environmental defence
INSPIRING CHANGE

Pollution in People:

Toxic Chemical Profiles of 11 Adults and 5 Families Across Canada

Body Burden Testing Results
September 2007

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Pollution in 11 Canadian Adults

Executive Summary

A cocktail of harmful toxic chemicals has been detected in every person tested in a cross-Canada study of pollution in people.

Environmental Defence tested 11 people from across the country for the presence of 88 chemicals in their blood and urine.

Here are the results:

- 60 of 88 chemicals tested for were detected, including 18 heavy metals, five PBDEs, 14 PCBs, one perfluorinated chemical, 10 organochlorine pesticides, five organophosphate insecticide metabolites, and seven VOCs.

- Of the 60 chemicals detected:
  - 41 are suspected cancer-causing substances,
  - 53 are chemicals that can cause reproductive disorders and harm the development of children,
  - 27 are chemicals that can disrupt the hormone system, and
  - 21 are chemicals associated with respiratory illnesses.

For more details, read Toxic Nation: A Report on Pollution in Canadians.

Summary: Number of chemicals detected in the *Toxic Nation* volunteers

Chemical Group	Total number of chemicals tested	Total number of Chemicals detected	Average number of chemicals detected in a volunteer
Heavy metals	19	18	17
PBDEs	5	5	3
PCBs	16	14	10
PFOS	1	1	1
Organochlorine pesticides	13	10	8
Organophosphate insecticide metabolites	6	5	4
VOCs	28	7	1
Total	**88**	**60**	**44**

Summary: Health effects of chemicals found in volunteers

Chemicals' Effect on Health	Number of chemicals detected in volunteers that are linked to listed health effect		
	Total	Average	Range (min to max)
Carcinogen	41	28	18-36
Hormone disruptor	27	18	13-24
Respiratory toxicant	21	15	12-18
Reproductive/ developmental toxicant	53	38	28-46

* Includes both recognized and suspected health effects for each chemical as identified on Scorecard.org Chemical Profiles in August 2005. The sum of health effects is greater than the total number of chemicals because a chemical may have multiple health effects

Summary: Chemical concentrations detected in the *Toxic Nation* volunteers

Chemical Group	Chemical concentrations in all volunteers		
	Median	Minimum	Maximum
Heavy metals **(umol/L in whole blood) Beryllium, copper, lithium, lead, zinc, selenium**	2.7	< 0.05	160
Heavy metals **(nmol/L in whole blood) Arsenic, bismuth, cadmium, cobalt, manganese, molybdenum, nickel, silver, tellurium, tin, thallium, uranium, mercury**	7	< 0.07	220
PBDEs **(ug/L in plasma)**	0.011	< 0.01	0.43
PCBs **(ug/L in plasma)**	0.018	< 0.01	19
PFOS **(ug/L in plasma)**	10	6.9	30
Organochlorinated pesticides **(ug/L in plasma)**	0.0098	< 0.005	8.2
Organophosphate insecticide metabolites **(ug/g cre in urine)**	1.9	< 0.67	61
VOCs **(ng/mL in whole blood)**	< 0.5	< 0.5	1.9

* Values of less than (<) = *not detected* at the lowest level of detection

Robert Bateman

48 of 88 chemicals were detected in Robert, including 32 cancer-causing chemicals.

Age: **75**
Sex: **Male**
Occupation: **Artist and naturalist**
Place of residence: **Saltspring Island, BC ; spent 55 years in southern Ontario**
Exposure to chemicals on the job: **Exposure to various chemicals through oil paints, acrylics, and printmaking, as well as exposure to asbestos as a teacher in the 1960s and to arsenic in museum work in the 1950s and 60s**
Height: **5'10"** Weight: **160 lb, stable**
Diet: **Omnivore**
Proportion of diet that is organic: **80%**
Hours spent in front of computer/day: **0**
Purchase of products likely to contain brominated flame retardants: **7 years ago**
Visited malarial area: **Yes, yearly since 1953**
Use of air fresheners: **None**
Pesticide use: **Occasional use of wasp nest spray**
Consumption of cigarettes: **None**

"Participating in this testing program was very important to me. Not only am I curious about my own chemical contamination, but is even more vital that the public as a whole pays attention. In learning about my own situation, I would hope to be able to take steps to improve things or at least change my ways to limit further insults to my physiology. Far more urgent, however, is the necessity to have a groundswell of public opinion which should give government more backbone to stand up to industry lobbies and pass strong protective legislation and ensure generous budgets to police the polluters."

—Robert Bateman

Number of chemicals detected in Robert that are linked to a listed chemical health effect, and the study average

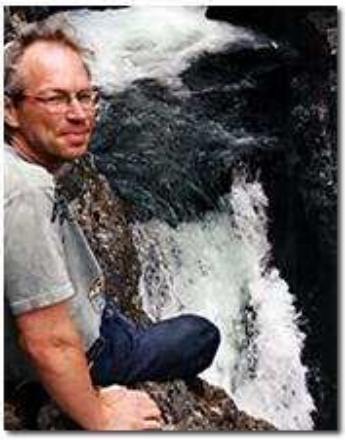
Chemicals' Effect on Health	Number of Chemicals Detected that are Linked to a Listed Health Effect	
	In Robert	Average in Study Volunteers
Carcinogen	32	28
Hormone disruptor	19	18
Respiratory toxicant	16	15
Reproductive/ developmental toxicant	42	38

Number and concentration of chemicals detected in Robert, and median chemical concentration in study volunteers

Chemical Group	Robert's Results			Median Concentration in Study Volunteers
	Number of Compounds Detected	Median Concentration	Concentration Range	
Heavy metals **(umol/L in whole blood): Beryllium, copper, lithium, lead, zinc, selenium**	5 of 6	2.5	< 0.05 to 120	2.7
Heavy metals **(nmol/L in whole blood): Arsenic, bismuth, cadmium, cobalt, manganese, molybdenum, nickel, silver, tellurium, tin, thallium, uranium, mercury**	12 of 13	5.5	< 10 to 190	7
PBDEs **(ug/L in plasma)**	2 of 5	< 0.02	< 0.01 to 0.031	0.011
PCBs **(ug/L in plasma)**	12 of 16	0.042	< 0.01 to 2.3	0.018
PFOS **(ug/L in plasma)**	1 of 1	6.9	n/a	10
Organochlorine pesticides **(ug/L in plasma)**	10 of 13	0.015	< 0.005 to 2.5	0.0098
Organophosphate insecticide metabolites **(ug/g cre in urine)**	5 of 6	1.2	< 0.67 to 5.3	1.9
VOCs **(ng/mL in whole blood)**	1 of 28	< 0.5	< 0.5 to trace	< 0.5
Total number of chemicals found in Robert: 48 of 88				

Norm Tandberg

49 of 88 chemicals were detected in Norm, including 31 cancer-causing chemicals.



Age: **54**
Sex: **Male**
Occupation: **Letter Carrier with Canada Post**
Place of residence: **Victoria , BC**
Exposure to chemicals on the job: **Worked in an ice plant 1970-73**
Height: **6'** Weight: **175 lb, stable**
Diet: **Omnivorous (limited meat intake)**
Proportion of diet that is organic: **50%**
Hours spent in front of computer/day: **0**
Purchase of products likely to contain brominated flame retardants: **5 years ago**
Visited malarial area: **No**
Use of air fresheners: **None**
Pesticide use: **None in garden, flea spray 6 years ago, neighbour uses pesticides**
Consumption of cigarettes: **None**

"I am disturbed to see I have any of the chemicals, pesticides and heavy metals that were tested. I thought that there would be little to show in my system because of my lifestyle and the area where I live. Turns out I was wrong. I have a new curiosity as to how to prevent further contamination of my body and the environment I live in."

