Environment and Health: Focus on Schools

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CASLE

Canadians for A Safe Learning Environment

- 20-year-old registered charity

- NS Departments of Education, Labour, Public Works, and Health partner with CASLE

to improve the Condition of schools and the Products and Practices used in school

And to build Healthy New Schools

CASLE has received several awards including a National Award of Excellence from the

Canadian Institute for Child Health

Indoor air is more polluted than outdoor air

A Health Canada study found that 3 out of 4 Canadians still believe that outdoor air is more polluted than indoor air.

(www.hc-sc,gcca/hecs-es/air_quality/pdf/environics_air_pollution_survey_Epdf)

Health Canada, the NRC, and most agencies recognize that indoor air is **2 to 5 times and often 10 to 100 times more polluted than outdoor air.**

Where does indoor air pollution come from?

Outdoor Air:

pollen, dust,

mould/fungal spores,

combustion emissions (busses, loading docks, exhausts near air intakes, furnace stack emissions),

industrial emissions,

pesticides,

roofing tar,

sewer gas…

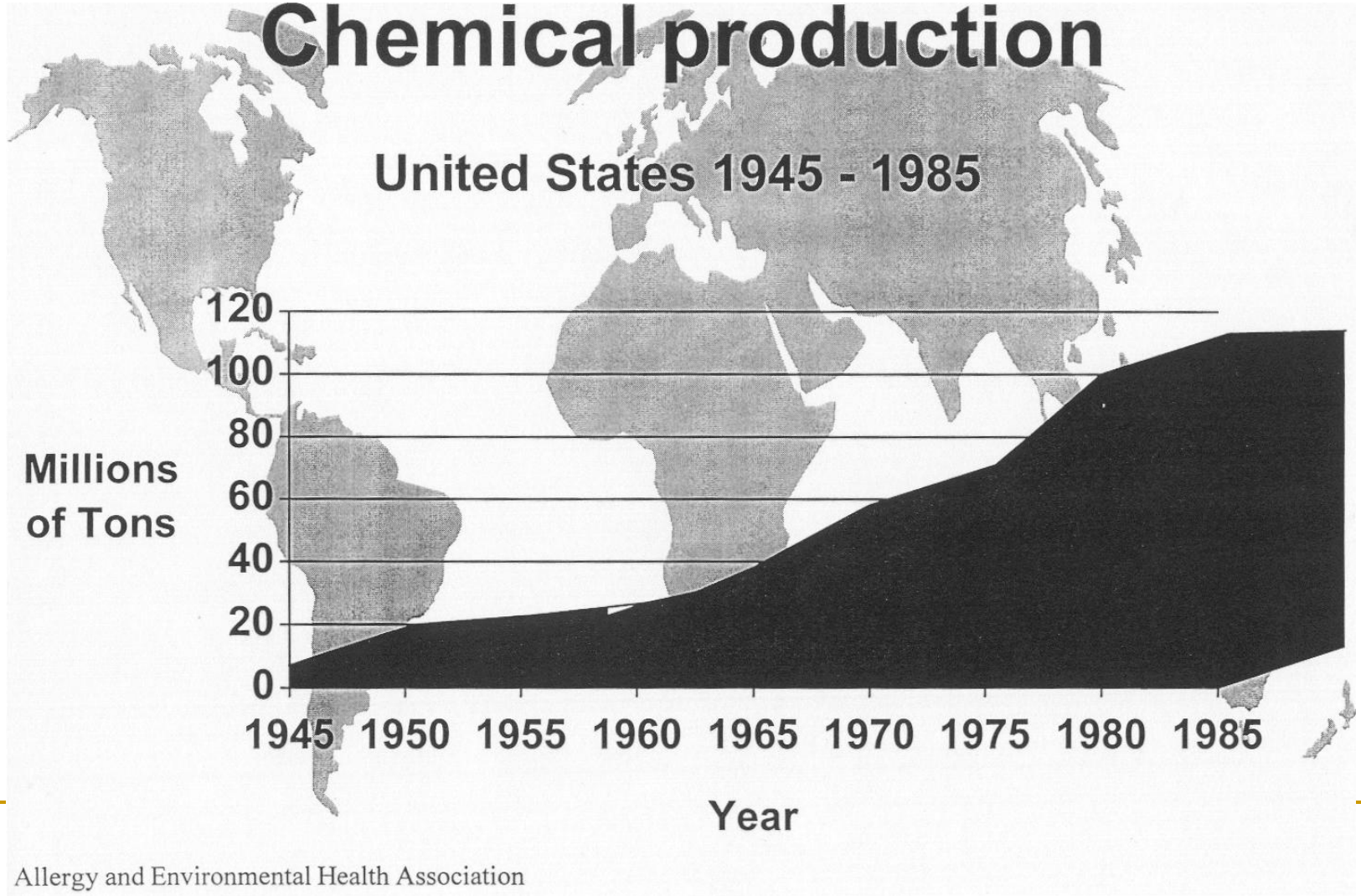
Indoor Air: Some the same, some different

