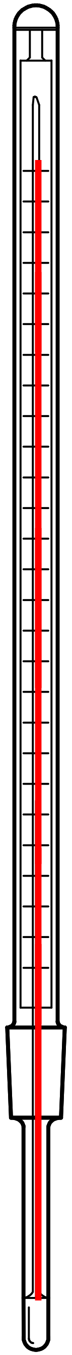
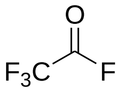


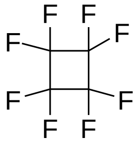
Termička razgradnja teflona



670 °C — Emisija stakleničkog plina CF_4

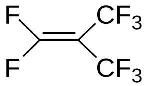
618 °C

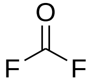




$CF_3CF_2CF_2CF_3$

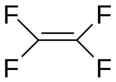
518 °C — Emisija bojnih otrova perfluoroizobutena i karbonil fluorida i kiseline HF

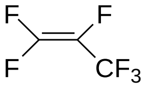


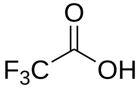


488 °C — Emisija vrlo toksičnog silicijevog tetrafluorida, SiF_4

378 °C — Emisija toksičnih plinova







$CF_3CF_2CF_2CF_2CF_2CF_2CF_2COOH$

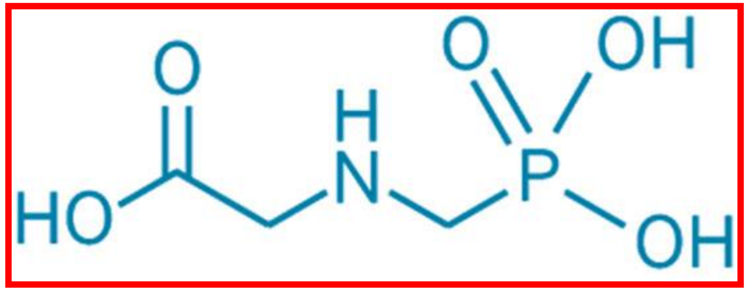
308 °C — Emisija ultrasitnih oksidiranih čestica teflona

258 °C — Temperatura pri kojoj je izmjerena koncentracija teflonskih razgradnih produkata

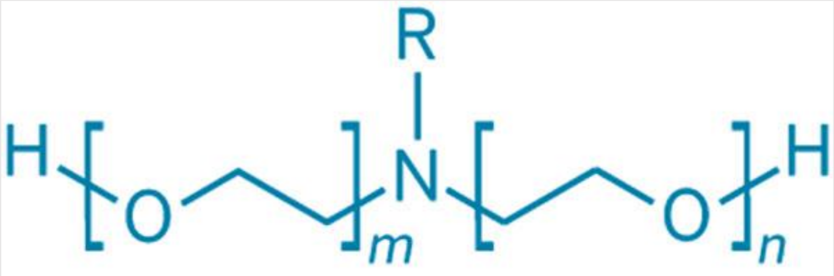
220 °C — Najniža temperatura pri kojoj je otkriveno štetno djelovanje termalnog raspada teflona; pokusi s pticama

3. GLIFOZAT

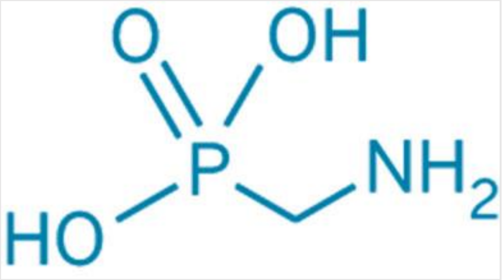
- 650 tisuća tona proizvoda na bazi glifozata (2011)
- Promet > 6 milijardi € (2014)
- Udio formulacija glifozata (>750) na tržištu herbicida: 54 %



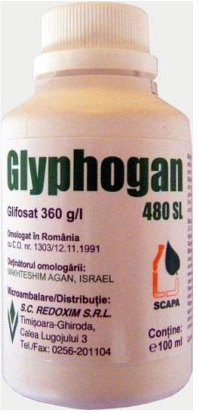
Glifozat – „blockbuster”