—Norm Tandberg

Number of chemicals detected in Norm that are linked to a listed chemical health effect, and the study average

Chemicals' Effect on Health	Number of Chemicals Detected that are Linked to a Listed Health Effect	
	In Norm	Average in Study Volunteers
Carcinogen	**31**	**28**
Hormone disruptor	**20**	**18**
Respiratory toxicant	**15**	**15**
Reproductive/ developmental toxicant	**41**	**38**

Number and concentration of chemicals detected in Norm, and median chemical concentration in study volunteers

Chemical Group	Norm's Results			Median Concentration in Study Volunteers
	Number of Compounds Detected	Median Concentration	Concentration Range	
Heavy metals **(umol/L in whole blood) Beryllium, copper, lithium, lead, zinc, selenium**	5 of 6	1.6	< 0.05 to 94	2.7
Heavy metals **(nmol/L in whole blood): Arsenic, bismuth, cadmium, cobalt, manganese, molybdenum, nickel, silver, tellurium, tin, thallium, uranium, mercury**	12 of 13	5.9	< 10 to 160	7
PBDEs **(ug/L in plasma)**	3 of 5	<0.02	< 0.01 to 0.13	0.011
PCBs **(ug/L in plasma)**	11 of 16	0.024	< 0.01 to 1.2	0.018
PFOS **(ug/L in plasma)**	1 of 1	9.5	n/a	10
Organochlorine pesticides **(ug/L in plasma)**	9 of 13	<0.01	< 0.005 to 0.96	0.0098
Organophosphate insecticide metabolites **(ug/g cre in urine)**	5 of 6	1.9	< 0.67 to 10	1.9
VOCs **(ng/mL in whole blood)**	3 of 28	< 0.5	< 0.5 to 1.6	< 0.5
Total number of chemicals found in Norm: 49 of 88				

Cheryl Henkelman

41 of 88 chemicals were detected in Cheryl, including 35 chemicals that can cause reproductive and developmental disorders.

Age: **46**
Sex: **Female**
Occupation: **Owner of Guardian Angel Home and Pet Sitting Services**
Place of residence: **Fort Saskatchewan , AB**
Exposure to chemicals on the job: **Pesticide and fungicide exposure at provincial tree nursery**
Height: **5'5"** Weight: **120 lb, stable**
Diet: **Lacto-ovo vegetarian**
Proportion of diet that is organic: **20%**
Hours spent in front of computer/day: **1**
Purchase of products likely to contain brominated flame retardants: **Over 20 years ago**
Visited malarial area: **No**
Use of air fresheners: **Occasional**
Pesticide use: **None**

"My initial reaction to my test results was of deep concern. I try to take care of myself as best as I can, yet unknown chemical exposures could be robbing me of a healthy life. The public needs to be made more aware and the people in power need to make changes now for the sake of people's health and our environment."

—Cheryl Henkelman

Number of chemicals detected in Cheryl that are linked to a listed chemical health effect, and the study average

Chemicals' Effect on Health	Number of Chemicals Detected that are Linked to a Listed Health Effect	
	In Cheryl	Average in Study Volunteers
Carcinogen	26	28
Hormone disruptor	18	18
Respiratory toxicant	13	15
Reproductive/ developmental toxicant	35	38

Number and concentration of chemicals detected in Cheryl, and median chemical concentration in study volunteers

Chemical Group	Cheryl's Results			Median Concentration in Study Volunteers
	Number of Compounds Detected	Median Concentration	Concentration Range	
Heavy metals **(umol/L in whole blood): Beryllium, copper, lithium, lead, zinc, selenium**	5 of 6	3.1	< 0.05 to 100	2.7
Heavy metals **(nmol/L in whole blood): Arsenic, bismuth, cadmium, cobalt, manganese, molybdenum, nickel, silver, tellurium, tin, thallium, uranium, mercury**	12 of 13	5.2	< 10 to 106	7
PBDEs **(ug/L in plasma)**	2 of 5	< 0.02	< 0.02 to 0.014	0.011
PCBs **(ug/L in plasma)**	12 of 16	0.036	< 0.01 to 1.8	0.018
PFOS **(ug/L in plasma)**	1 of 1	9.3	n/a	10
Organochlorine pesticides **(ug/L in plasma)**	8 of 13	< 0.005	< 0.005 to 1.5	0.0098
Organophosphate insecticide metabolites **(ug/g cre in urine)**	1 of 6	< 0.67	< 0.67 to 5.4	1.9
VOCs **(ng/mL in whole blood)**	0 of 28	< 0.5	< 0.05 to < 1.0	< 0.5
Total number of chemicals found in Cheryl: 41 of 88				

After finding out her test results, Cheryl has pledged to eliminate many sources of toxic chemicals from her home. To reduce your household's exposure to toxic chemicals make your own Chemical Reduction Pledge.

Cheryl will eliminate the following sources of toxic chemicals from her home:

- Upholstery and furniture that are treated with stain repellants and brominated flame retardants
- Imported PVC-containing mini-blinds
- Chemical air fresheners
- Plastic food wrap
- Crystal tableware
- Cleaning products with harsh chemical ingredients and synthetic fragrances
- Anti-bacterial soaps, dishwashing liquids and other cleaners that contain triclosan;
- Bed sheets that are wrinkle-resistant or made with pesticide-treated cotton
- Moth-proof wool blankets
- Dry-clean clothes
- Clothes with stain repellants, wrinkle-resistant treatments, brominated flame retardants, pesticide-treated cotton or plastic labels
- Cosmetics, toiletries and perfumes with synthetic fragrances
- Antibacterial toothpaste, toothbrushes and mouthwashes that contain triclosan
- Laundry detergents and fabric softeners with synthetic fragrances
- Chlorine bleach
- Chemical pesticides

Merrell-Ann Phare

39 of 88 chemicals were detected in Merrell-Ann, including 35 chemicals that can cause reproductive and developmental disorders.

Age: **40**
Sex: **Female**
Occupation: **Legal Counsel and Executive Director of the Centre for Indigenous Environmental Resources (CIER)**
Place of residence: **Winnipeg , MB**
Exposure to chemicals on the job: **No**
Height: **5'10"** Weight: **140 lb, stable**
Diet: **Lacto-ovo vegetarian**
Proportion of diet that is organic: **35%**
Hours spent in front of computer/day: **6**
Purchase of products likely to contain brominated flame retardants: **Within the last 5 years**
Visited malarial area: **South Africa , 1995**
Use of air fresheners: **Incense**
Pesticide use: **None**
Consumption of cigarettes: **None**

"I am surprised that my levels of toxic chemicals weren't lower because I'm very careful about my exposure to chemicals. My results seem to indicate that chemicals are so pervasive and persistent that they are difficult to avoid. An astounding result is the fact I have DDT in my body. I know that DDT was banned years ago in Canada, but it's still contaminating my body."

—Merrell-Ann Phare

Number of chemicals detected in Merrell-Ann that are linked to a listed chemical health effect, and the study average

Chemicals' Effect on Health	Number of Chemicals Detected that are Linked to a Listed Health Effect	
	In Merrell-Ann	Average in Study Volunteers
Carcinogen	26	28
Hormone disruptor	15	18
Respiratory toxicant	13	15
Reproductive/ developmental toxicant	35	38

Number and concentration of chemicals detected in Merrell-Ann, and median chemical concentration in study volunteers

Chemical Group	Merrell-Ann's Results			Median Concentration in Study Volunteers
	Number of Compounds Detected	Median Concentration	Concentration Range	
Heavy metals **(umol/L in whole blood): Beryllium, copper, lithium, lead, zinc, selenium**	5 of 6	2.1	< 0.05 to 89	2.7
Heavy metals **(nmol/L in whole blood): Arsenic, bismuth, cadmium, cobalt, manganese, molybdenum, nickel, silver, tellurium, tin, thallium, uranium, mercury**	10 of 13	0.16	< 0.07 to 190	7
PBDEs **(ug/L in plasma)**	3 of 5	< 0.02	< 0.01 to 0.12	0.011
PCBs **(ug/L in plasma)**	9 of 16	0.011	< 0.01 to 0.72	0.018
PFOS **(ug/L in plasma)**	1 of 1	12	n/a	10
Organochlorine pesticides **(ug/L in plasma)**	6 of 13	< 0.01	< 0.005 to 0.95	0.0098
Organophosphate insecticide metabolites **(ug/g cre in urine)**	4 of 6	2.5	< 0.67 to 61	1.9
VOCs **(ng/mL in whole blood)**	1 of 28	< 0.5	< 0.5 to 0.5	< 0.5
Total number of chemicals found in Merrell-Ann: 39 of 88				

Christine Chui

32 of 88 chemicals were detected in Christine, including 28 chemicals that can cause reproductive and developmental disorders.