dust, mould/fungal spores, pesticides, combustion emissions, fuel leaks, chemical emissions, plus outdoor contaminants…

and from occupants:

- CO_2
- Personal products
- Skin particles
- Pet dander
- Mould
- Fabric softener
- Viruses
- Bacteria
- Food
- Classroom materials/plastic

Since the Second World War, we have been exposed to a rapidly expanding number of new synthetic chemicals



Harmful chemicals including carcinogens and endocrine disruptors are found in:

Building materials: Insulation, caulking, paints, varnishes, vinyl tile, glues, particle board, plastics…

School supplies: felt markers, whiteout, inks, laminates, photocopiers, printers, fire retardants…

Personal products: perfumes, deodorants, laundry residues…

Cleaning agents: hand soaps, waxes and floor strippers, air fresheners…

Combustion gases: furnaces, vehicle exhaust…

Over 23,000 of chemicals currently in use are not assessed for health effects.

- *Medical Perspectives on Environmental Sensitivities. M.E. Sears, 2007*

Recent research links 216 common chemical compounds to breast cancer.

www.silentspring.org/sciencereview

Pollution is not just in the air: We are what we eat, drink, breathe, and touch

Phthalates and Bisphenol-A:

- Escape from plastics and are found in human tissue and throughout the natural environment. Nov 2011 Harvard U study tested blood levels of BPA were may times higher in subject who ate canned goods vs controls who did not. (both groups alternated eating canned goods).

- Low doses are suspected in early puberty onset and low sperm counts and obesity in humans.

We are learning more about how buildings affect occupants' health and ability to function

- Did you know that within 26 seconds of using a cleaning material, the chemicals in the cleaning material can be found in every organ of the body? - *CCHC*

Important New Developments

- **"The old toxicology: The dose makes the problem**
- **The new approach: Very small doses can alter function of the body."**
- **Everyone is affected to some degree.**

- Dr Alan Abelsohn, WHO, Children's Environmental Health Workshop, IWK Hospital, April, 2007.

Our Toxic Nation Report, 2007

Key findings:

- "On average, **44 chemicals were detected in each volunteer, including 41 carcinogens, 27 hormone disruptors, 21 respiratory toxins, and 53 reproductive/developmental toxins…**
- **Sources of toxic exposure are varied and numerous, and small changes in lifestyle and purchasing behaviour can make a difference in the level of pollutants each person carries."**