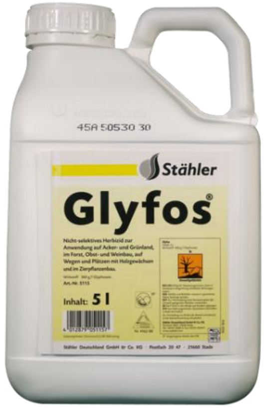


Polietoksilirani amini,
aditivi/surfaktanti u formulaciji



AMPA,
glavni razgradni produkt





Benbrook *Environ Sci Eur* (2016) 28:3
DOI 10.1186/s12302-016-0070-0

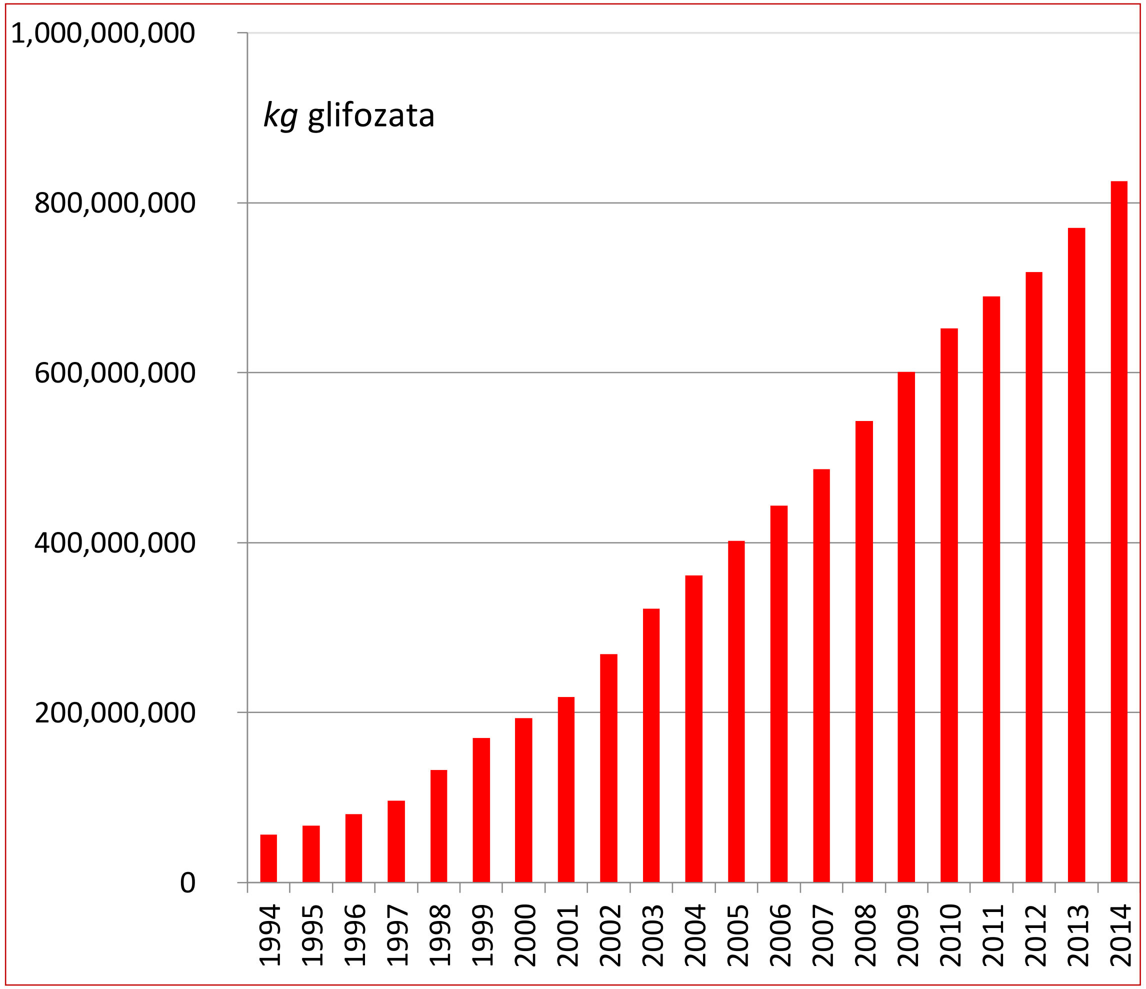
Environmental Sciences Europe
a SpringerOpen Journal