Age: **25**
Sex: **Female**
Occupation: **student in graphic animation**
Place of residence: **Toronto , ON ; born in Hong Kong , China , and spent 16 years in Edmonton , AB.**
Exposure to chemicals on the job: **None**
Height: **5'7"** Weight: **135 lb, stable**
Diet: **Omnivore**
Proportion of diet that is organic: **10%**
Hours spent in front of computer/day: **5**
Purchase of products likely to contain brominated flame retardants: **Within the last 6 months**
Visited malarial area: **No**
Use of air fresheners: **Yes**
Pesticide use: **None**
Consumption of cigarettes: **None**

Number of chemicals detected in Christine that are linked to a listed chemical health effect, and the study average

Chemicals' Effect on Health	Number of Chemicals Detected that are Linked to a Listed Health Effect	
	In Christine	Average in Study Volunteers
Carcinogen	18	28
Hormone disruptor	14	18
Respiratory toxicant	12	15
Reproductive/ developmental toxicant	28	38

Number and concentration of chemicals detected in Christine, and median chemical concentration in study volunteers

Chemical Group	Christine's Results			Median Concentration in Study Volunteers
	Number of Compounds Detected	Median Concentration	Concentration Range	
Heavy metals **(umol/L in whole blood) Beryllium, copper, lithium, lead, zinc, selenium**	5 of 6	1.9	< 0.05 to 160	2.7
Heavy metals **(nmol/L in whole blood): Arsenic, bismuth, cadmium, cobalt, manganese, molybdenum, nickel, silver, tellurium, tin, thallium, uranium, mercury**	12 of 13	5.8	< 10 to 220	7
PBDEs **(ug/L in plasma)**	2 of 5	< 0.01	< 0.01 to 0.15	0.011
PCBs **(ug/L in plasma)**	5 of 16	< 0.01	< 0.01 to 0.33	0.018
PFOS **(ug/L in plasma)**	1 of 1	9.6	n/a	10
Organochlorine pesticides **(ug/L in plasma)**	5 of 13	< 0.01	< 0.005 to 1.1	0.0098
Organophosphate insecticide metabolites **(ug/g cre in urine)**	2 of 6	< 0.67	< 0.67 to 3.9	1.9
VOCs **(ng/mL in whole blood)**	0 of 28	< 0.5	< 0.5 to <1.0	< 0.5
Total number of chemicals found in Christine: 32 of 88				

Sarah Winterton

43 of 88 chemicals were detected in Sarah, including 38 cancer-causing chemicals.

Age: **45**
Sex: **Female**
Occupation: **Program Director, Environmental Defence**
Place of residence: **Toronto , ON**
Exposure to chemicals on the job: **no**
Height: **5'4"** Weight: **150 lb, stable**
Diet: **Omnivore**
Proportion of diet that is organic: **50%**
Hours spent in front of computer/day: **8**
Purchase of products likely to contain brominated flame retardants: **Within the last 2 years**
Visited malarial area: **No**
Use of air fresheners: **None**
Pesticide use: **None**
Consumption of cigarettes: **None**

"Since we tested for only 88 chemicals, my results offer just a glimpse of the toxic burden I'm carrying. I'm sure that additional tests would find many more chemicals and that scares me. Sadly, we are all unwilling participants in a giant experiment in human health. Our bodies are hazardous waste disposal sites."

—Sarah Winterton

Number of chemicals detected in Sarah that are linked to a listed chemical health effect, and the study average

Chemicals' Effect on Health	Number of Chemicals Detected that are Linked to a Listed Health Effect	
	In Sarah	Average in Study Volunteers
Carcinogen	27	28
Hormone disruptor	19	18
Respiratory toxicant	16	15
Reproductive/ developmental toxicant	38	38

Number and concentration of chemicals detected in Sarah, and median chemical concentration in study volunteers

Chemical Group	Sarah's Results			Median Concentration in Study Volunteers
	Number of Compounds Detected	Median Concentration	Concentration Range	
Heavy metals **(umol/L in whole blood) Beryllium, copper, lithium, lead, zinc, selenium**	5 of 6	2.7	< 0.05 to 120	2.7
Heavy metals **(nmol/L in whole blood): Arsenic, bismuth, cadmium, cobalt, manganese, molybdenum, nickel, silver, tellurium, tin, thallium, uranium, mercury**	12 of 13	5.8	< 10 to 190	7
PBDEs **(ug/L in plasma)**	2 of 5	< 0.01	< 0.01 to 0.14	0.011
PCBs **(ug/L in plasma)**	12 of 16	0.017	< 0.01 to 0.85	0.018
PFOS **(ug/L in plasma)**	1 of 1	13	n/a	10
Organochlorine pesticides **(ug/L in plasma)**	9 of 13	0.0054	< 0.005 to 0.53	0.0098
Organophosphate insecticide metabolites **(ug/g cre in urine)**	1 of 6	< 0.67	< 0.67 to 17	1.9
VOCs **(ng/mL in whole blood)**	1 of 28	< 0.5	< 0.5 to trace	< 0.5
Total number of chemicals found in Sarah: 43 of 88				

After finding out her test results, Sarah has pledged to eliminate many sources of toxic chemicals from her home. To reduce your household's exposure to toxic chemicals make your own Chemical Reduction Pledge.

Sarah will eliminate the following sources of toxic chemicals from her home:

- Food in tin cans
- Produce treated with pesticides
- Clothes with stain repellants, wrinkle-resistant treatments, brominated flame retardants, pesticide-treated cotton or plastic labels
- Sanitary products bleached with chlorine or made with pesticide-treated cotton
- Furniture and cabinets made of particle board, fibreboard, plywood, or wood with a toxic finish

Kapil Khatter

45 of 88 chemicals were detected in Kapil, including 39 chemicals that can cause reproductive and developmental disorders.

Age: **39**
Sex: **Male**
Occupation: **Family physician**
Place of residence: **Toronto , ON**
Exposure to chemicals on the job: **Formaldehyde in medical school**
Height: **5'7"** Weight: **165 lb, stable**
Diet: **Omnivore**
Proportion of diet that is organic: **10%**
Hours spent in front of computer/day: **8**
Purchase of products likely to contain brominated flame retardants: **Within the last 6 months**
Visited malarial area: **Yes**
Use of air fresheners: **None**
Pesticide use: **None**
Consumption of cigarettes: **None**

"I live a pretty low-chemical life - as much as that's possible. But as expected, no choice I make can protect me completely. After all, I grew up in a DDT and PCB world. Clearly, there needs to be more action taken to reduce or eliminate chemicals contaminating our bodies."

—Dr. Kapil Khatter

Number of chemicals detected in Kapil that are linked to a listed chemical health effect, and the study average

Chemicals' Effect on Health	Number of Chemicals Detected that are Linked to a Listed Health Effect	
	In Kapil	Average in Study Volunteers
Carcinogen	28	28
Hormone disruptor	17	18
Respiratory toxicant	14	15
Reproductive/ developmental toxicant	39	38

Number and concentration of chemicals detected in Kapil, and median chemical concentration in study volunteers

Chemical Group	Kapil's Results			Median Concentration in Study Volunteers
	Number of Compounds Detected	Median Concentration	Concentration Range	
Heavy metals **(umol/L in whole blood) Beryllium, copper, lithium, lead, zinc, selenium**	4 of 6	0.14	< 0.05 to 120	2.7
Heavy metals **(nmol/L in whole blood): Arsenic, bismuth, cadmium, cobalt, manganese, molybdenum, nickel, silver, tellurium, tin, thallium, uranium, mercury**	13 of 13	6.9	0.035 to 130	7
PBDEs **(ug/L in plasma)**	2 of 5	< 0.02	< 0.01 to 0.071	0.011
PCBs **(ug/L in plasma)**	11 of 16	0.015	< 0.01 to 0.69	0.018
PFOS **(ug/L in plasma)**	1 of 1	13	n/a	10
Organochlorine pesticides **(ug/L in plasma)**	8 of 13	0.0058	< 0.005 to 0.79	0.0098
Organophosphate insecticide metabolites **(ug/g cre in urine)**	5 of 6	3.4	< 0.67 to 28	1.9
VOCs **(ng/mL in whole blood)**	1 of 28	< 0.5	< 0.5 to trace	< 0.5
Total number of chemicals found in Kapil: 45 of 88				

After finding out his test results, Kapil has pledged to eliminate many sources of toxic chemicals from his home. To reduce your household's exposure to toxic chemicals make your own Chemical Reduction Pledge.