Health, learning and behaviour can be affected

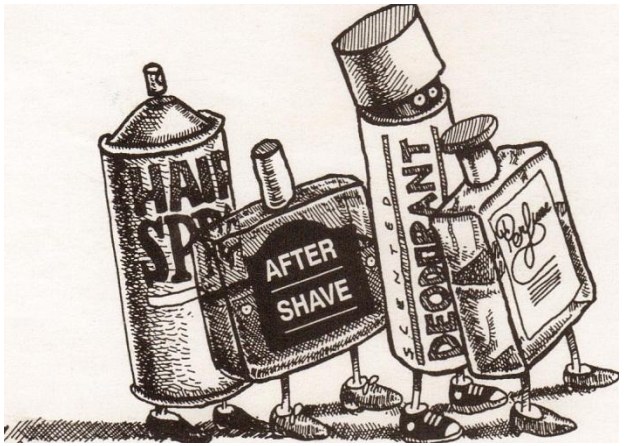
Normal subjects exposed to low levels of VOC's from common paints, varnishes, glues, dyes and cleaning agents, suffered significant impairment on tests for learning, memory, visual spatial tasks, attention, mental flexibility, and psychomotor speed.

This study also found a connection between VOC exposures and clinically significant depression, anxiety, somatic concerns (e.g. headache) and disturbances in thinking.

- University of Pittsburgh School of Medicine, Bell, Healthy School Handbook 1992, p.78

Example:
Asthma and Chemical Fragrances

Fragrances are well-known asthma "triggers," listed by the Journal of the American Medical Association, the American and Canadian Lung Association, the Mayo Clinic, Johns Hopkins University and the American Academy of Allergy, Asthma and Immunology, among others.



- Bradshaw, Women's College Hospital Environmental Health Clinic, Sept, 2009

Asthma Facts

- Asthma is the leading cause of absenteeism from school and the third leading cause of work loss
- Prevalence rates, world-wide, are increasing by 50% every decade
- World-wide, the economic loss associated with asthma exceed those of TB and AIDS combined
- **Asthma can be triggered by many inhalants – from dust and moulds to chemicals.**

  Asthma Society of Canada, 2005

Chemical components of fragrances

- Up to 4,000 ingredients in perfume – organic and non-organic chemicals, known respiratory irritants
- 95% are petroleum-based
- Fixatives often used to cause the scent to persist
- Some ingredients have been linked with cancer, birth defects and neurotoxic effects at higher exposure levels
- 72% of asthmatics have respiratory symptoms from fragrance chemicals. *(FDA)*

- Bradshaw, Women's College Hospital Environmental Health Clinic, Sept, 2009

Fragrance Ingredients linked with cancer and birth defects

- Ingredients in fragrances linked with cancer and birth defects*

  Methylene chloride

  Toluene

  Ethanol

  Methyl ethyl ketone

  Tert Butyl

  Sec Butyl

  Benzyl chloride

**Compiled by comparing 120 fragrance chemicals from the EPA and California's Prop 65 List of Chemicals - Bradshaw, Women's College Hospital Environmental Health Clinic, Sept, 2009*

Neurotoxic Ingredients in Fragrances

- Ingredients in fragrances found to be neurotoxic*
  Hexachlorophene
  Cetyl-ethyl-tetramethly-tetralin
  1 Butanol
  Isobutanol
  Toluene

** Complied from TOXLINE database of fragrance industry and medical journals*
- Bradshaw, Women's College Hospital Environmental Health Clinic, Sept, 2009

Common symptoms linked with perfume exposure

- Rash
- Headaches
- Dizziness
- Watery eyes
- Sinusitis
- Fatigue
- Difficulty concentrating, groggy or “spacey” feeling
- Asthma/asthma-like symptoms – cough, wheezing, shortness of breath

“It is not about the smell. It is about the chemicals.”

- Bradshaw, Women’s College Hospital Environmental Health Clinic, Sept, 2009

Common sources of Fragrance in Schools

- Students, staff and visitors who are wearing perfume, cologne, body sprays or aftershave; scented hand, face and body lotions; scented hair products (e.g. mousse, gels, sprays); scented laundry products
- Scented cleaning products, disinfectants, floor wax, and paints
- Fragrance-emitting devices and sprays
- Markers, glues, art supplies and other solvents

- Bradshaw, Women's College Hospital Environmental Health Clinic, Sept, 2009

Children are More Vulnerable

1. Dynamic developmental physiology

- Children's bodies are growing and using available foods, chemicals, minerals…to do so.
- Full biological growth occurs around age 18.
- Final brain development is around age 20.