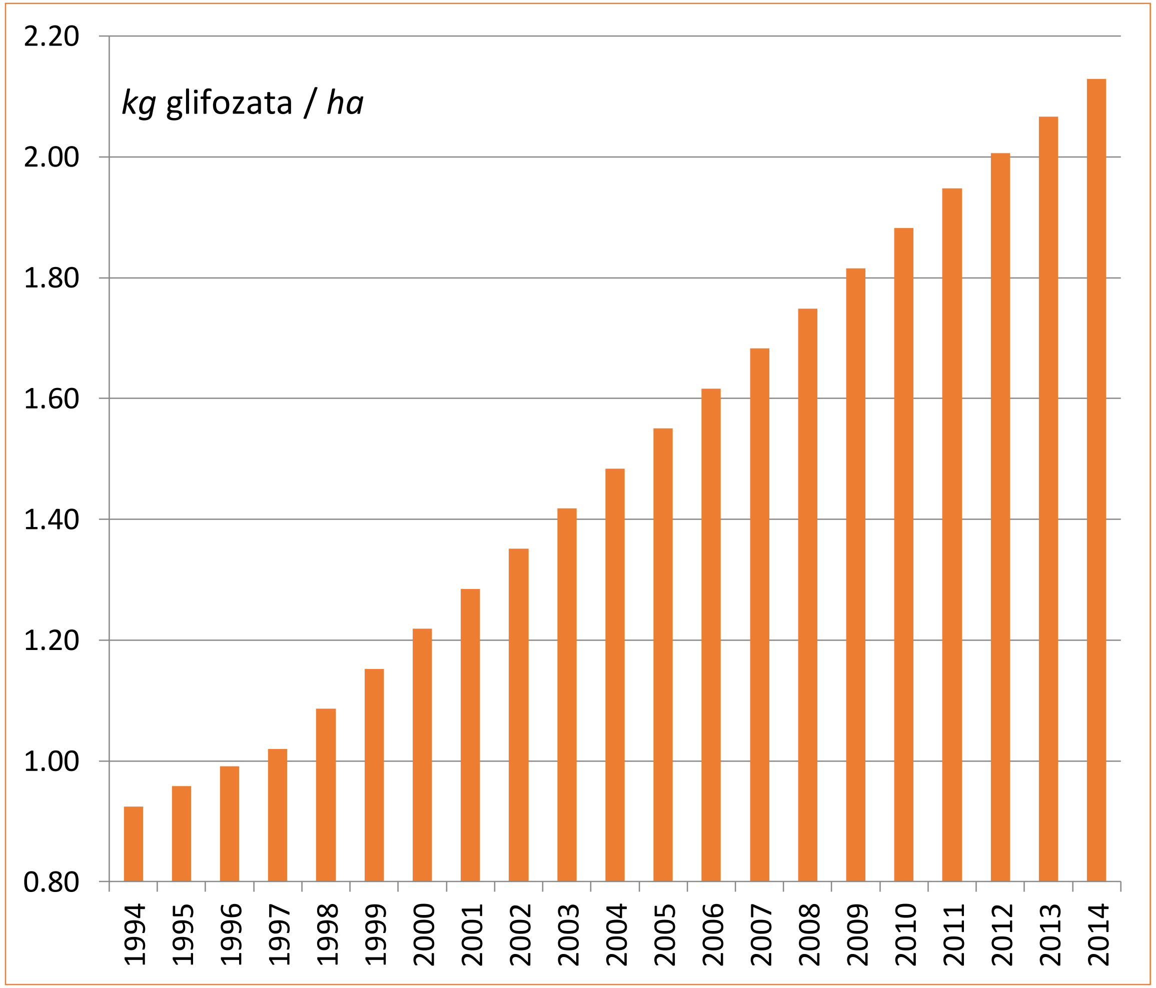
RESEARCH **Open Access**

Trends in glyphosate herbicide use in the United States and globally

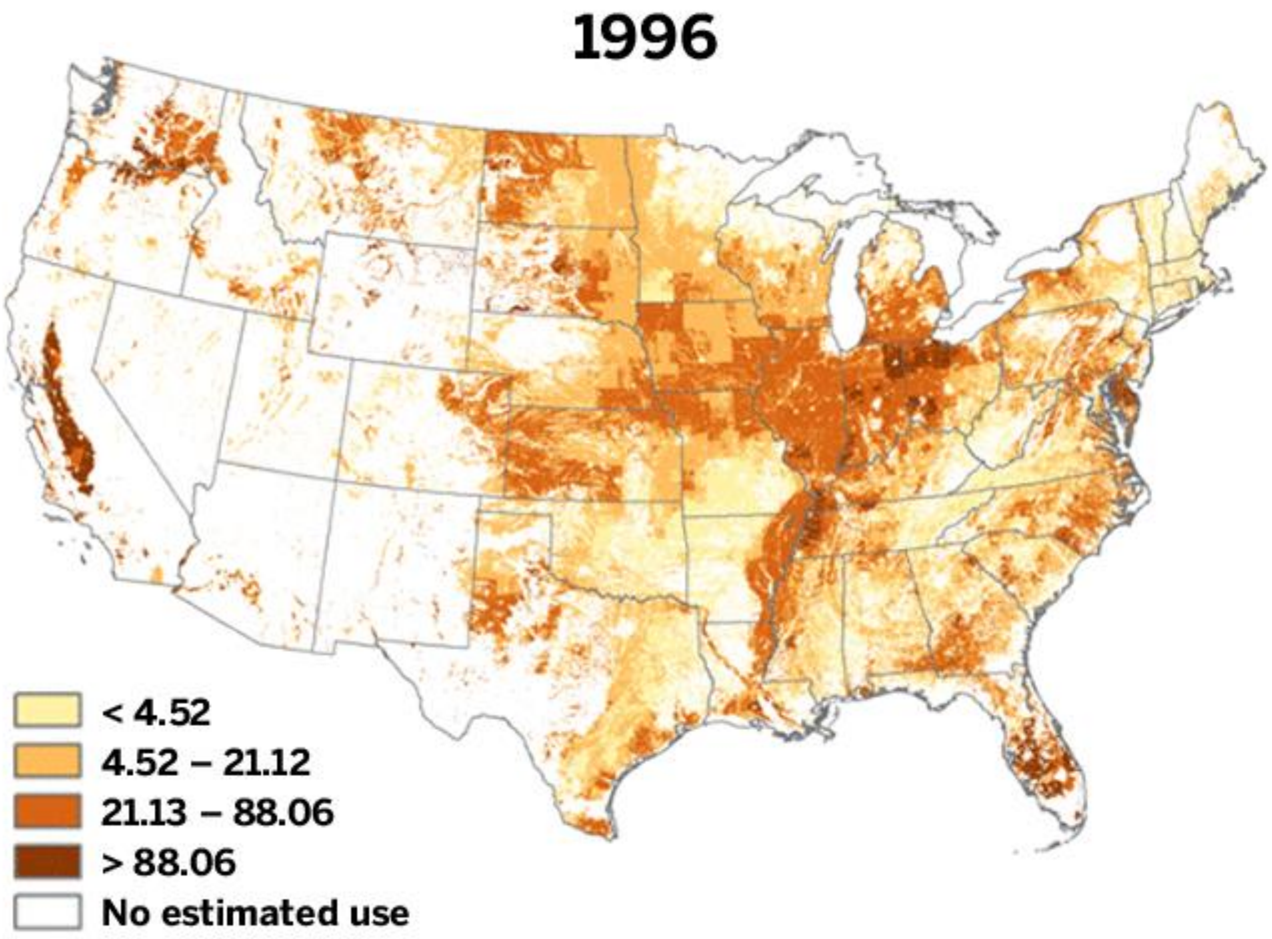
Charles M. Benbrook*

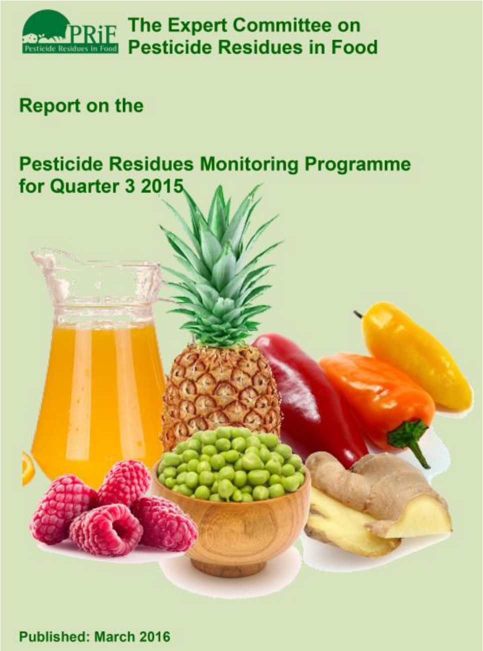
3. GLIFOZAT





Glifozat – porast uporabe po jedinici površine





Food Standard Agency (Listopad, 2012):

glifozat > 0.2 mg/kg
u 25% uzoraka kruha

Umweltinstitut München e.V. (Ožujak, 2016):

glifozat 0.5 - 30 μg/L
u svakoj pivi

Anresco Lab., San Francisco (Travanj, 2016):