Kapil will eliminate the following sources of toxic chemicals from his home:

1. Vinyl floors
2. Food in tin cans
3. Produce treated with pesticides
4. Porcelain enamel bathtubs and fixtures
5. CCA pressure treated wood for patios and fences

Nycole Turmel

51 of 88 chemicals were detected in Nycole, including 34 cancer-causing chemicals.

Age: **63**
Sex: **Female**
Occupation: **National President, Public Service Alliance of Canada**
Place of residence: **Gatineau , QC**
Exposure to chemicals on the job: **No**
Height: **5'8"** Weight: **140 lb, stable**
Diet: **Omnivore**
Proportion of diet that is organic: **20%**
Hours spent in front of computer/day: **0.5**
Purchase of products likely to contain brominated flame retardants: **Within the last 2 years**
Visited malarial area: **Yes, 1995**
Use of air fresheners: **None**
Pesticide use: **None**
Consumption of cigarettes: **None**

"I think of myself as a healthy person, so of course I found my test results to be unsettling. No one wants to learn that they have heavy metals, PCBs or other toxic chemicals in their blood. But more importantly, my tests results have underlined for me the importance of strengthening CEPA (the Canadian Environmental Protection Act). We need a pollution law with teeth - one that is comprehensive and enforceable. We need a law that will hold polluters accountable and help create a cleaner environment."

—Nycole Turmel

Number of chemicals detected in Nycole that are linked to a listed chemical health effect, and the study average

Chemicals' Effect on Health	Number of Chemicals Detected that are Linked to a Listed Health Effect	
	In Nycole	Average in Study Volunteers
Carcinogen	34	28
Hormone disruptor	23	18
Respiratory toxicant	17	15
Reproductive/ developmental toxicant	45	38

Number and concentration of chemicals detected in Nycole, and median chemical concentration in study volunteers

Chemical Group	Nycole's Results			Median Concentration in Study Volunteers
	Number of Compounds Detected	Median Concentration	Concentration Range	
Heavy metals **(umol/L in whole blood) Beryllium, copper, lithium, lead, zinc, selenium**	5 of 6	2	< 0.05 to 120	2.7
Heavy metals **(nmol/L in whole blood): Arsenic, bismuth, cadmium, cobalt, manganese, molybdenum, nickel, silver, tellurium, tin, thallium, uranium, mercury**	12 of 13	6.7	< 10 to 140	7
PBDEs **(ug/L in plasma)**	5 of 5	0.029	0.025 to 0.26	0.011
PCBs **(ug/L in plasma)**	12 of 16	0.049	< 0.01 to 3.5	0.018
PFOS **(ug/L in plasma)**	1 of 1	11	n/a	10
Organochlorine pesticides **(ug/L in plasma)**	10 of 13	0.012	< 0.005 to 2.2	0.0098
Organophosphate insecticide metabolites **(ug/g cre in urine)**	4 of 6	1.4	< 0.67 to 12	1.9
VOCs **(ng/mL in whole blood)**	2 of 28	< 0.5	< 0.5 to 1.9	< 0.5
Total number of chemicals found in Nycole: 51 of 88				

After finding out her test results, Nycole has pledged to eliminate many sources of toxic chemicals from her home. To reduce your household's exposure to toxic chemicals make your own Chemical Reduction Pledge.

Nycole will eliminate the following sources of toxic chemicals from her home:

1. Carpets that contain stain repellants and brominated flame retardants
2. Imported PVC-containing mini-blinds
3. Chemical air fresheners
4. Vinyl floors
5. Food in tin cans
6. Plastic food wrap
7. Microwing food in plastic wrap
8. Dry clean only clothing
9. Cosmetics, toiletries and perfumes with synthetic fragrances
10. Vinyl shower curtains
11. Laundry detergents and fabric softeners with synthetic fragrances
12. Chlorine bleach
13. Chemical pesticides

Véronique Martel

34 of 88 chemicals were detected in Véronique, including 30 chemicals that can cause reproductive and developmental disorders.

Age: **23**
Sex: **Female**
Occupation: **Communications Officer, Fédération étudiante universitaire du Québec (FEUQ)**
Place of residence: **Montreal , QC**
Exposure to chemicals on the job: **None**
Height: **5'4"** Weight: **115 lb, stable**
Diet: **Omnivore**
Proportion of diet that is organic: **10%**
Hours spent in front of computer/day: **6**
Purchase of products likely to contain brominated flame retardants: **N/A**
Visited malarial area: **No**
Use of air fresheners: **None**
Pesticide use: **None**
Consumption of cigarettes: **15 per day**

Number of chemicals detected in Véronique that are linked to a listed chemical health effect, and the study average

Chemicals' Effect on Health	Number of Chemicals Detected that are Linked to a Listed Health Effect	
	In Véronique	Average in Study Volunteers
Carcinogen	20	28
Hormone disruptor	13	18
Respiratory toxicant	12	15
Reproductive/ developmental toxicant	30	38

Number and concentration of chemicals detected in Véronique, and median chemical concentration in study volunteers

Chemical Group	Véronique's Results			Median Concentration in Study Volunteers
	Number of Compounds Detected	Median Concentration	Concentration Range	
Heavy metals **(umol/L in whole blood) Beryllium, copper, lithium, lead, zinc, selenium**	4 of 6	0.059	< 0.05 to 100	2.7
Heavy metals **(nmol/L in whole blood): Arsenic, bismuth, cadmium, cobalt, manganese, molybdenum, nickel, silver, tellurium, tin, thallium, uranium, mercury**	12 of 13	1.2	<10 to 130	7
PBDEs **(ug/L in plasma)**	1 of 5	< 0.01	< 0.01 to 0.11	0.011
PCBs **(ug/L in plasma)**	5 of 16	< 0.01	< 0.01 to 0.32	0.018
PFOS **(ug/L in plasma)**	1 of 1	10	n/a	10
Organochlorine pesticides **(ug/L in plasma)**	5 of 13	< 0.01	< 0.005 to 0.33	0.0098
Organophosphate insecticide metabolites **(ug/g cre in urine)**	5 of 6	2.4	< 0.67 to 17	1.9
VOCs **(ng/mL in whole blood)**	1 of 28	< 0.5	< 0.5 to trace	< 0.5
Total number of chemicals found in Véronique: 34 of 88				

After finding out her test results, Véronique has pledged to eliminate many sources of toxic chemicals from her home. To reduce your household's exposure to toxic chemicals make your own Chemical Reduction Pledge.

Véronique will eliminate the following sources of toxic chemicals from her home:

1. Chemical air fresheners
2. Vinyl floors
3. Food in tin cans
4. Plastic food wrap
5. Microwaving food in plastic wrap, or plastic containers that are not marked microwave safe
6. Produce treated with pesticides
7. Anti-bacterial soaps, dishwashing liquids and other cleaners that contain triclosan
8. Bed sheets that are wrinkle-resistant or made with pesticide-treated cotton
9. Moth-proof wool blankets
10. Cosmetics, toiletries and perfumes with synthetic fragrances
11. Porcelain enamel bathtubs and fixtures
12. Vinyl shower curtains
13. Furniture and cabinets made of particle board, fibreboard, plywood, or wood with a toxic finish
14. Computers and other electronics that contain brominated flame retardants
15. Laundry detergents and fabric softeners with synthetic fragrances
16. Chlorine bleach
17. Chemical pesticides

David Masty

51 of 88 chemicals were detected in David, including 36 cancer-causing chemicals.