2. Unique exposures

3. Politically powerless

4. Long term health consequences in adulthood

Carolina

Children are not little adults…

Are there Solutions?

- **Controlling Hazardous Products Works**

- **PBDE, a common flame retardant in fabrics and furniture is an endocrine disruptor. It is not "bound"; comes out easily. Studies found it in human breast milk around the world. Since Europe banned its use, the levels have dropped.**
- **PCBs were banned in 1977. Levels found in young people are now very low.**
- **BPA (Bisphenol-A (used in plastics) was declared a toxic substance in 2012. Action to stop exposure has begun.**

Consumer Action

Use: ***HIP's Buyers Guide***

www.lesstoxicguide.ca

The Seven Sins of Green

"Green" and "Healthy" are not always the same.
Make sure…become informed…get both!

"Why are some children and staff more affected by environmental quality than others?“

During the Sick Building incident at the US EPA's Washington offices in the 1990's, carpet glues made over 100 workers ill.

And no two had exactly the same symptoms.

How could this be?

Our bodies have differences.

"A study of two women in a workplace tested blood chemical levels at the end of their workday. Levels were the same. Repeat tests the next morning found one at 0 and the other's levels were unchanged. Why?

Some are missing glutathione, detox genes, minerals..."

-Dr Jennifer Armstrong, WHO, Children's Environmental Health Workshop, IWK Hospital, April, 2007

We are what we eat, drink, breathe and touch

- **We ingest** additives and pesticide residues in our food and drink**.**
- **We absorb** chemicals through the skin from such products as hair dyes, skin products and cleaning materials.
- **We inhale** pollutants from many sources.

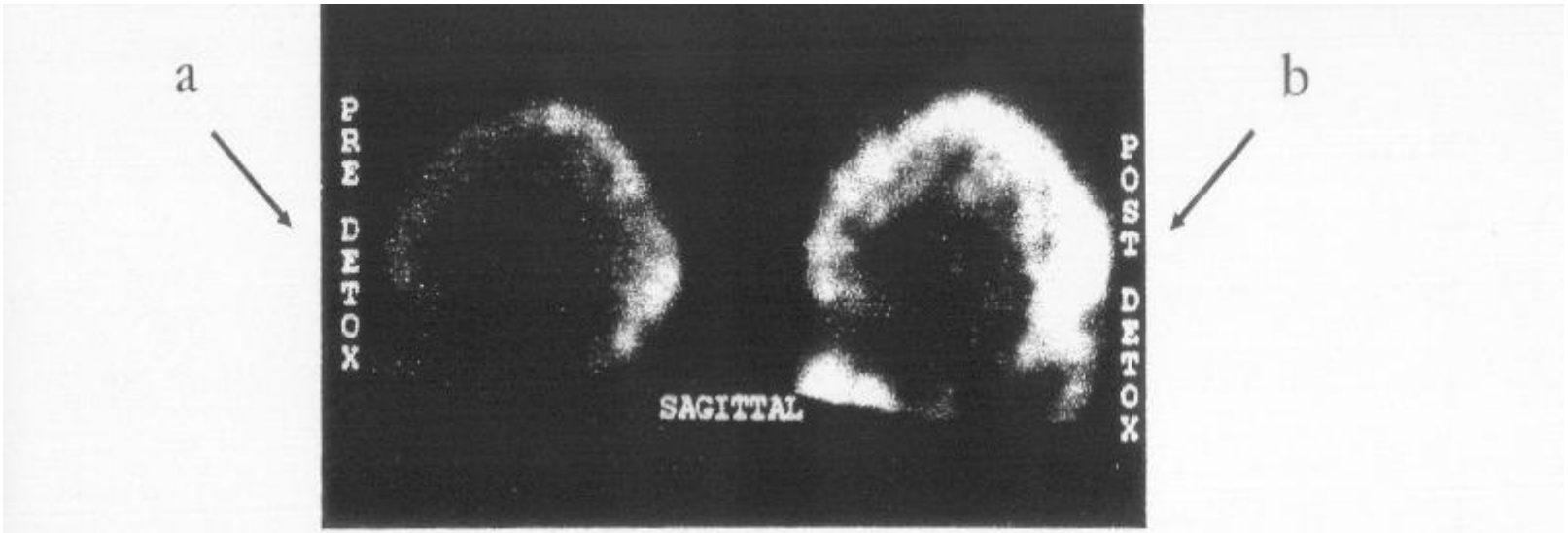
- **"Sometimes people who experience intense or ongoing exposure to one or more of these chemicals or irritants become sensitive to them."** *(NSEHC Risk Assessment)*