Glifozat 0.8 mg/kg
u svim grickalicama

JAMA
The Journal of the American Medical Association

Research Letter

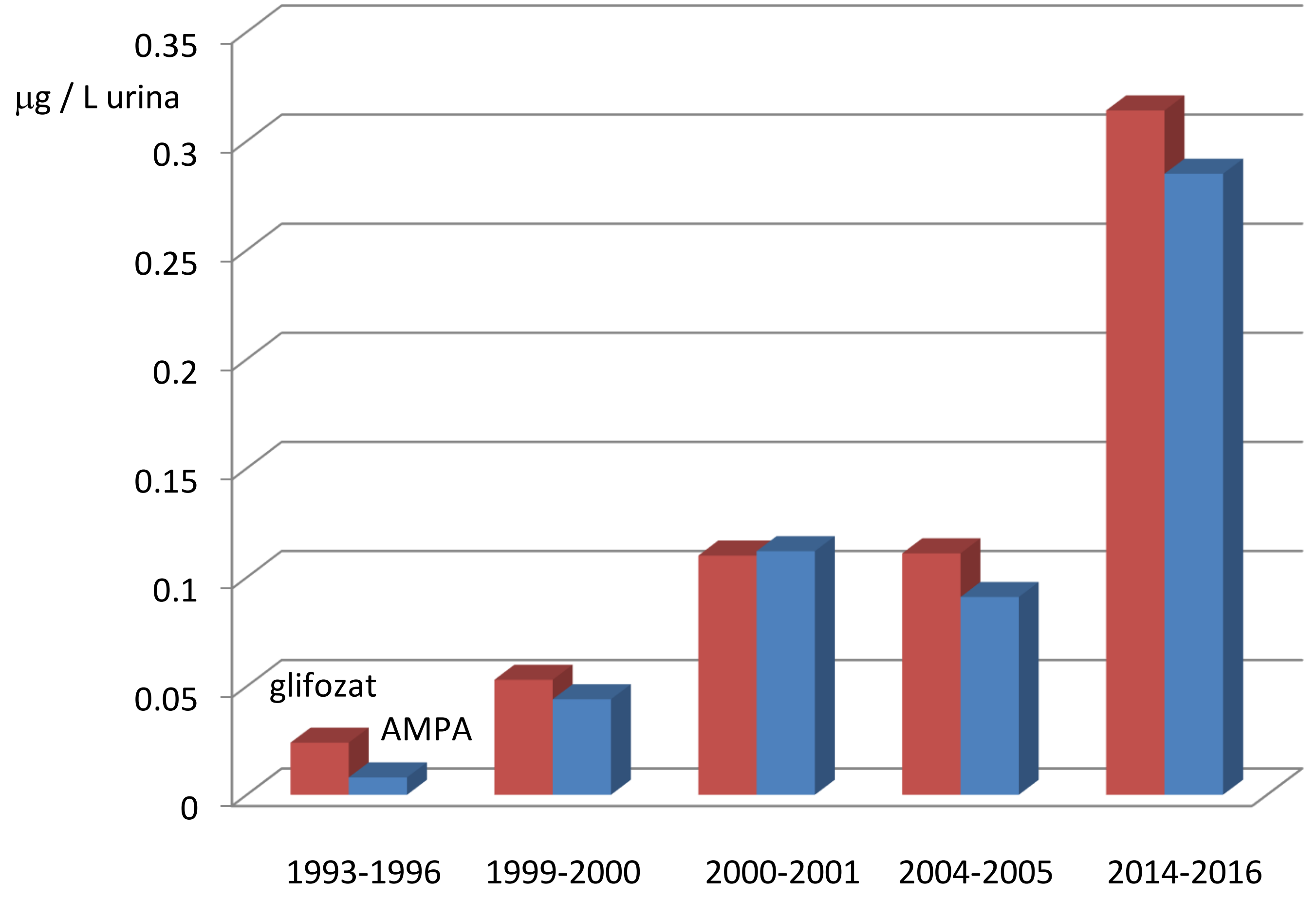
October 24/31, 2017

Excretion of the Herbicide Glyphosate in Older Adults Between 1993 and 2016

Paul J. Mills, PhD[1]; Izabela Kania-Korwel, PhD[2]; John Fagan, PhD[2]; et al

» Author Affiliations | Article Information

JAMA. 2017;318(16):1610-1611. doi:10.1001/jama.2017.11726



Sigurnost/štetnost glifozata – znanstvena/politička kontroverza

International Agency for Research on Cancer

World Health Organization

20 March 2015

IARC Monographs Volume 112: evaluation of five organophosphate insecticides and herbicides

Lyon, France, 20 March 2015 – The International Agency for Research on Cancer (IARC), the specialized cancer agency of the World Health Organization, has assessed the carcinogenicity of **five organophosphate pesticides**. A summary of the final evaluations together with a short rationale have now been published online in The Lancet Oncology, and the detailed assessments will be published as Volume 112 of the IARC Monographs.

What were the results of the IARC evaluations?

The herbicide **glyphosate** and the insecticides **malathion** and **diazinon** were classified as *probably carcinogenic to humans* (Group 2A).

efsa European Food Safety Authority

EFSA Journal 2015;13(11):4302

CONCLUSION ON PESTICIDE PEER REVIEW

Conclusion on the peer review of the pesticide risk assessment of the active substance glyphosate[1]

European Food Safety Authority (EFSA)[2]

European Food Safety Authority (EFSA), Parma, Italy

ABSTRACT

The conclusions of the European Food Safety Authority (EFSA), following the peer review of the initial risk assessments carried out by the competent authority of the rapporteur Member State Germany, for the pesticide active substance glyphosate are reported. The context of the peer review was that required by Commission Regulation (EU) No 1141/2010 as amended by Commission Implementing Regulation (EU) No 380/2013. The conclusions were reached on the basis of the evaluation of the representative uses of glyphosate as a herbicide on emerged annual, perennial and biennial weeds in all crops [crops including but not restricted to root and tuber vegetables, bulb vegetables, stem vegetables, field vegetables (fruiting vegetables, brassica vegetables, leaf vegetables and fresh herbs, legume vegetables), pulses, oil seeds, potatoes, cereals, and sugar- and fodder beet; orchard crops and vine, before planting fruit crops, ornamentals, trees, nursery plants etc.] and foliar spraying for desiccation in cereals and oilseeds (pre-harvest). The reliable endpoints, concluded as being appropriate for use in regulatory risk assessment and derived from the available studies and literature in the dossier peer reviewed, are presented. Missing information identified as being required by the regulatory framework is listed. Concerns are identified. Following a second mandate from the European Commission to consider the findings from the International Agency for Research on Cancer (IARC) regarding the potential carcinogenicity of glyphosate or glyphosate-containing plant protection products in the on-going peer review of the active substance, EFSA concluded that glyphosate is unlikely to pose a carcinogenic hazard to humans and the evidence does not support classification with regard to its carcinogenic potential according to Regulation (EC) No 1272/2008.