Environmental Defence is sad to report that former Chief David Masty died in a snowmobile accident in late November 2007.

Age: **60**
Sex: **Male**
Occupation: **Chief of Whapmagoostui First Nation**
Place of residence: **Whapmagoostui, QC**
Exposure to chemicals on the job: **No**
Height: **6'2"** Weight: **150 lb, stable**
Diet: **Omnivore, only occasional fish and egg consumption**
Proportion of diet that is organic: **20%**
Hours spent in front of computer/day: **2**
Purchase of products likely to contain brominated flame retardants: **Within the last year**
Visited malarial area: **No**
Use air fresheners: **Yes**
Pesticide use: **None**
Consumption of cigarettes: **None**

"I am very alarmed by the results of my blood tests for pollutants. The movement of pollutants through the atmosphere is a reality we are concerned about in the North as it harms our lands, waters and air, and affects the wildlife resources we depend on for our way of life. If other countries have taken action to reduce or eliminate some pollutants, Canada should follow suit."

—Chief David Masty

Number of chemicals detected in David that are linked to a listed chemical health effect, and the study average

Chemicals' Effect on Health	Number of Chemicals Detected that are Linked to a Listed Health Effect	
	In David	Average in Study Volunteers
Carcinogen	36	28
Hormone disruptor	24	18
Respiratory toxicant	18	15
Reproductive/developmental toxicant	46	38

Number and concentration of chemicals detected in David, and median chemical concentration in study volunteers

Chemical Group	David's Results			Median Concentration in Study Volunteers
	Number of Compounds Detected	Median Concentration	Concentration Range	
Heavy metals **(umol/L in whole blood) Beryllium, copper, lithium, lead, zinc, selenium**	5 of 6	1.3	< 0.05 to 100	2.7
Heavy metals **(nmol/L in whole blood): Arsenic, bismuth, cadmium, cobalt, manganese, molybdenum, nickel, silver, tellurium, tin, thallium, uranium, mercury**	10 of 13	0.18	< 0.07 to 190	7
PBDEs **(ug/L in plasma)**	5 of 5	0.077	0.034 to 0.43	0.011
PCBs **(ug/L in plasma)**	14 of 16	0.29	< 0.03 to 19	0.018
PFOS **(ug/L in plasma)**	1 of 1	30	n/a	10
Organochlorine pesticides **(ug/L in plasma)**	10 of 13	0.12	< 0.005 to 8.2	0.0098
Organophosphate insecticide metabolites **(ug/g cre in urine)**	3 of 6	< 0.67	< 0.67 to 4.7	1.9
VOCs **(ng/mL in whole blood)**	3 of 28	< 0.5	< 0.5 to 1.1	< 0.5
Total number of chemicals found in David: 51 of 88				

Mary Sexton

49 of 88 chemicals were detected in Mary, including 31 cancer-causing chemicals.

Age: **43**
Sex: **Female**
Occupation: **Filmmaker/Producer**
Place of residence: **St. John's, NL**
Exposure to chemicals on the job: **None**
Height: **5'6"** Weight: **170 lb, stable**
Diet: **Pesco-vegetarian**
Proportion of diet that is organic: **35%**
Hours spent in front of computer/day: **10 to 12**
Purchase of products likely to contain brominated flame retardants: **Within the last 2 years**
Visited malarial area: **No**
Use of air fresheners: **Yes**
Pesticide use: **None**
Consumption of cigarettes: **1/day**

"Wow, I am shocked! I thought I was extremely healthy. I've been a vegetarian for years, exercised, and walked the dogs. Little did I know that the environment plays such a huge role in what goes into our bodies. More disturbing is the fact that we have little or no control over it. I want to make a pledge and a commitment to do my part in making our planet a less toxic place to live. Because after all, it's not just our own health we have to think about, but the health and well being of our children, grandchildren and generations to come.

—Mary Sexton

Number of chemicals detected in Mary that are linked to a listed chemical health effect, and the study average

Chemicals' Effect on Health	Number of Chemicals Detected that are Linked to a Listed Health Effect	
	In Mary	Average in Study Volunteers
Carcinogen	31	28
Hormone disruptor	20	18
Respiratory toxicant	17	15
Reproductive/ developmental toxicant	42	38

Number and concentration of chemicals detected in Mary, and median chemical concentration in study volunteers

Chemical Group	Mary's Results			Median Concentration in Study Volunteers
	Number of Compounds Detected	Median Concentration	Concentration Range	
Heavy metals **(umol/L in whole blood) Beryllium, copper, lithium, lead, zinc, selenium**	5 of 6	10	0.04 to 200	2.7
Heavy metals **(nmol/L in whole blood): Arsenic, bismuth, cadmium, cobalt, manganese, molybdenum, nickel, silver, tellurium, tin, thallium, uranium, mercury**	13 of 13	2.5	< 0.05 to 89	7
PBDEs **(ug/L in plasma)**	2 of 5	< 0.02	< 0.01 to 0.1	0.011
PCBs **(ug/L in plasma)**	11 of 16	0.016	< 0.01 to 0.76	0.018
PFOS **(ug/L in plasma)**	1 of 1	14	n/a	10
Organochlorine pesticides **(ug/L in plasma)**	9 of 13	0.006	< 0.005 to 0.47	0.0098
Organophosphate insecticide metabolites **(ug/g cre in urine)**	5 of 6	2	< 0.67 to 7.9	1.9
VOCs **(ng/mL in whole blood)**	3 of 28	< 0.5	< 0.5 to 0.8	< 0.5
Total number of chemicals found in Mary: 49 of 88				

Pollution in 5 Canadian Families

Executive Summary

Harmful chemicals have been found in the bodies of every child and parent tested in the first cross-Canada study of pollution in families.

Environmental Defence tested five families from British Columbia, Ontario, Quebec and New Brunswick for 68 toxic chemicals in their blood and urine. The family members tested included seven children (aged 10 to 15 years), five parents and one grandparent (aged 33 to 66 years).

Test Results

- 46 of 68 chemicals tested for were detected, including five heavy metals, five PBDEs, 13 PCBs, five perfluorinated chemical, nine organochlorine pesticides, four organophosphate insecticide metabolites, and five PAHs.
- On average, 32 chemicals were detected in each parent volunteer, and 23 chemicals were detected in each child volunteer.
- Of the 46 chemicals detected:
  - 38 are cancer-causing substances,
  - 38 are chemicals that can harm reproduction and the development of children,
  - 19 are chemicals that can harm the nervous system,
  - 23 are chemicals that can disrupt the hormone system, and
  - 12 are chemicals associated with respiratory illnesses.

Key Findings

- In general, the child volunteers were less polluted than their parents by PCBs and organochlorine pesticides. Many of of these 'older' chemicals were banned before the children in the study were born. The decreased presence of PCBs and organochlorine pesticides in the children suggests that when governments take action to eliminate toxic chemicals, people's toxic load decreases, even if it takes several decades.
- It is alarming, however, that there were several cases where the children in the study were *more* polluted than their parents by chemicals that are still in use. The children were more polluted by several chemicals that belong to the following groups: PFCs, PBDEs, organophosphate insecticide metabolites, heavy metals and PAHs.

For more details, read the full report: Polluted Children, Toxic Nation: A Report on the Pollution in Canadian Families

Summary: Number of chemicals detected in the study volunteers

Chemical Group	Total number of chemicals tested	Total number of chemicals detected		
		In adults	In children	In all volunteers
Heavy metals	5	5	5	5
PBDEs	5	5	5	5
PCBs	16	13	10	13
PFCs	13	5	4	5
Organochlorine pesticides	13	9	7	9
Organophosphate insecticide metabolites	6	4	3	4
PAHs	10	4	5	5
Total :	68	45	39	46

Summary: Health effects of chemicals found in volunteers

Chemicals' Effect on Health	Number of chemicals detected in volunteers that are linked to listed health effect		
	Total	In Adults	In Children
Carcinogen	38	37	33
Hormone disruptor	23	23	20
Respiratory toxin	12	11	11
Reproductive/ developmental toxin	38	37	33
Neurotoxin	19	19	17
No data on health effects	3	3	2

* Includes both recognized and suspected health effects for each chemical as identified on Scorecard.org Chemical Profiles in April 2006.

