

Using toenail biomarkers to compare arsenic speciation and metallomic profiles in breast, cervical, prostate, and skin cancers

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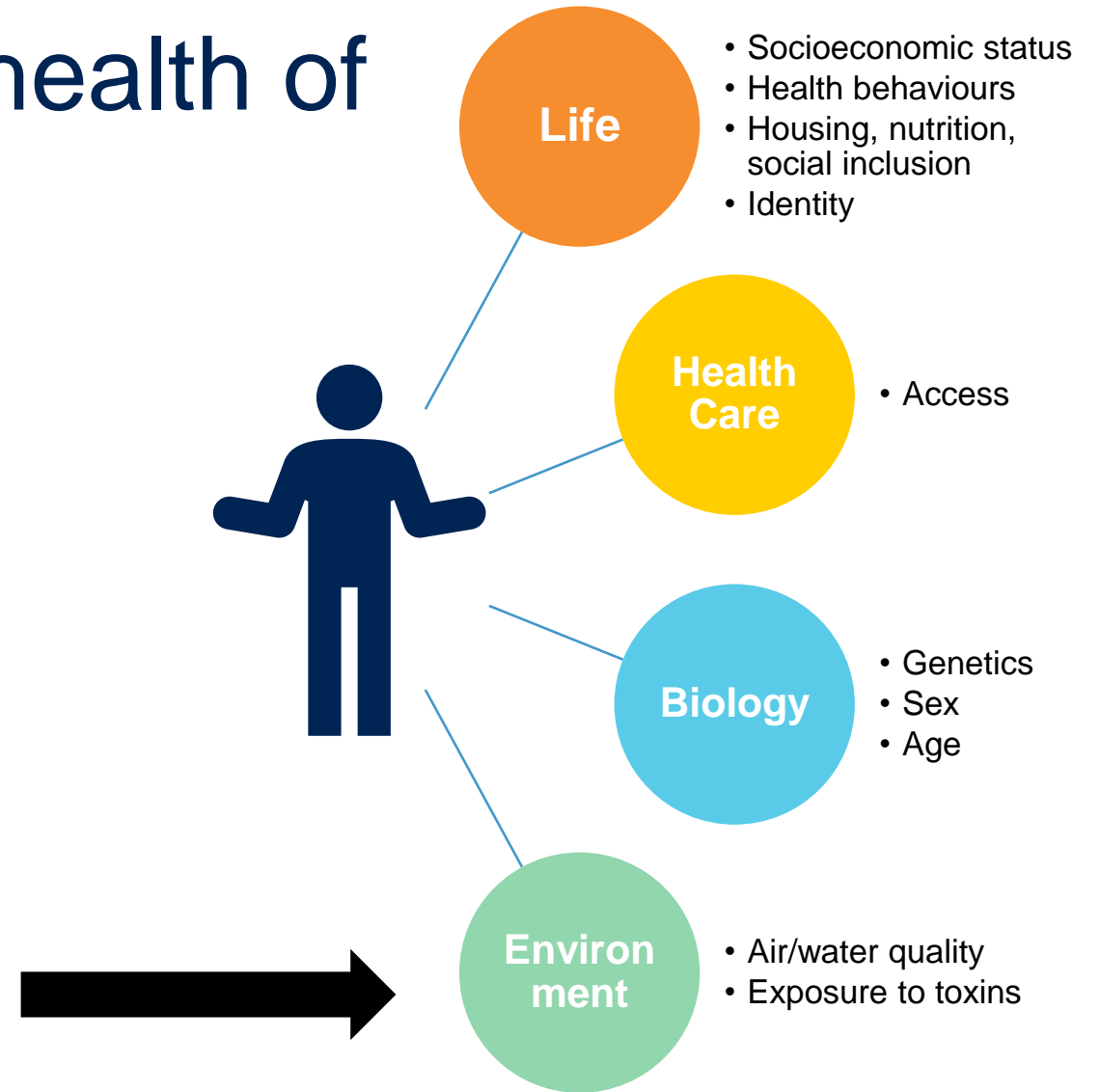
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How can we improve the health of Canadians?