  This is called Environmental Sensitivity (ES) or Multiple Chemical Sensitivity (MCS) or Environmental Illness (EI).

Consequences of environmental hazards

Research using SPECT brain scans

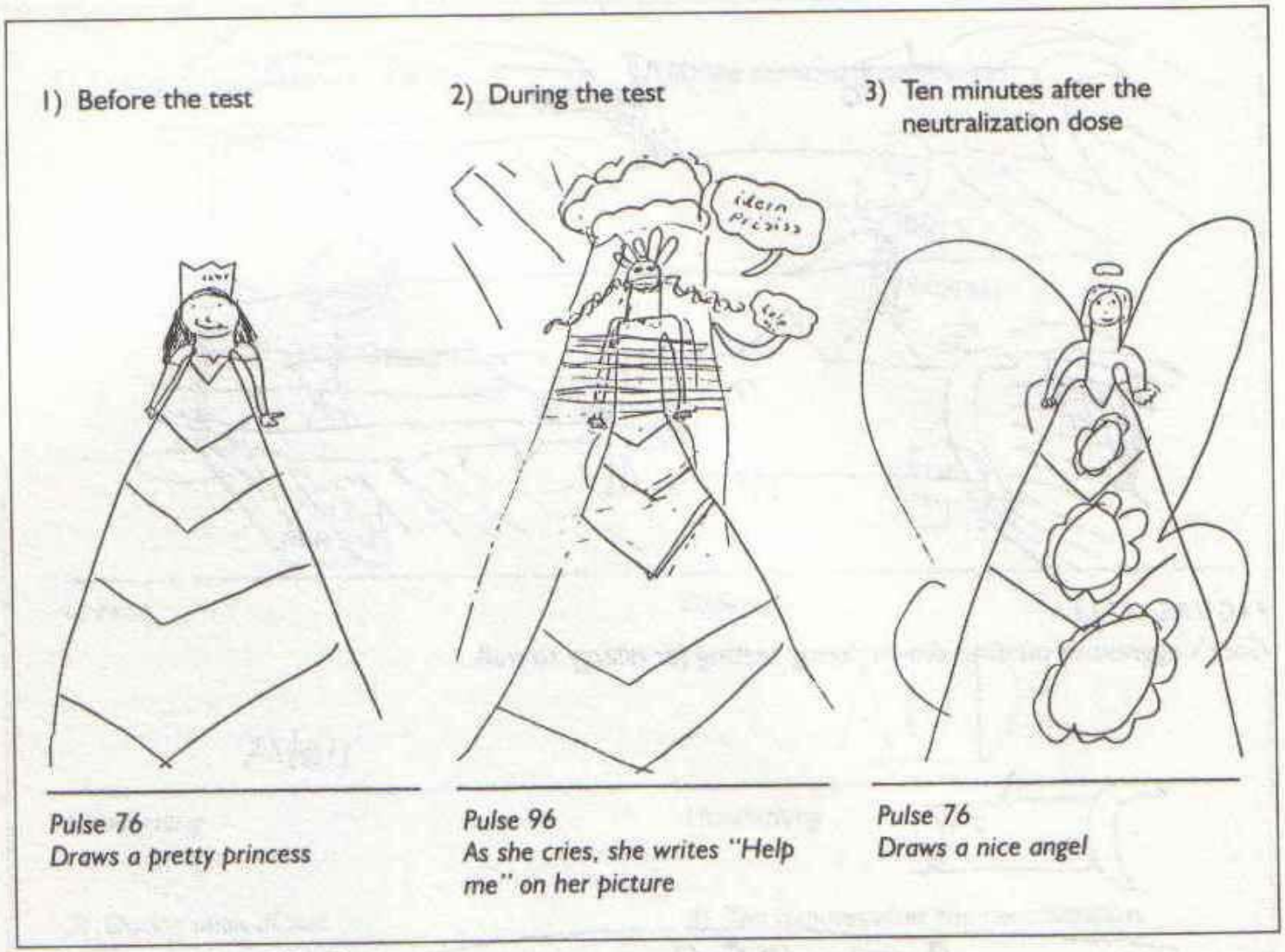
This shows a cause and effect relationship between toxin exposures and brain function. The light areas indicate brain functions. The scan on the left is that of a 12-year-old child with metal toxicity from tooth braces. The one on the right is the same child after removal of the braces and detoxification treatment.