Summary: Chemical concentrations detected in the *Toxic Nation* volunteers

Chemical Group	Median total concentrations and ranges*	
	In Adults	In Children
PBDEs **(ug/L in plasma)**	0.042 (<0.010 - 0.71)	0.118 (<0.010 - 0.13)
PCBs **(ug/L in plasma)**	1.934 (<0.010 - 2.6)	0.574 (<0.010 - 0.76)
PFCs**(ng/mL in serum)**	17.345 (<0.46 - 76.4)	17.329 (<0.46 - 19.1)
Organochlorinated pesticides **(ug/L in plasma)**	0.787 (<0.005 - 1.5)	0.286 (<0.005 - 0.48)
Organophosphate insecticide metabolites **(ug/L in urine)**	7.9 (<1 - 45)	7.7 (<1 - 55)
PAHs **(ug/L in urine)**	<LLD (<0.057-0.36)	0.273 (<0.013 - 1.2)
Mercury **(nmol/L in whole blood)**	3.7 (1.6 - 16)	1.4 (0.51-4.5)
Lead **(umol/L in whole blood)**	0.052 (0.033 - 0.16)	0.033 (0.023 - 0.082)
Arsenic **(nmol/L in whole blood)**	12 (8.1 - 56)	12 (11 -1 9)
Cadmium **(nmol/L in whole blood)**	5.4 (4.1 - 36)	2.5 (2.2 - 3.2)
Manganese **(nmol/L in whole blood)**	170 (120 - 260)	180 (110 - 360)

*Ranges refer to concentrations detected for individual chemicals within the chemical group.
** Values of less than (<) = *not detected* at the lowest level of detection (LLD)

The Vancouver Family

The Robertsons now live in Vancouver, but have spent several years living on Cortez Island and in the Fraser Valley in British Columbia. Amy works at home and grows much of the family's food in their organic garden. The children in this family had higher concentrations of several chemicals than their mom, and they were the only children in the study to have a higher total concentration of PCBs than their parent. Of all the children in the study, Johanna, the daughter, had the highest total number of chemicals (32 of 68). Johanna is the only child in the study to have a greater number of chemicals than her parent. Satchel, the son, had the second highest number of chemicals detected in a child in the study (28 of 68).

From left to right:
Johanna (daughter, age 15), Amy (mother, age 42), and Satchel (son, age 13)

Among the children in the study, Johanna and Satchel both had a higher than average number of PCBs and organochlorine pesticides detected in their samples. Both children have higher levels than their mom for several PCBs, and they are both contaminated by PCBs that were not present in their mom. Johanna and Satchel both also had a higher concentration than their mom for one organochlorine pesticide.

Johanna was the only person in the study with alll five PBDEs. Both children had higher levels than their mom of specific PBDEs, as well as PBDEs that were not detected in their mom. Both Johanna and Satchel were more polluted by certain PAHs than their mom. Satchel also had the highest concentrations in the family for three PFCs.

Amy, the mom, had the least number of PCBs of any of the adults in the study. However, within the group of PFCs, Amy had the highest concentration of PFNA in the study, and she was the only volunteer with PFUnA. Amy also had an above normal level of cadmium, and the highest concentration of arsenic in the study.

Number of chemicals detected in the Vancouver family that are linked to a listed health effect

Chemicals Effect on Health	Number of Chemicals Detected that are Linked to a Listed Health Effect		
	Mother	Daughter	Son
Carcinogen	24	26	24
Hormone disruptor	18	19	16
Respiratory toxin	10	7	8
Reproductive/ developmental toxin	25	27	25
Neurotoxin	13	15	13
No data on health effects	2	2	2

*Includes both recognized and suspected health effects for each chemical as identified on Scorecard.org Chemical Profiles in April 2006.

Number and concentration of chemicals detected in the Vancouver family

Chemical Group	Number of compounds detected			Total Concentration		
	Mother	Daughter	Son	Mother	Daughter	Son
PBDEs **(ug/L in plasma)**	2 of 5	5 of 5	3 of 5	0.028	0.23	0.136
PCBs **(ug/L in plasma)**	9 of 16	10 of 16	9 of 16	0.888	1.104	1.041
PFCs**(ng/mL in serum)**	4 of 13	4 of 13	3 of 13	23	14.871	23.47
Organochlorine pesticides **(ug/L in plasma)**	8 of 13	6 of 13	5 of 13	0.8237	0.509	0.661
Organophosphate insecticide metabolites **(ug/L in urine)**	0 of 6	1 of 6	1 of 6	nd	7.7	9.6
PAHs **(ug/L)**	3 of 10	1 of 10	3 of 10	0.539	0.41	1.28
Mercury **(nmol/L in whole blood)**	1 of 1	1 of 1	1 of 1	13	1.4	3.9
Lead **(umol/L in whole blood)**	1 of 1	1 of 1	1 of 1	0.046	0.031	0.04
Arsenic **(nmol/L in whole blood)**	1 of 1	1 of 1	1 of 1	56	15	19
Cadmium **(nmol/L in whole blood)**	1 of 1	1 of 1	1 of 1	10	2.5	2.7
Manganese**(nmol/L in whole blood)**	1 of 1	1 of 1	1 of 1	170	190	110
Total number of chemicals detected	31 of 68	32 of 68	29 of 68			

Sarnia Family

Jessie: polluted with 20 of 68 chemicals
Wilson Jr.: polluted with 36 of 68 chemicals
Wilson Sr.: polluted with 32 of 68 chemicals

The Plain family is from the Aamjiwnaang First Nation Community in Sarnia, Ontario. Wilson Sr., now retired, spent his working life in various industrial factories in the Sarnia area. Of all the volunteers in the study, Wilson Sr. had the highest concentration of PFOS, at 35.8 ng/mL, as well as the highest total concentrations for PCBs and organochlorine pesticides. Wilson Jr. has also worked in various industrial facilities in the Sarnia area and is now a truck driver. Along with one other volunteer, Wilson Jr. had the highest total number of chemicals detected in a volunteer (36 of 68), as well as the highest total concentrations for PBDEs and PFCs. For individual chemicals, Wilson Jr. had by far the highest level of PFOS detected at a concentration of 76.4 ng/mL, and the highest concentration of cadmium at 36 nmol/L.

From left to right: Wilson Sr. (grandfather, age 66), Jessie (daughter, age 14), and Wilson Jr. (father, age 44)

Jessie, the daughter, had a lower than average number of chemicals detected in her samples, as well as the least number of PCBs and organochlorine pesticides of any volunteer in the study. A relatively high level of manganese was detected in Jessie's sample. Jessie was the only child in the study that did not have any chemicals detected in her samples at higher concentrations than her parent.

Number of chemicals detected in the Sarnia family that are linked to a listed health effect

Chemicals Effect on Health	Number of Chemicals Detected that are Linked to a Listed Health Effect		
	Grandfather	Father	Daughter
Carcinogen	**25**	**29**	**16**
Hormone disruptor	**16**	**21**	**12**
Respiratory toxin	**6**	**9**	**7**
Reproductive/ developmental toxin	**25**	**29**	**17**
Neurotoxin	**13**	**17**	**10**
No data on health effects	**2**	**2**	**1**

* Includes both recognized and suspected health effects for each chemical as identified on Scorecard.org Chemical Profiles in April 2006.

