



Age: 10-13

SO-BAL GIRLS

WHAT'S IN YOUR WATER

**Aahana Ghotge¹, Saanvi Gaddam², Reeva Gothoskar³,
Amanya Gourav⁴**

**Polo Ridge Elementary¹, Polo Ridge Elementary², Polo Ridge Elementary³,
Providence Spring Elementary⁴**

*Corresponding author:
Dr. Lopamudra Das Roy
Questions, please reach out:
lopa@breastcancerhub.org*

A B S T R A C T

Background: Have you ever stopped and thought about what's in your drinking water? It could be anything! Most of you probably have filters but what about countries that either don't have resources or have the types of contaminants that cannot be “filtered out”? **Aim:** Our aim was to research how water (consumption & other uses) can contribute to cancer; understand the side-effects and diagnosis and steps or precautions to take to avoid water-borne cancer. **Methods:** We did both individual internet research; and met as a group every few weeks for group research and discussions. We also discussed our ideas and analysis with our parents. **Discussion:** We observed and realized that causes of cancer are everywhere in our daily lives – water we drink, fruits and veggies we eat or air we breathe could all carry carcinogenic! **Conclusion:** We have realized that the water we consume and various forms can have a huge impact to overall wellbeing and probability to get cancer. **Being educated and aware; and investing in cancer research like BCH is the only way to COMBAT this deadly disease.**

C A R C I N O G E N I C S

- A Carcinogenic is something that can **directly cause cancer**. [1]
- You are exposed to carcinogenic no matter where you are. [1]
- Depends on the **length of exposure** and a person's **overall health**. [1]

Foods and Drinks [2]

Processed & Red Meats
Alcoholic beverages
Hot beverages >65
Artificial sweeteners;
Food coloring



Household Products [3]

Air fresheners &
Deodorants
Cleaning supplies
Weedicides, Insecticides
& Pesticides



Cosmetics [4]