igure 2-4.

: Brain scan of 12-year-old with braces before treatment.

: Brain scan of 12-year-old after treatment. Light areas denote improved brain functions.



FIGURES 5.39A TO C
Changes in Cindy's drawing during testing for allergy to mold.

Is this Your Child's World? Dr. Doris Rapp, 1996

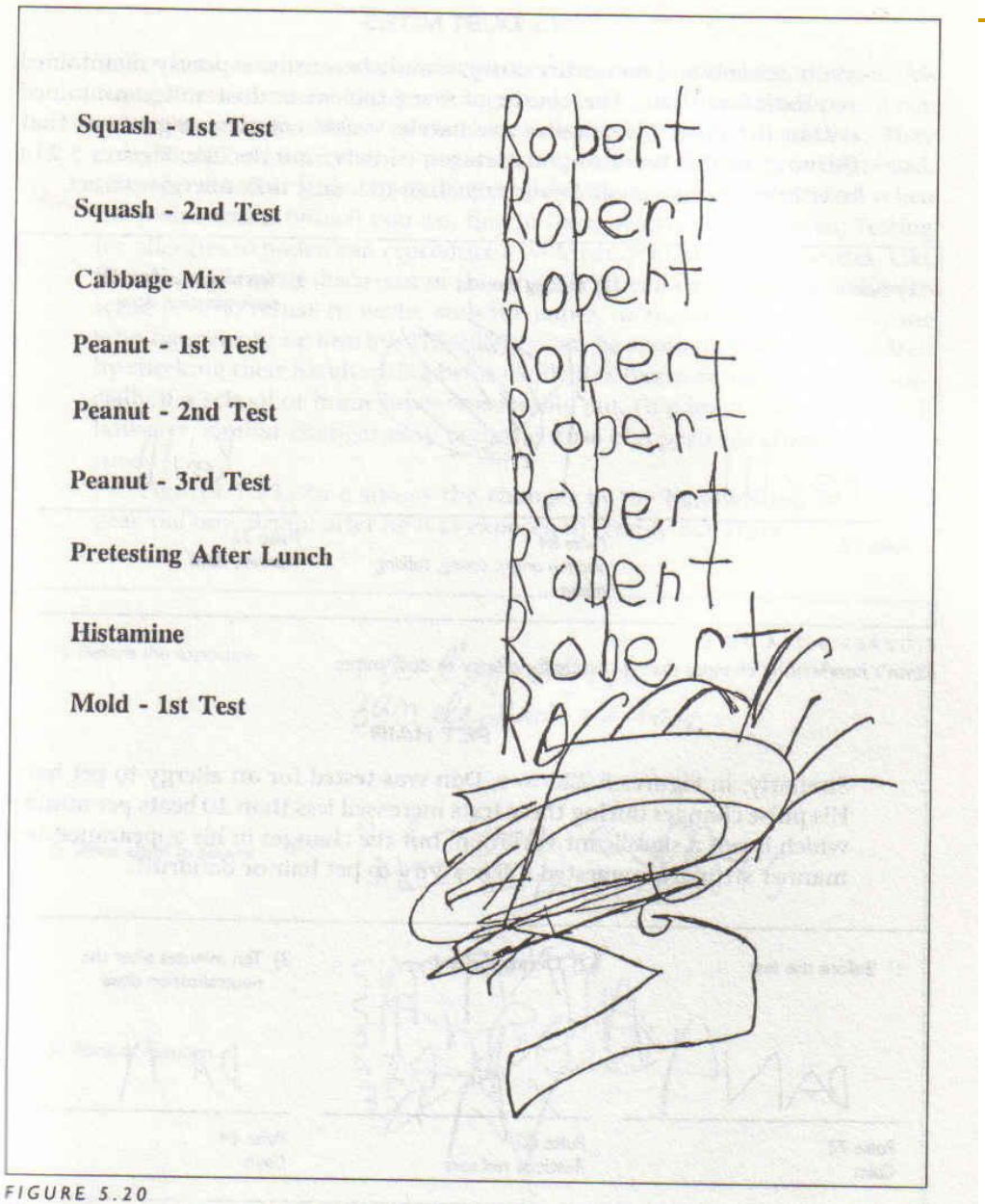
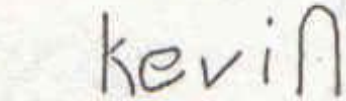


FIGURE 5.20
Changes in Robert's handwriting during testing for mold allergy.

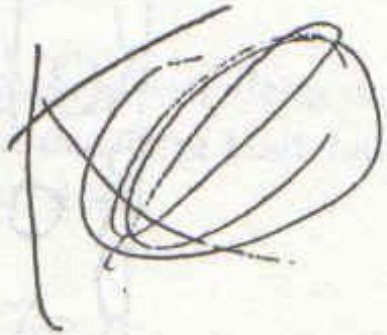
Is this Your Child's World? Dr. Doris Rapp, 1996