Plastifikacija životnog prostora:

Posuđe	Igračke	Ambalaža
Vrećice	Namještaj	Odjeća
Tepisi	Laminat	Stolarija
Implatanti…		

5 g mikro/nanoplastike svaki tjedan

Environmental Science & Technology

Article

Cite This: *Environ. Sci. Technol.* 2019, 53, 7068−7074

pubs.acs.org/est

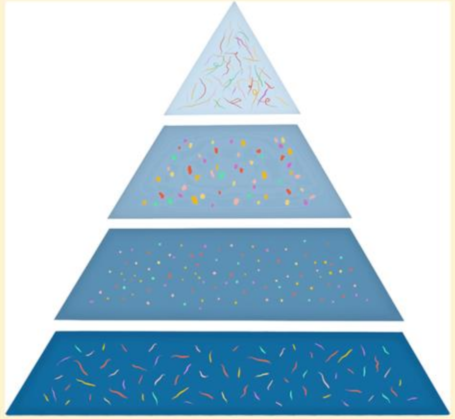
Human Consumption of Microplastics

Kieran D. Cox,[*,†,‡] Garth A. Coverton,[†] Hailey L. Davies,[†] John F. Dower,[†] Francis Juanes,[†] and Sarah E. Dudas[†,‡,§]

[†]Department of Biology, University of Victoria, Victoria, British Columbia V8P 5C2 Canada
[‡]Hakai Institute, Calvert Island, British Columbia V0P 1H0 Canada
[§]Fisheries and Oceans Canada, Pacific Biological Station, Nanaimo, British Columbia V9T 6N7 Canada

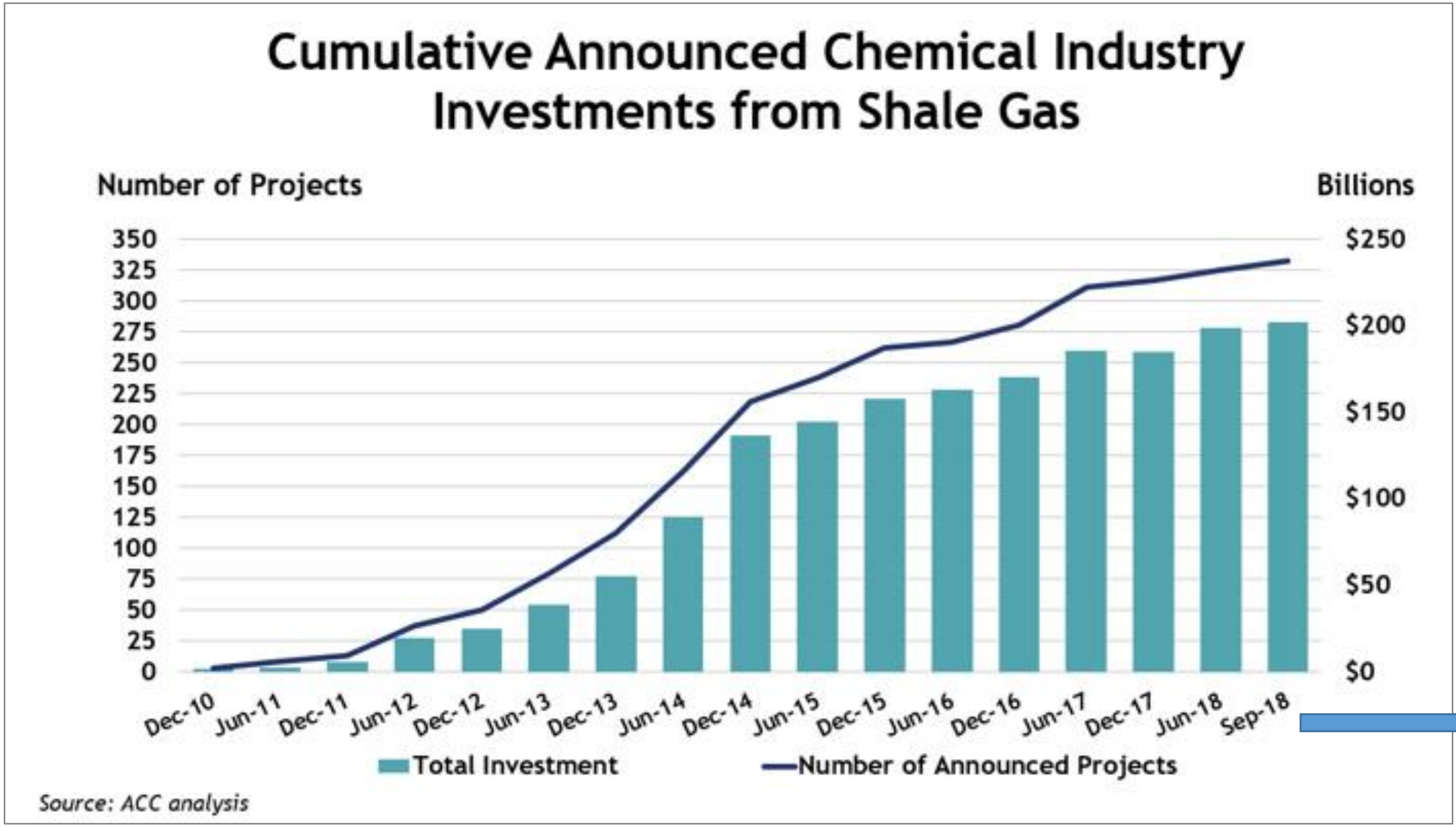
Supporting Information

ABSTRACT: Microplastics are ubiquitous across ecosystems, yet the exposure risk to humans is unresolved. Focusing on the American diet, we evaluated the number of microplastic particles in commonly consumed foods in relation to their recommended daily intake. The potential for microplastic inhalation and how the source of drinking water may affect microplastic consumption were also explored. Our analysis used 402 data points from 26 studies, which represents over 3600 processed samples. Evaluating approximately 15% of Americans' caloric intake, we estimate that annual microplastics consumption ranges from 39000 to 52000 particles depending on age and sex. These estimates increase to 74000 and 121000 when inhalation is considered. Additionally, individuals who meet their recommended water intake through only bottled sources may be ingesting an additional 90000 microplastics annually, compared to 4000 microplastics for those who consume only tap water. These estimates are subject to large amounts of variation; however, given methodological and data limitations, these values are likely underestimates.