What makes Canadians sick?

What are the determinants of Health?



Arsenic Exposure

Agency for Toxic Substances & Disease Registry:

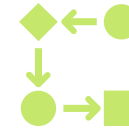
- Arsenic (As) is #1 global health hazard
- Lead (Pb) – #2
- Mercury – #3
- Cadmium (Cd) – #7



Naturally found around the world



Common water contaminant
Inorganic arsenic (iAs)



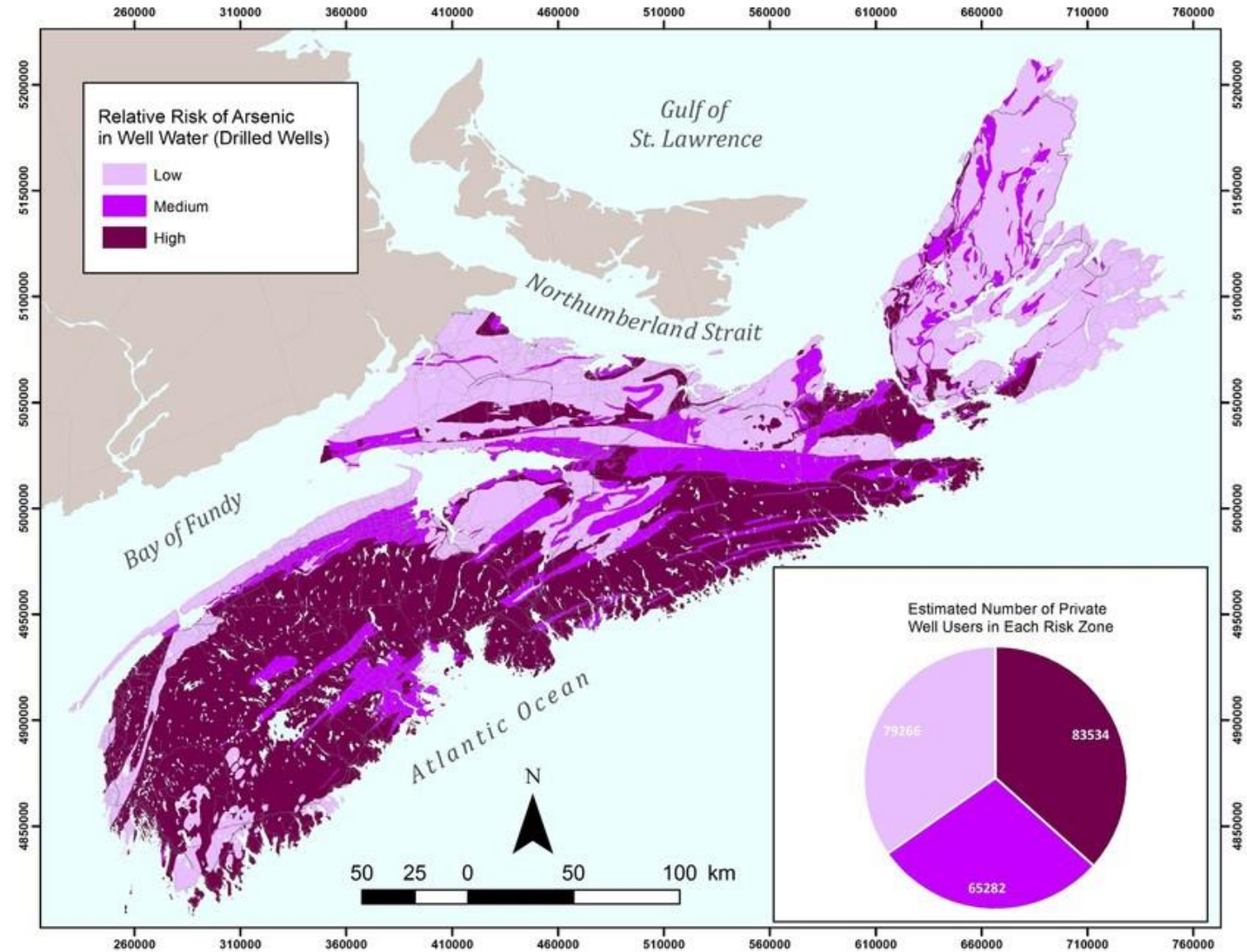
Associated with several cancers
Drinking water considered main exposure pathway