Number and concentration of chemicals detected in the Sarnia family

Chemical Group	Number of compounds detected			Total Concentration		
	Grandfather	Father	Daughter	Grandfather	Father	Daughter
PBDEs **(ug/L in plasma)**	0 of 5	4 of 5	2 of 5	nd	0.941	0.116
PCBs **(ug/L in plasma)**	12 of 16	9 of 16	4 of 16	3.775	1.214	0.239
PFCs**(ng/mL in serum)**	4 of 13	4 of 13	3 of 13	45.03	86.93	23.49
Organochlorine pesticides **(ug/L in plasma)**	8 of 13	9 of 13	2 of 13	1.9053	0.7869	0.151
Organophosphate insecticide metabolites **(ug/L in urine)**	3 of 6	3 of 6	2 of 6	47	25.5	4.3
PAHs **(ug/L)**	0 of 10	2 of 10	2 of 10	nd	0.5	0.273
Mercury **(nmol/L in whole blood)**	1 of 1	1 of 1	1 of 1	1.6	7.1	0.86
Lead **(umol/L in whole blood)**	1 of 1	1 of 1	1 of 1	0.052	0.033	0.026
Arsenic **(nmol/L in whole blood)**	1 of 1	1 of 1	1 of 1	12	8.1	12
Cadmium **(nmol/L in whole blood)**	1 of 1	1 of 1	1 of 1	4.6	36	2.2
Manganese**(nmol/L in whole blood)**	1 of 1	1 of 1	1 of 1	230	120	300
Total number of chemicals detected	32 of 68	36 of 68	20 of 68			

* nd = not detected

The Toronto Family

Ada: polluted with 24 of 68 chemicals
Barri: polluted with 31 of 68 chemicals

Barri and Ada live in Toronto, Ontario, where Barri is a filmmaker and writer. Compared to the other volunteers in the study, Barri's test results were fairly average, except that she had the highest levels of both mercury and lead in the study; she also had an above normal level of cadmium.

From left to right: Ada (daughter, age 10) and Barri (mother, age 40s)

Ada had a higher number of PBDEs and PFCs than her mom, as well as a higher total concentration of PBDEs. Ada's level of PBDE 99 was higher than her mom's. Ada also had one PBDE that her mom did not, PBDE 153. For PFCs, Ada had a higher concentration of PFOA than her mom, and she also had PFHxS, which was not present in her mom. Of all the volunteers in the study, Ada had the highest concentration of manganese at 360 nmol/L, which is above the normal range.

Number of chemicals detected in the Toronto family that are linked to a listed health effect

Chemicals Effect on Health	Number of Chemicals Detected that are Linked to a Listed Health Effect	
	Mother	Daughter
Carcinogen	25	18
Hormone disruptor	18	14
Respiratory toxin	6	5
Reproductive/ developmental toxin	25	19
Neurotoxin	13	9
No data on health effects	1	2

*Includes both recognized and suspected health effects for each chemical as identified on Scorecard.org Chemical Profiles in April 2006.

Number and concentration of chemicals detected in the Toronto family

Chemical Group	Number of compounds detected		Total Concentration	
	Mother	Daughter	Mother	Daughter
PBDEs **(ug/L in plasma)**	2 of 5	3 of 5	0.154	0.174
PCBs **(ug/L in plasma)**	11 of 16	9 of 16	2.159	0.709
PFCs**(ng/mL in serum)**	3 of 13	4 of 13	17.345	17.329
Organochlorine pesticides **(ug/L in plasma)**	8 of 13	3 of 13	0.6018	0.218
Organophosphate insecticide metabolites **(ug/L in urine)**	2 of 6	0 of 6	7.9	nd
PAHs **(ug/L)**	0 of 10	0 of 10	nd	nd
Mercury **(nmol/L in whole blood)**	1 of 1	1 of 1	16	2.2
Lead **(umol/L in whole blood)**	1 of 1	1 of 1	0.16	0.058
Arsenic **(nmol/L in whole blood)**	1 of 1	1 of 1	31	11
Cadmium **(nmol/L in whole blood)**	1 of 1	1 of 1	15	2.8
Manganese**(nmol/L in whole blood)**	1 of 1	1 of 1	260	360
Total number of chemicals detected	31 of 68	24 of 68		

* nd = not detected

The Montreal Family

Aladin: polluted with 25 of 68 chemicals
Viviane: polluted with 36 of 68 chemicals

Viviane and Aladin live in Montreal, Quebec, where Viviane is a Coordinator of Project Integration at a wind energy consulting firm. Along with one other volunteer in the study, Viviane had the highest total number of chemicals (36 of 68).

Both Viviane and Aladin had high levels of organophosphate insecticides. Viviane had the highest level of DMTP, at 45 ug/L, while Aladin had the highest level of DMP, at a concentration of 55 ug/L.

From left to right: Aladin (son, age 10) and Viviane (mother, age 33)

Aladin was also one of only two volunteers with DEP, and he had the highest total concentration of organophosphate insecticide metabolites in the study. Viviane had the second highest total concentration of organophosphate insecticide metabolites in the study. Of all the children, Aladin had the highest total concentration for PFCs,and the highest level of PFHxS in the study, at a concentration of 4.75 ng/mL (PFHxS was not detected in Viviane). In addition, Aladin's levels of PFOS and PFOA were higher than his mom's. Aladin's lead level was the second highest lead level in the study, and higher than his mom's lead level, as well.

Number of chemicals detected in the Montreal family that are linked to a listed health effect

Chemicals Effect on Health	Number of Chemicals Detected that are Linked to a Listed Health Effect	
	Mother	Son
Carcinogen	30	19
Hormone disruptor	20	14
Respiratory toxin	9	7
Reproductive/ developmental toxin	31	20
Neurotoxin	15	13
No data on health effects	1	2

*Includes both recognized and suspected health effects for each chemical as identified on Scorecard.org Chemical Profiles in April 2006.

Number and concentration of chemicals detected in the Montreal family

Chemical Group	Number of compounds detected		Total Concentration	
	Mother	Son	Mother	Son
PBDEs **(ug/L in plasma)**	4 of 5	2 of 5	0.576	0.118
PCBs **(ug/L in plasma)**	12 of 16	5 of 16	2.119	0.358
PFCs**(ng/mL in serum)**	3 of 13	4 of 13	14.04	28.823
Organochlorine pesticides **(ug/L in plasma)**	7 of 13	4 of 13	1.0644	0.3
Organophosphate insecticide metabolites **(ug/L in urine)**	2 of 6	3 of 6	66	80.1
PAHs **(ug/L)**	3 of 10	2 of 10	0.89	1.5
Mercury **(nmol/L in whole blood)**	1 of 1	1 of 1	3.5	4.5
Lead **(umol/L in whole blood)**	1 of 1	1 of 1	0.076	0.082
Arsenic **(nmol/L in whole blood)**	1 of 1	1 of 1	17	11
Cadmium **(nmol/L in whole blood)**	1 of 1	1 of 1	4.1	2.3
Manganese**(nmol/L in whole blood)**	1 of 1	1 of 1	150	120
Total number of chemicals detected	36 of 68	25 of 68		

* nd = not detected

The Quispamsis Family

Mary: polluted with 17 of 68 chemicals
Hanna: polluted with 17 of 68 chemicals
Patty: polluted with 24 of 68 chemicals

The Donovans live in the town of Quispamsis in New Brunswick. Patty, a Program Facilitator at a women's centre, had the lowest total number of chemicals of all the adults in the study (24 of 68). Her twin daughters, Mary and Hanna, had the same number of chemicals detected in their samples (17 of 68), which was the lowest total number of chemicals of all the volunteers in the study.

From left to right: Hanna (daughter, age 14), Patty (mother, age 45), and Mary (daughter, age 14)

All three family members had the least number of PFCs detected in their samples; while the other volunteers in the study each had three or four PFCs, the Donovans each had only two (PFOS and PFOA).

Patty had a slightly above normal level of cadmium. Hanna and Mary, along with one other volunteer were the only ones in the study with no PBDEs detected in their samples. Both daughters had a higher level of PFOA than their mom, and Mary also had a higher level of PFOS than her mom. All three family members had the least number of PFCs detected in their samples; while the other volunteers in the study each had three or four PFCs, the Donovans each had only two (PFOS and PFOA). Patty had a slightly above normal level of cadmium. Hanna and Mary, along with one other volunteer were the only ones in the study with no PBDEs detected in their samples. Both daughters had a higher level of PFOA than their mom, and Mary also had a higher level of PFOS than her mom. Hanna had a significantly higher level of DMP (an organophosphate insecticide metabolite) than the median in the study. The level of DMP detected in Hanna was 29 ug/L, while the study median was 4.6 ug/L.