1) Before the test



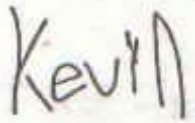
Pulse 72

2) During the test



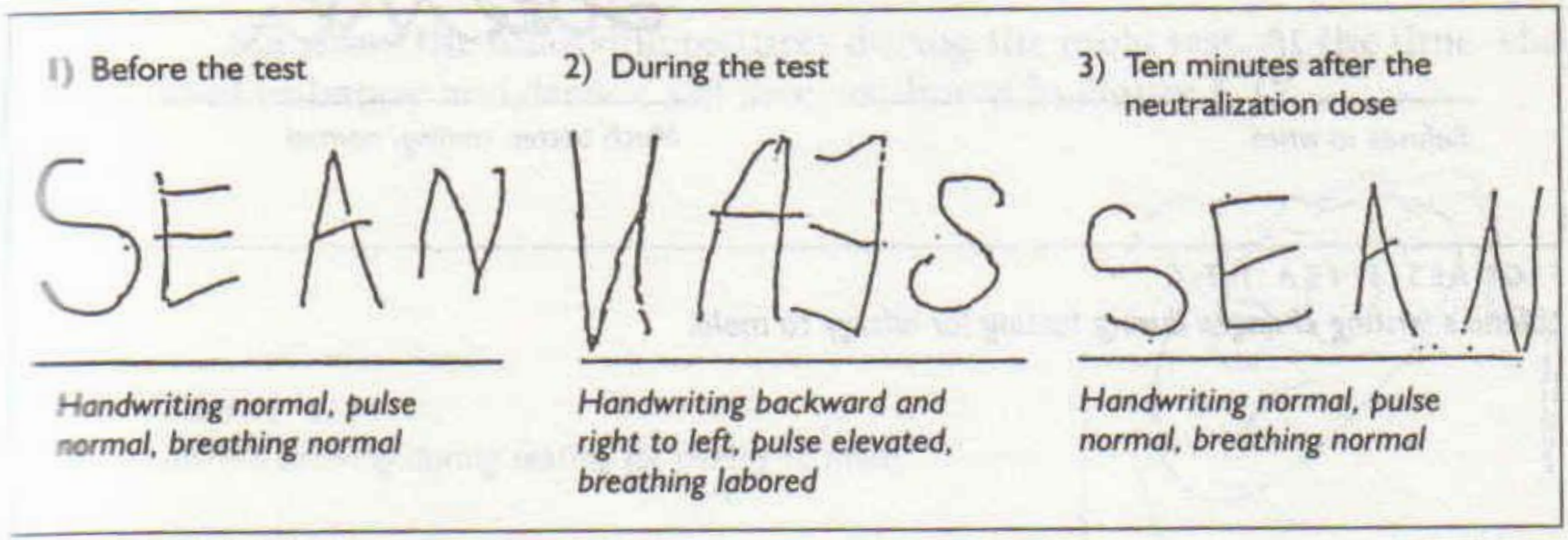
Pulse 84
Sudden anger, crying, talking mean

3) Ten minutes after the neutralization dose



Pulse 72
Normal, calm