Recommended limit 10 $\mu\text{g/L}$

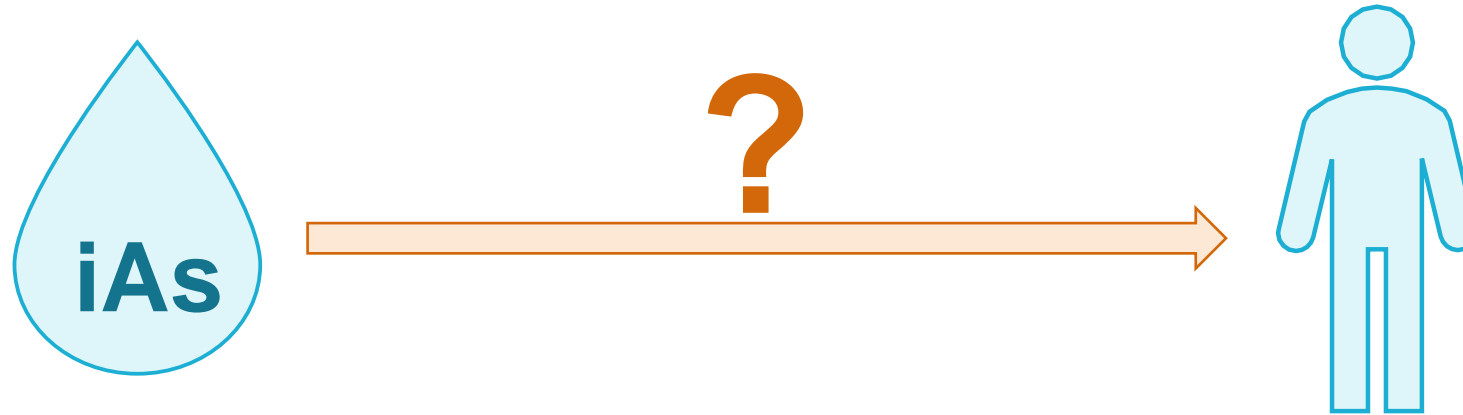
Atlantic Canada

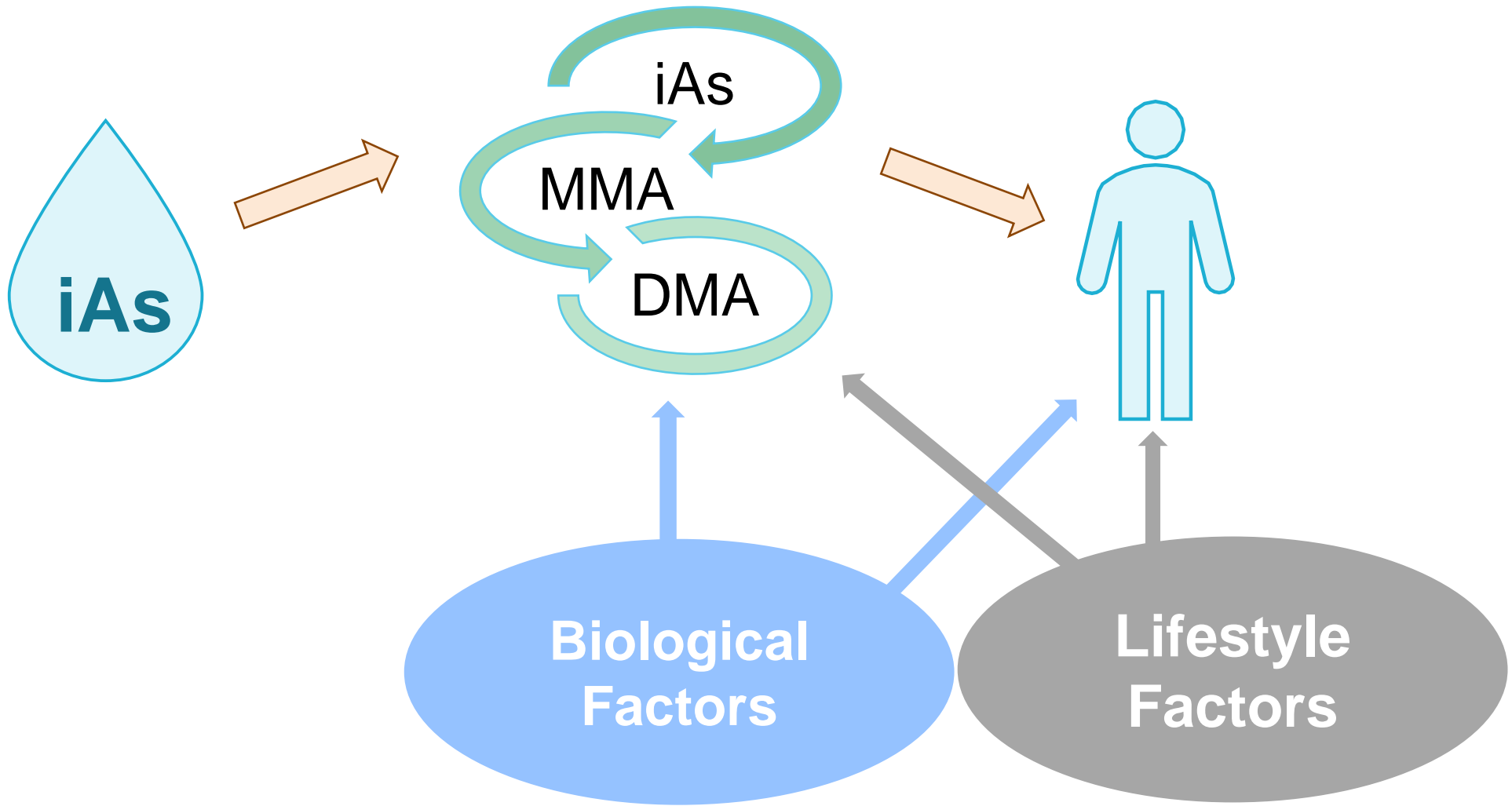
- High levels of geological As
- Prevalent well-water usage
- Highest age-standardized incidence rates of cancer



GW Kennedy & JM Drage (2017)

What's the link between As exposure and cancer?





How can we assess these associations?