Number of chemicals detected in the Quispamsis family that are linked to a listed health effect

Chemicals Effect on Health	Number of Chemicals Detected that are Linked to a Listed Health Effect		
	Mother	Daughter (M)	Daughter (H)
Carcinogen	20	14	14
Hormone disruptor	14	10	11
Respiratory toxin	5	5	6
Reproductive/ developmental toxin	21	15	14
Neurotoxin	11	7	8
No data on health effects	0	0	0

*Includes both recognized and suspected health effects for each chemical as identified on Scorecard.org Chemical Profiles in April 2006.

Number and concentration of chemicals detected in the Quispamsis family

Chemical Group	Number of compounds detected			Total Concentration		
	Mother	Daughter (M)	Daughter (H)	Mother	Daughter (M)	Daughter (H)
PBDEs **(ug/L in plasma)**	1 of 5	0 of 5	0 of 5	0.042	nd	nd
PCBs **(ug/L in plasma)**	10 of 16	7 of 16	4 of 16	1.934	0.574	0.313
PFCs**(ng/mL in serum)**	2 of 13	2 of 13	2 of 13	14.3	15.66	12.13
Organochlorine pesticides **(ug/L in plasma)**	5 of 13	2 of 13	3 of 13	0.724	0.206	0.286
Organophosphate insecticide metabolites **(ug/L in urine)**	13 of 6	1 of 6	2 of 6	5	5.7	4
PAHs **(ug/L)**	0 of 10	0 of 10	1 of 10	nd	nd	0.11
Mercury **(nmol/L in whole blood)**	1 of 1	1 of 1	1 of 1	3.7	0.88	0.51
Lead **(umol/L in whole blood)**	1 of 1	1 of 1	1 of 1	0.071	0.023	0.033
Arsenic **(nmol/L in whole blood)**	1 of 1	1 of 1	1 of 1	12	14	12
Cadmium **(nmol/L in whole blood)**	1 of 1	1 of 1	1 of 1	5.4	3.2	2.4
Manganese**(nmol/L in whole blood)**	1 of 1	1 of 1	1 of 1	180	160	180
Total number of chemicals detected	24 of 68	17 of 68	17 of 68			

* nd = not detected

Donovan Family Update

Shortly after becoming involved with Toxic Nation, Mary Donovan was diagnosed with severe aplastic anemia, a rare but extremely serious condition where the bone marrow fails to produce blood cells. Mary was fortunate enough to find a bone marrow donor; but, she did not recover from her bone marrow transplant, and passed away on November 30, 2006. Mary leaves behind her parents, Patty and Dale, her twin Hanna, sister Emma and brother Zech.

A poem from Mary's family:

it takes a village to raise a child
to welcome, love, guide and safeguard
to laugh and sing with, create with
and to learn from

it takes a village to mourn a child
to honour, admire, remember and celebrate
to pay tribute to the completion of her circle
and in this, we continue to learn

Mary with her pet bird, Spirit

Sarnia, Ontario

Shari: polluted with 24 of 68 chemicals
Sandy: polluted with 37 of 68 chemicals

The Toxic Nation body burden testing project has included five individuals from Sarnia, three family members from the Amjiwnaang First Nation Community, and Shari and Sandy, a mother and daughter from what is known as 'Chemical Valley'.

From left to right: Sandy (mother, age 58) and Shari (daughter, age 33)

Sarnia is a highly industrialized area, home to dozens of petrochemical, polymer and chemical facilities. The area is an occupational health hazard hot spot, which has touched the lives of Sandy and Shari who lost their husband and father, Blayne, to mesothelioma, a cancer in the lining of the chest wall. While mesothelioma is an exceedingly rare cancer, it is exceedingly common around Sarnia among workers and their families who were exposed to asbestos in industrial facilities throughout the 1960s and 70s.

It is suspected that members of the Amjiwnaang First Nation Community near Sarnia are also feeling the brunt of chemical contamination from Sarnia's Chemical Valley. Birth records for the community from 1994 to 2003 revealed that twice as many girls as boys were born. Researchers who identified the declining male to female birth ratio indicated that they cannot be sure that the changing birth ratio in the community is due to environmental exposures, but the possibility merits immediate study. It is well known that, in comparison to male fetuses, female fetuses are stronger and more able to survive in harsher conditions, so when exposed to pollutants, male fetuses may be more likely to perish in the womb or suffer obstetric complications.

Sandy's Results

Compared to the volunteers in *Polluted Children, Toxic Nation*, who were tested at the same time as Sandy and Shari, Sandy had the highest total number of chemicals detected in her body (37 of 68). The average number of chemicals detected in the adults in the family study was 32.

Sandy had an above normal level of arsenic at 130 nmol/L in whole blood, the normal level established by the laboratory that conducted the analysis is 0-80 nmol/L, and the median arsenic level detected in the study was 12 nmol/L. The laboratory did not flag Sandy's arsenic level as exceeding the alert threshold.

Sandy had the highest levels for several PCBs and organochlorine pesticides, and PFCs. For PCBs, Sandy had the highest level of PCB 105, 118, and 163. Sandy was also the only volunteer with PCB 28. Sandy had the highest concentration detected for four organochlorine pesticides: hexachlorobenzene, toxaphene parlar 26, p,p'-DDE (the metabolite of DDT), and β-HCH, as well as for three perfluorinated chemicals (PFOA, PFOS and PFHxS). For the groups of chemicals, Sandy had the highest total concentrations for PFCs and organochlorine pesticides.

Shari's Results

Compared to the adult volunteers in *Polluted Children, Toxic Nation*, Shari had a lower than average total number of chemicals (24/68), mainly because she had a low number of PCBs (6 of 16). Shari did, however, have the highest concentrations detected for two organophosphate insecticide metabolites: dimethyl phosphate (DMP) and dimethyl thiophosphate (DMTP). Shari's DMP level was 40 ug/L in urine, while the study median for DMP was 4.6 ug/L; her level of DMTP was 26 ug/L in urine, compared to the study median of 7.7 ug/L

Number of chemicals detected in the Sarnia adults that are linked to a listed health effect

Chemicals Effect on Health	Number of Chemicals Detected that are Linked to a Listed Health Effect	
	Mother	Daughter
Carcinogen	30	19
Hormone disruptor	20	15
Respiratory toxin	7	6
Reproductive/ developmental toxin	31	20
Neurotoxin	17	13
No data on health effects	2	1

*Includes both recognized and suspected health effects for each chemical as identified on Scorecard.org Chemical Profiles in April 2006.

Number and concentration of chemicals detected in the Sarnia adults

Chemical Group	Number of compounds detected		Total Concentration	
	Mother	Daughter	Mother	Daughter
PBDEs **(ug/L in plasma)**	3 of 5	2 of 5	0.231	0.080
PCBs **(ug/L in plasma)**	14 of 16	6 of 16	3.290	0.658
PFCs**(ng/mL in serum)**	4 of 13	3 of 13	104.10	26.940
Organochlorine pesticides **(ug/L in plasma)**	8 of 13	5 of 13	2.495	0.389
Organophosphate insecticide metabolites **(ug/L in urine)**	3 of 6	2 of 6	36.6	66
PAHs **(ug/L)**	0 of 10	1 of 10	na	0.078
Mercury **(nmol/L in whole blood)**	1 of 1	1 of 1	13	3.6
Lead **(umol/L in whole blood)**	1 of 1	1 of 1	0.077	0.03
Arsenic **(nmol/L in whole blood)**	1 of 1	1 of 1	130	21
Cadmium **(nmol/L in whole blood)**	1 of 1	1 of 1	3.3	3
Manganese**(nmol/L in whole blood)**	1 of 1	1 of 1	200	190
Total number of chemicals detected	37 of 68	24 of 68		

* nd = not detected