Parabens;
Synthetic colors
Fragrances;
Sunscreens



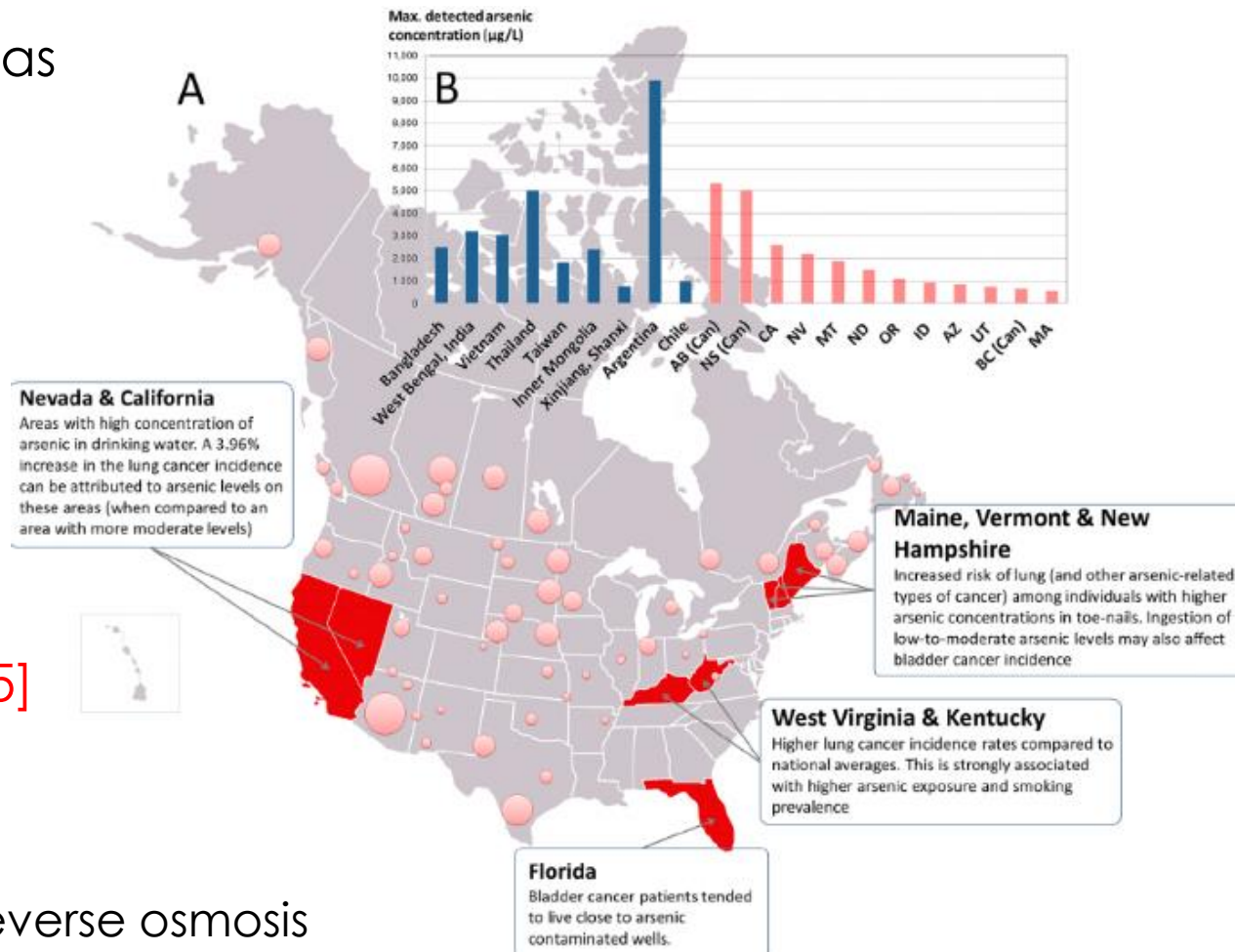
ARSENIC

- ❖ Element found in **rocky soil, water, air, and plants** [5]
- ❖ **Dissolves easily in groundwater** (wells) in areas with mineral deposits or industrial wastes [5]
- ❖ Exposure by **smoking tobacco**, being **around tobacco smoke**, drinking **contaminated water**, or **eating pesticide-treated food!** [6]
- ❖ Lung, bladder, skin, liver, kidney, prostate cancer [5]

How to Avoid?

1. Get your water tested!
2. Ultrafiltration, distillation, reverse osmosis

Heating or boiling water will **not** remove arsenic

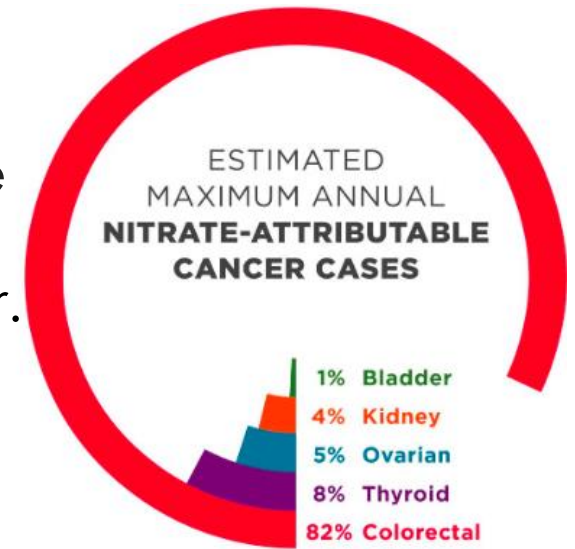


https://www.researchgate.net/publication/236062724_Molecular_features_in_arsenic-induced_lung_tumors

OTHER WATER-BORNE CARCINOGENS

Nitrates

- ❖ Nitrogen-based **Fertilizers used in farming** are the biggest source of Nitrogen in water. [5]
- ❖ Nitrates + Amines = NOC known to cause cancer.
- ❖ Nitrate is **hard and costly to filter out** of water. [5]



<https://www.ewg.org/research/nitrate-us-tap-water-may-cause-more-12500-cancers-year>

PFAS

- ❖ PFAs are a group of chemicals resistant to heat, water, and oil. [5]
- ❖ Classified by EPA as emerging contaminant on national landscape [5]
- ❖ Contaminated soil and water used to grow the food; Food packaging containing PFAS.
- ❖ **Fire fighting training exercises** and responses have resulted in PFAS contamination at many DOD sites [7]