„Pretvorba energije u materiju”

Plin i nafta postaju plastika



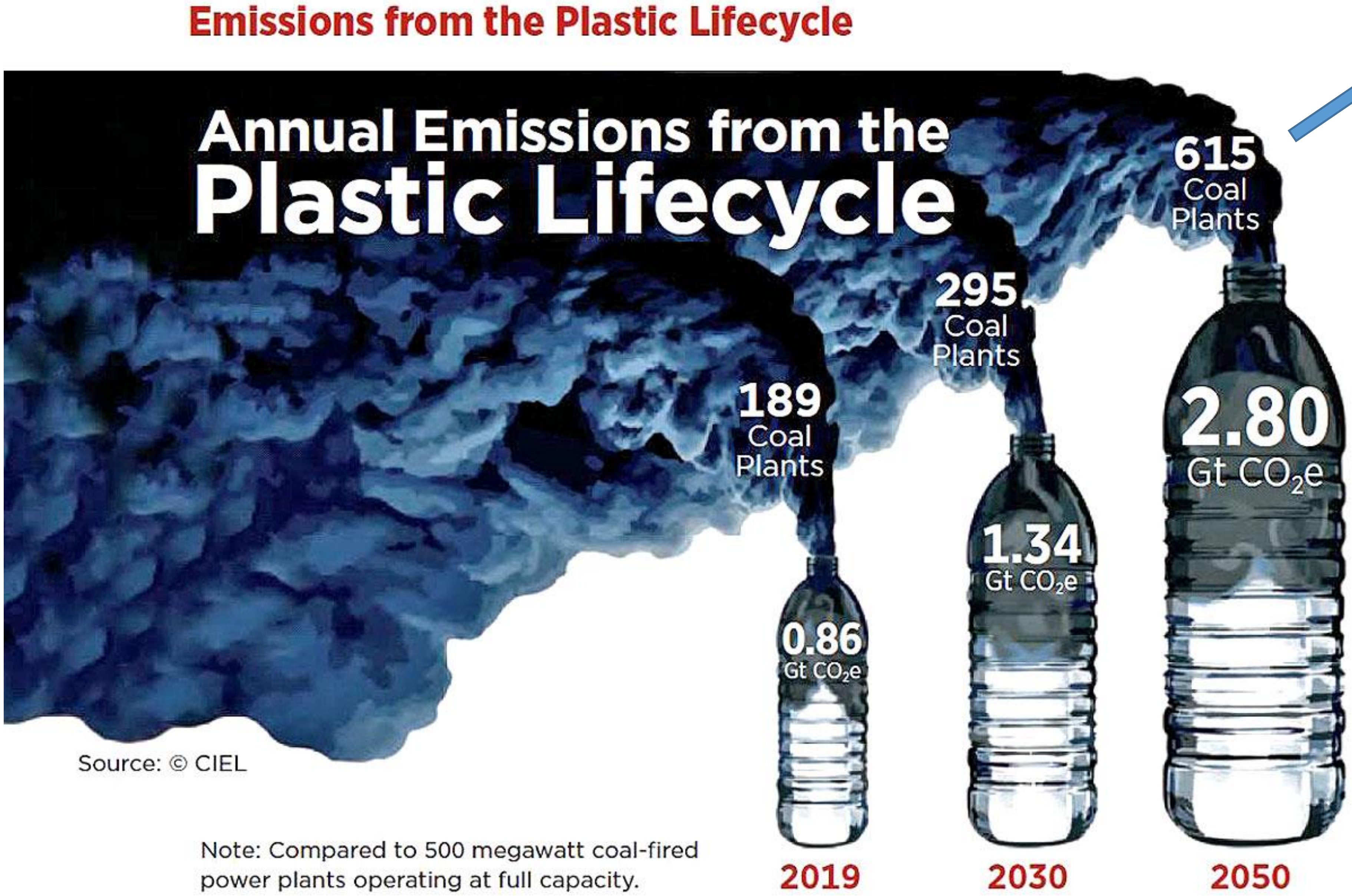
50 %

2050.

2020.

15 %

Ekološki otisak plastike – od kolijevke do groba



> 1000 „Plomina”

Pergamon

Marine Pollution Bulletin Vol. 42, No. 12, pp. 1297–1300, 2001

0025-326X/01 $ - see front matter

PII: S0025-326X(01)00114-X

A Comparison of Plastic and Plankton in the North Pacific Central Gyre

C. J. MOORE†*, S. L. MOORE†, M. K. LEECASTER‡,[1] and S. B. WEISBERG‡
†*Algalita Marine Research Foundation, 345 Bay Shore Avenue, Long Beach, CA 90803, USA*
‡*Southern California Coastal Water Research Project, 7171 Fenwick Lane, Westminster, CA 92683, USA*