Atlantic
PATH



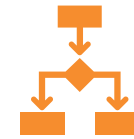
**Use toenails to
create profiles**

Novel biomarker
Toxicology analysis



**Compare profiles
between cases &
controls**

As **speciation** & total
metals

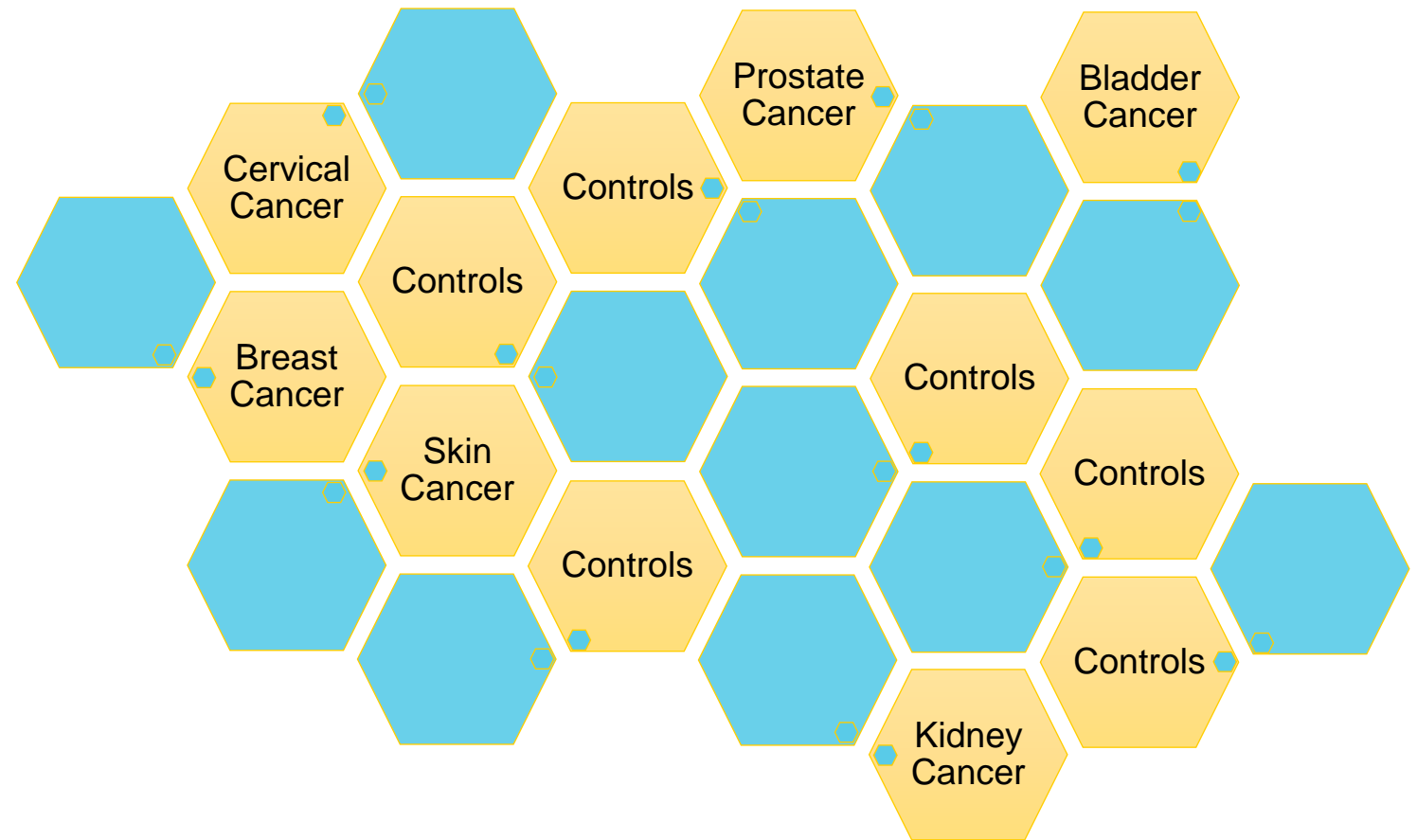


**Identify factors
linked to altered
profiles**

Approach

- Breast, cervical, prostate, skin, bladder, kidney, and lung cancer cases
- Age and sex matched controls (1:1)