1,4-DIOXANE

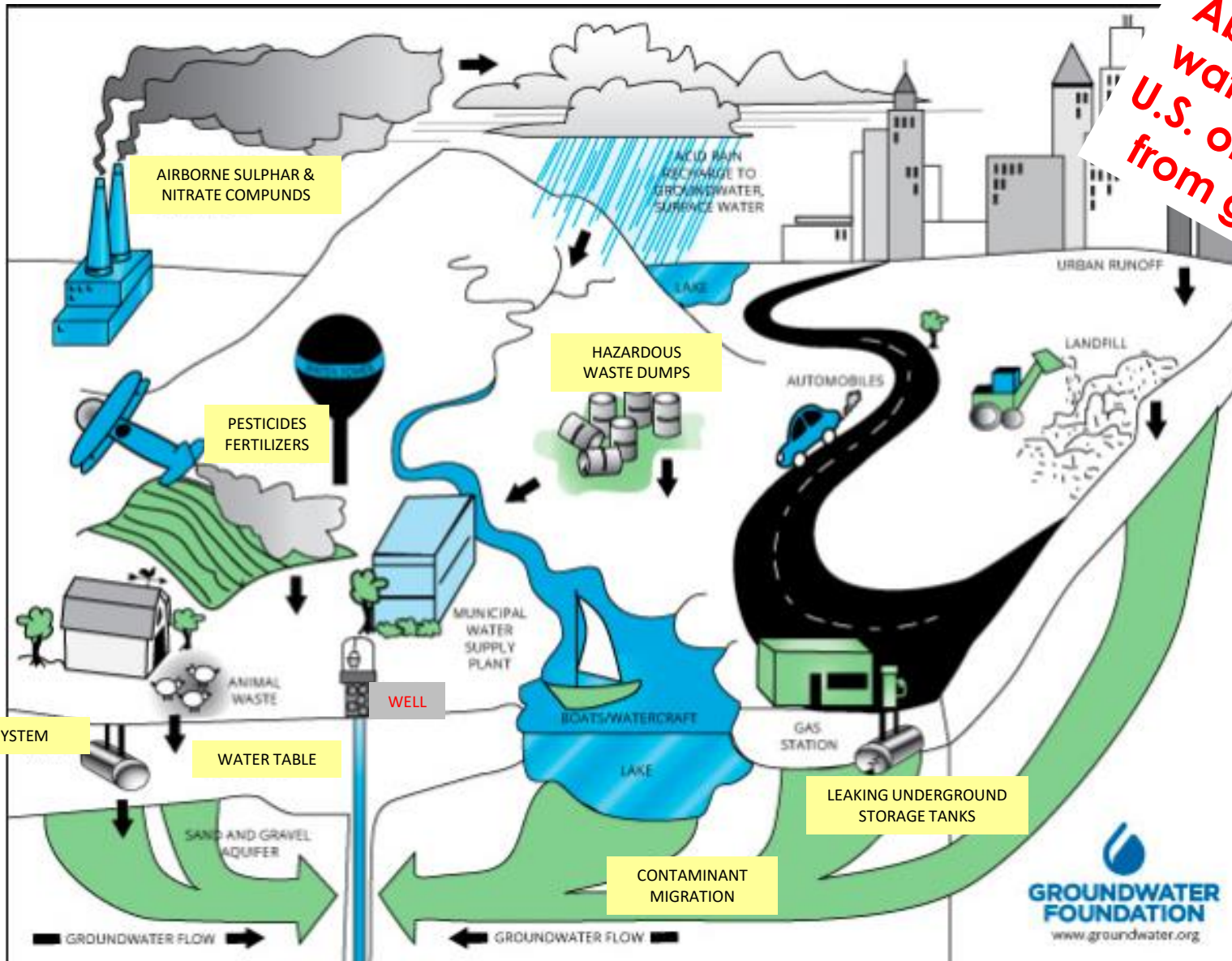
- ❖ Looks like clear liquid; **highly soluble in water**, does not readily bind to soils, and readily leaches to groundwater. [8]
- ❖ **Difficult to treat & resistant to natural biodegradation** processes. [8]
- ❖ **Leaking underground storage tanks** at hazardous waste sites, or discharges from manufacturing plants. [9]
- ❖ Many **personal care products & household cleaners** [9]
- ❖ Extent of its presence in products is hard to quantify because it is considered a byproduct, not an ingredient added on purpose, so it isn't listed on product labels. [10]
- ❖ Short term exposure > liver function, skin lesions etc.
- ❖ Long term exposure > immune system > liver & kidney cancer.