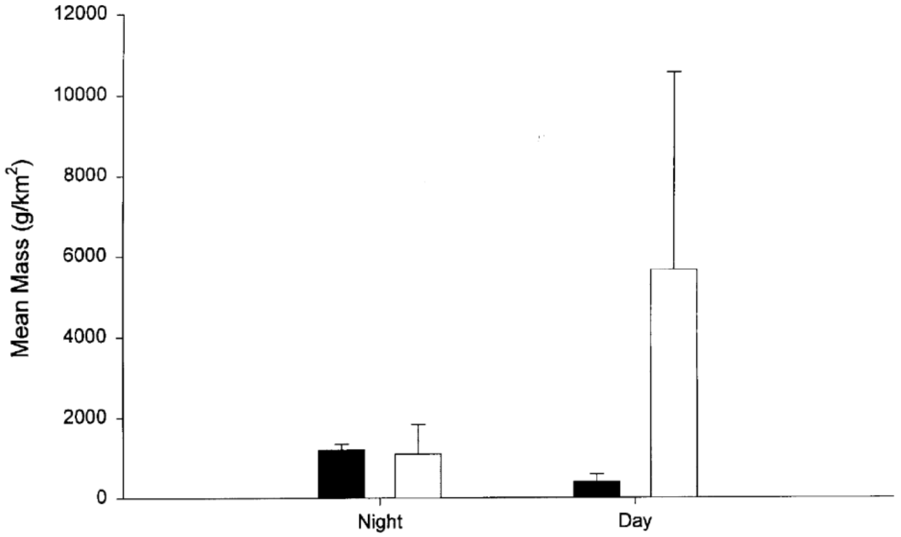
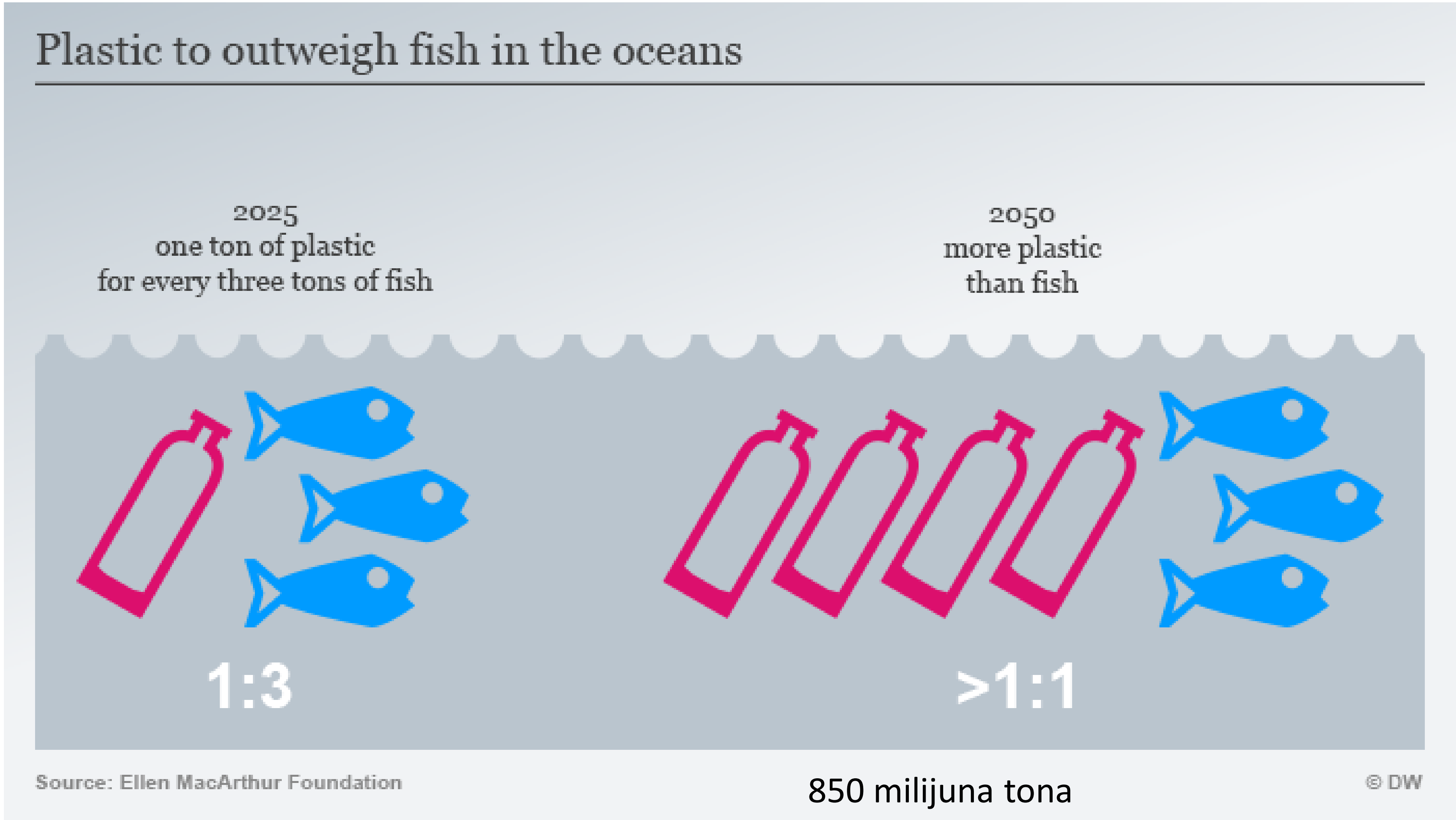


Fig. 2 Abundance and mass of plankton and plastic in night versus day samples.

Više plastike nego hrane

Na površini mora pluta šest puta veća masa sintetskih polimera nego planktona



850 milijuna tona

Postoje li rješenja?

Da, ali su jednostavna!

1. Informacija/pismenost
2. Regulacija/zabrana
3. Promjena stilova života/komocije

Primjer zakonodavne regulacije

EUROPSKA
KOMISIJA

Bruxelles, 28.5.2018.
COM(2018) 340 final

2018/0172 (COD)

Prijedlog

DIREKTIVE EUROPSKOG PARLAMENTA I VIJEĆA

o smanjenju utjecaja određenih plastičnih proizvoda na okoliš

Primjer tržišne regulacije

www.soilassociation.org
Britanska inicijativa protiv glifozata u kruhu

Od 2013. danska pekarska tvrtka
ne prihvaća žitarice tretirane glifozatom

03. travanj 2018. Emilio Ferrari, direktor nabave, najavio smanjenje (za 35%)
uvoza kanadske durum pšenice, zbog prevelikog sadržaja glifozata

Kompanija Kellogg's objavila odluku (27.01.2020.) da od 2025. godine
u proizvodima neće imati tragove glifozata.