Atlantic PATH cohort

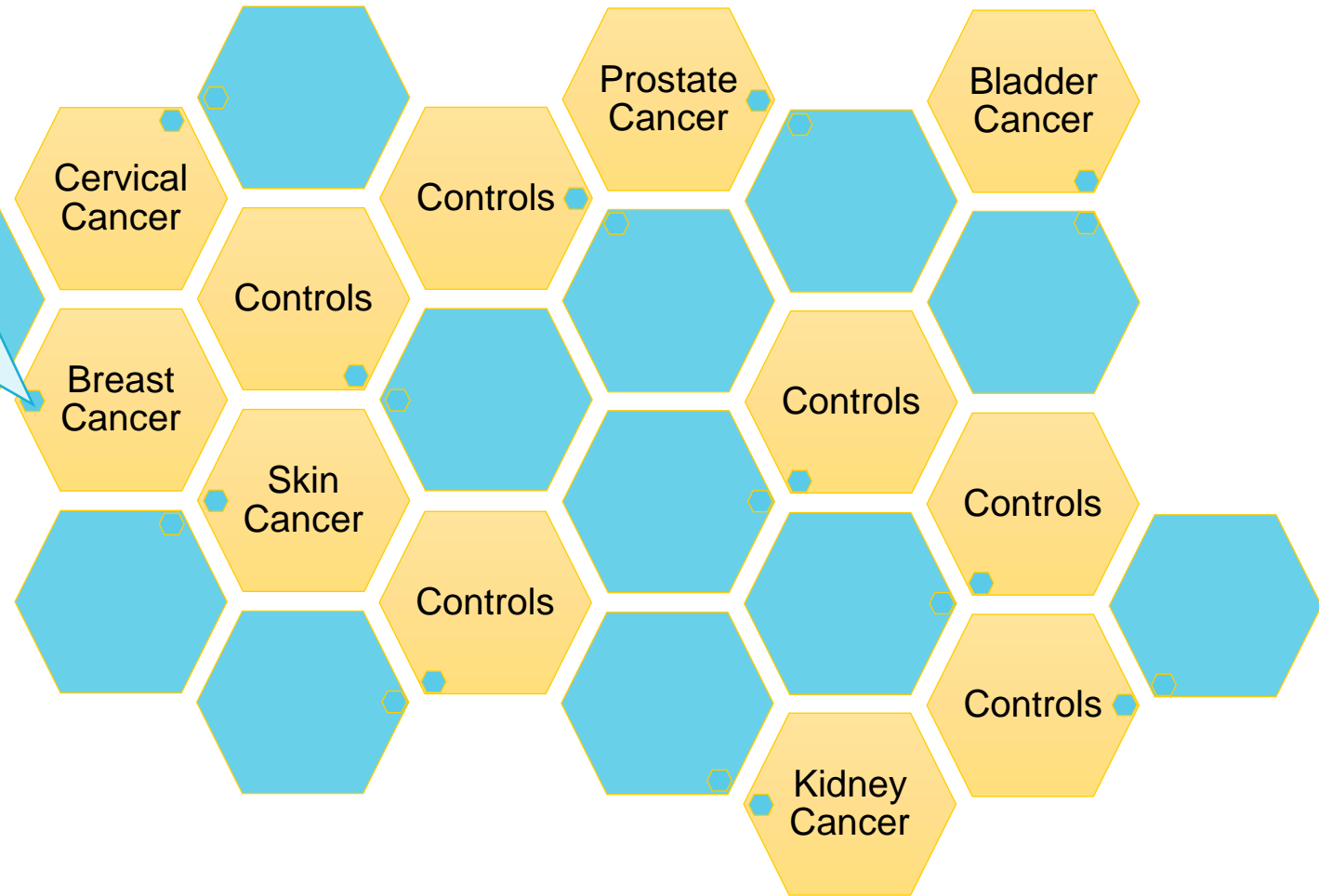


Participant information:

Age
Sex
History of cancer
Family history of cancer
Smoking frequency
Physical activity
Body mass index (BMI)
Water source

Toenail sample:

Total metals concentration
As speciation



Implications

- Risk of chronic exposure to As in drinking water
 - Reassess WHO and Health Canada recommended limits
 - Improved monitoring
- As methylation a better predictor of cancer than total As
 - Potential for upstream biomonitoring project



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