EWG shows that dioxane is found in drinking water in **45 states**, **afflicting over 90 million people** in U.S. had the highest numbers! [8]

California, New York, and North Carolina had the highest numbers! [8]

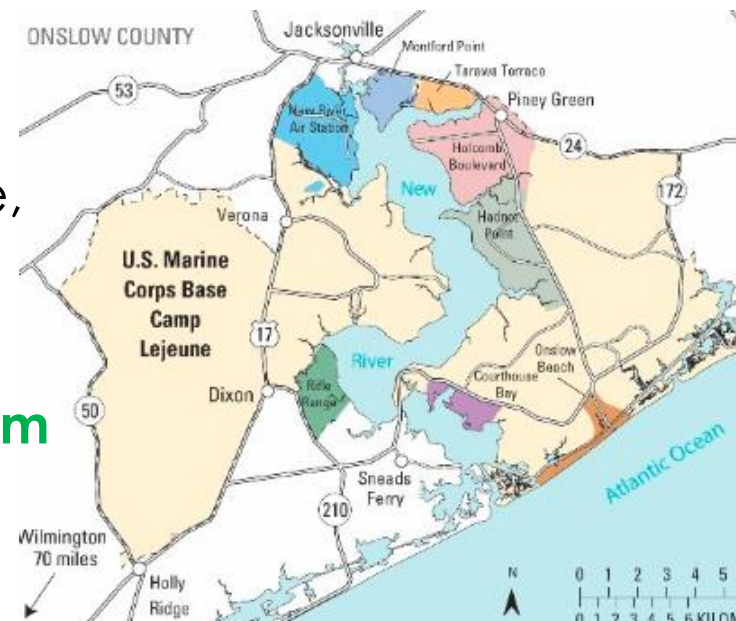
HOW CARCINOGENS GET INTO WATER

About 90% of public water systems in the U.S. obtain their water from groundwater.



CLOSE TO HOME CANCER IN CAMP LEJUENE NC

- ❖ Marine Corps base in North Carolina **70 miles north of Wilmington** [11]
- ❖ Tanks **full of chemicals** (including dioxane, arsenic and more!) [11]
- ❖ Starting 1953, leakage into ground that seeped into wells which **people drank from for 35 years** causing diseases – biggest is **male breast cancer** [11]



What has happened since...

- ❖ 3 lawsuits have been filed against the marine corps. [11]
- ❖ **Janey Ensminger Act** was passed on July 18, 2012 by US Senate in honor of his daughter (Janey) who died of cancer at age 9. [11]
- ❖ Gives free medical care to 15 conditions of cancer and other diseases caused by this water contamination [11]

STORY OF A SURVIVOR

MIKE PARTAIN

- ❖ Lived in Camp Lejeune [12]
- ❖ In April 2007, felt a grape-sized bump on his right nipple; figured it was ingrown hair & didn't action!
- ❖ Doctors decided on mammogram; and official diagnosis was **Stage 2 breast cancer.** [12]



He had no idea it was due to Camp Lejeune contamination!