Primjer političke zabrane

NAJAVA DANSKOGA MINISTRA POLJOPRIVREDE Prva zabrana ambalaže za brzu hranu

Autor **Valerije Vrček** - 28. rujna 2019.

Mogens Jensen, danski ministar poljoprivrede

Danska će ove godine postati prva zemlja na svijetu u kojoj će biti zabranjena uporaba fluoriranih kemikalija u materijalima koji dolaze u kontakt s hranom. To se u prvoj fazi odnosi na papirnu i kartonsku ambalažu koja sadrži organofluorne spojeve poznate pod zajedničkim skraćenim nazivom PFAS (polifluorirani alkilni spojevi).

Primjer promjene stila života

Research | Children's Health

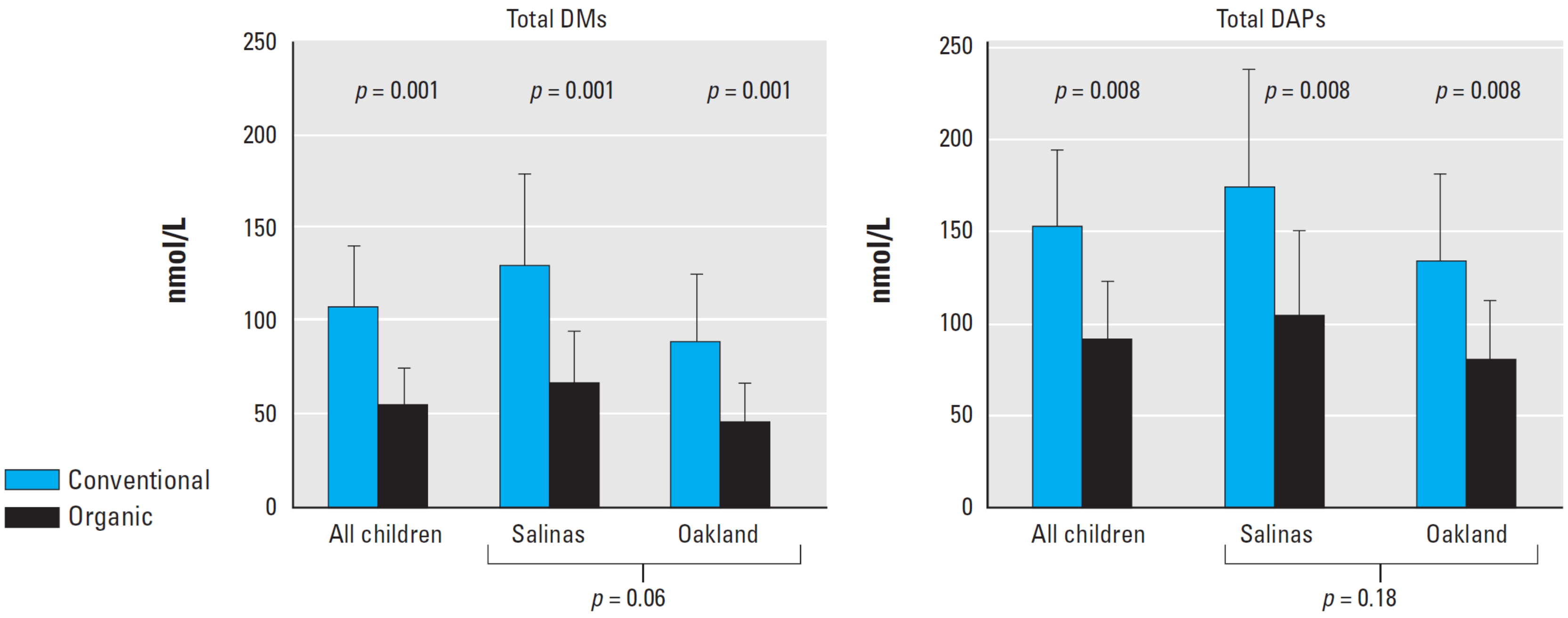
VOLUME 123 | NUMBER 10 | October 2015 • Environmental Health Perspectives

is available at http://dx.doi.org/10.1289/ehp.1408660.

Effect of Organic Diet Intervention on Pesticide Exposures in Young Children Living in Low-Income Urban and Agricultural Communities

Asa Bradman,[1] Lesliam Quirós-Alcalá,[1,2*] Rosemary Castorina,[1] Raul Aguilar Schall,[1] Jose Camacho,[1] Nina T. Holland,[1] Dana Boyd Barr,[3] and Brenda Eskenazi[1]*

[1]Center for Environmental Research and Children's Health (CERCH), School of Public Health, University of California, Berkeley, Berkeley, California, USA; [2]Maryland Institute for Applied Environmental Health, School of Public Health, University of Maryland, College Park, Maryland, USA; [3]Rollins School of Public Health, Emory University, Atlanta, Georgia, USA



Primjer promjene stila života

Primjer…

Hvala na pažnji !

Korištena literatura:

- https://www.epa.gov/
- https://www.cdc.gov/exposurereport/index.html
- https://echa.europa.eu/hr/home
- https://www.ellenmacarthurfoundation.org/
- https://www.glas-koncila.hr/author/vvrcek/
- Int. J. Environ. Res. Public. Health 2015, 12, 10549.
- Environ. Health Perspect. 2008, 116, A24.
- J. Photochem. Photobiol. A: Chemistry 2003, 158, 63.
- Nature 2001, 412, 321.
- Environ. Sci. Eur. 2016, 28, 3.
- JAMA 2017, 318, 1610.
- Environ. Sci. Technol. 2019, 53, 7068.
- Mar. Pollut. Bull. 2001, 42, 1297.
- Environ. Health. Persp. 2015,123, 1086.
- PNAS 2014, 111, 17200.
- Int. J. Hyg. Environ. Health 2017, 220, 8.
- Environ. Sci. Technol. Lett. 2017, 4, 105.
- Environ. Sci. Technol. 2019, 53, 12300.
- Itd…