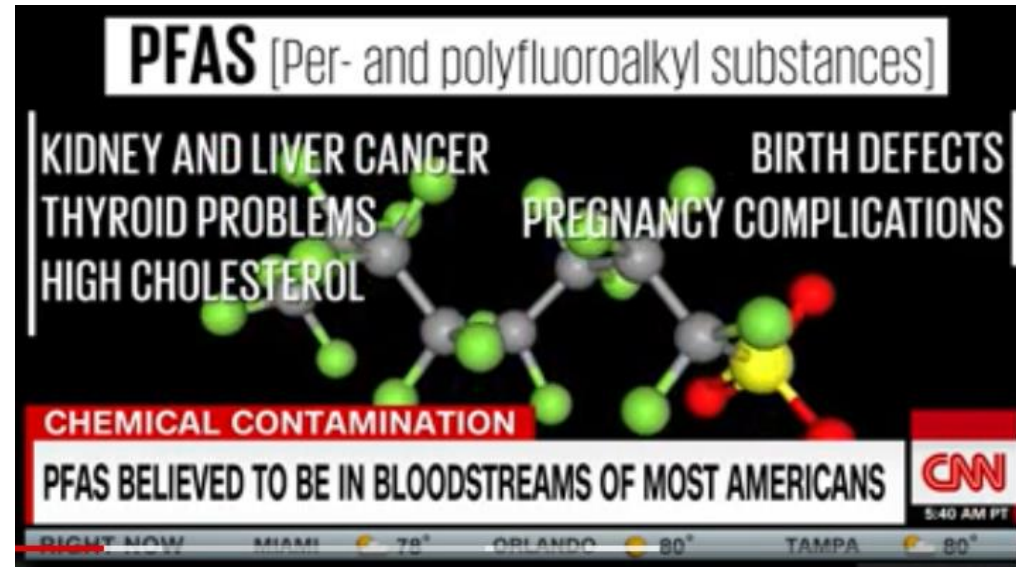
- ❖ In 2012 Sgt Jerry Ensminger **testified in congress** about Marine children born at Camp Lejeune between **Jan1968-Dec1985** at risk of cancer[11]
- ❖ The documentary ***Semper Fi: Always Faithful*** captures the survivors early struggle to uncover the truth and our fight for justice [12]

To date, Camp Lejeune represents one of the **worst drinking water contamination events in this country's history.** [12]

IN RECENT NEWS – CNN Report 8/22/19

In Belmont, Michigan...

- ❖ **Wolverine shoe factory** has been dumping waste in Belmont's main water supply wrapped in **3M** scotch tape leaking **PFAS**. [13]
- ❖ **3M & Wolverine** shoe factory have been sued by state of Michigan [13]
- ❖ **PFAS** cause kidney and liver cancer, birth defects & pregnancy issues
- ❖ **PFAS** is also in non stick pans, fabric protectants. [13]



In New Mexico...

- ❖ A farmer is **dumping 12,000 gallons** of milk a day. [13]
- ❖ Firefighting foam used in training exercises at the nearby Cannon Air Force Base contaminated the groundwater with PFAS. [13]



POISON IN YOUR GARDEN!!!!

Are you jealous of your neighbors very green and perfect lawn?

You shouldn't be! They probably used **roundup** which is under scrutiny!

- ❖ **World Health Organization's** (WHO) panel of cancer experts, published its 2015 review of the cancer risks of glyphosate. [14]
- ❖ There are **2400 lawsuits** and counting against Monsanto/Bayer (the parent company)!!!! [14]
- ❖ Glyphosate or “Roundup”, is a herbicide
- ❖ Recent study by oncologists Dr. Hardell & Dr. Eriksson , has revealed clear links glyphosate, to non-Hodgkins lymphoma, a form of cancer. [15]
- ❖ Recent tests have found glyphosate in **water, urine, breast milk, food** etc. [15]



WORLD SCENARIO

CHINA...

- ❖ **Half of China's population cannot access water** that is safe for human consumption and two-thirds of China's rural population relies on tainted water. [16]
- ❖ China's water supply has been contaminated by the dumping of toxic human and industrial waste. [16]
- ❖ In 2011, Greenpeace launched Detox campaign to publicize the relationship between MNC, suppliers & water pollution in China. [17]

INDIA...

- ❖ According to reports, 17 of Bihar's 38 districts have groundwater with arsenic concentrations above the permitted limit. [18]
- ❖ Hand pumps in some parts have been found to have severe arsenic poisoning with concentrations above 1,500 parts per billion but sadly India does not have the supplies to fix it. [18]

WORLD SCENARIO

UNITED STATES of AMERICA...

- ❖ Millions of tons of **nitrates** from industrial farming get into America's drinking water each year. [19]
 - ❖ Nearly **12,600 cases** of cancer/year in America due to nitrates [19]
 - ❖ 3,000 babies with very low birth weight & 1,700 preterm births [19]
- ❖ **Small farming communities** have the highest nitrate levels in their water.
- ❖ **Iowa and California** two heavily agricultural states were found to have the most nitrate-related cancer cases [19]
- ❖ For tap water to be safe, levels need to be **70 X lower** than today [19]
- ❖ EWG's 2017 released report on Tap Water Database shows that of **93 of 250 contaminants** detected in tests are linked to an increased risk of developing cancer. (***Data from tap water data analyzed for 48,000 water utilities nationwide for 2010 – 2015***) [20]

OUR ANALYSIS

Developed VS Developing Countries

- ❖ Our research shows that **developed countries have more overall cancer cases than developing** countries.
- ❖ **Developed** countries have **more industrial wastes** in their water and get more cancer.
- ❖ **Developed** countries also use more pesticides and fertilizers in their crop causing **more nitrate water** contamination.

❖ **Developing** countries on the other hand rely on more natural means of life and **industrial waste is lesser.**

❖ However, **developed** countries have more resources to purify water and also medical facilities to treat cancer.

Percentage of population using an unimproved drinking water source

<1	1-10	11-20	>20	Insufficient data or not applicable
----	------	-------	-----	-------------------------------------



<https://www.theguardian.com/global-development-professionals-network/2017/mar/17/access-to-drinking-water-world-six-infographics>

PRECAUTIONS & AVOIDANCE

- ❖ **Filtered tap water over bottled water!**
- ❖ Install tap **filters** or store drinking water in pitcher with a filter. [21]
- ❖ **Plain water over flavored water!**
- ❖ Always choose bottled water in **glass or BPA-free plastic container** [21]
- ❖ Boil your water if you think it is contaminated with bacteria. [21]
- ❖ Reverse osmosis systems and ion exchange pour-through. [21]
- ❖ **Drink at least 8 glasses of water a day**
- ❖ Stay clear from swim-pools that have bacteria risk/standing water [21]

How to spot water imposters

Try to get your nutrients from foods. Not drinks.

Check the calories
Real water has zero calories.

Watch out for sugar
Some so-called waters have sugar or other sweeteners.

Look for sodium
Make sure you're not consuming more than 2,400 milligrams a day.

Nutrition Facts	
Serving Size 12 fl oz (360mL)	
Servings Per Container 2	
Amount Per Serving	
Calories 0	
% Daily Value*	
Total Fat 0	0%
Total Carbohydrate 0	0%
Sugar 0	0%
Sodium 0	0%
Protein 0	0%

THE UNIVERSITY OF TEXAS
MDAnderson
Cancer Center
Making Cancer History®

<https://www.mdanderson.org/publications/focused-on-health/Waterdrinks.h30Z1590624.html>

REFERENCES

1. <https://www.webmd.com/cancer/known-common-carcinogens#1>
2. <https://www.huffingtonpost.com.au/2016/08/15/17-carcinogenic-foods-you-probably-eat-every-day>
3. <https://www.cheatsheet.com/health-fitness/cancer-from-chemicals-household-products-that-are-known-carcinogens.html/>
4. <https://www.healthline.com/health/carcinogenic-ingredients-your-personal-care-products#common-chemicals>
5. <https://epa.gov>
6. <https://cancer.org>
7. <https://www.ewg.org/research/pfas-chemicals-contaminate-us-military-sites>
8. <https://en.wikipedia.org/wiki/1,4-Dioxane>
9. <https://www.wateronline.com/doc/in-u-s-million-affected-by-dioxane-pollution-0001>
10. <https://news.bloombergenvironment.com/environment-and-energy/california-considers-curbing-a-chemical-in-household-detergents>
11. https://en.wikipedia.org/wiki/Camp_Lejeune_water_contamination
12. <https://malebreastcancercoalition.org/Survivor%20Stories/mike-partain/>
13. <https://www.cnn.com/2019/08/22/politics/pfas-water-chemicals/index.html>
14. <https://usrtk.org › pesticides › glyphosate-health-concerns>
15. https://www.fs.usda.gov/nfs/11558/www/nepa/103623_FSPLT3_4284738.pdf
16. <https://borgenproject.org/water-pollution-in-china/>
17. <http://www.greenpeace.org/eastasia/campaigns/toxics/problems/water-pollution/>
18. <https://www.cnn.com/2017/04/28/health/arsenic-water-pollution-cancer-india/index.html>
19. <https://www.usnews.com/news/health-news/articles/2019-06-12/your-drinking-water-may-harbor-cancer-causing-nitrate-study>
20. <https://mytapscore.com/blogs/tips-for-taps/glyphosate-most-common-herbicide-puts-tap-water-at>
21. https://www.breastcancer.org/risk/factors/water_chem