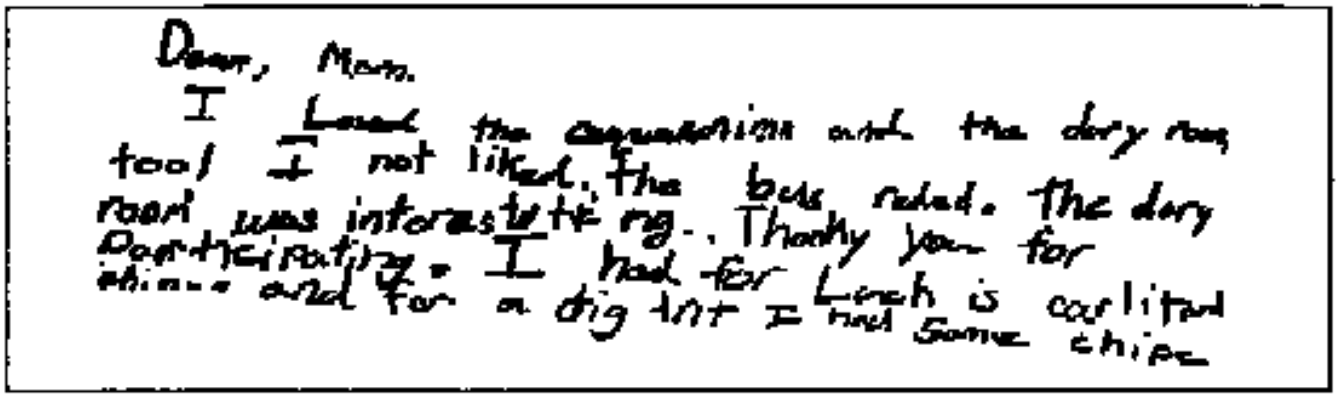
FIGURES 5.21A TO C
Kevin's handwriting changes during testing for allergy to dust mites.



FIGURES 5.14A TO C
Handwriting, pulse, and breathing changes in Sean during testing for allergy to mold.

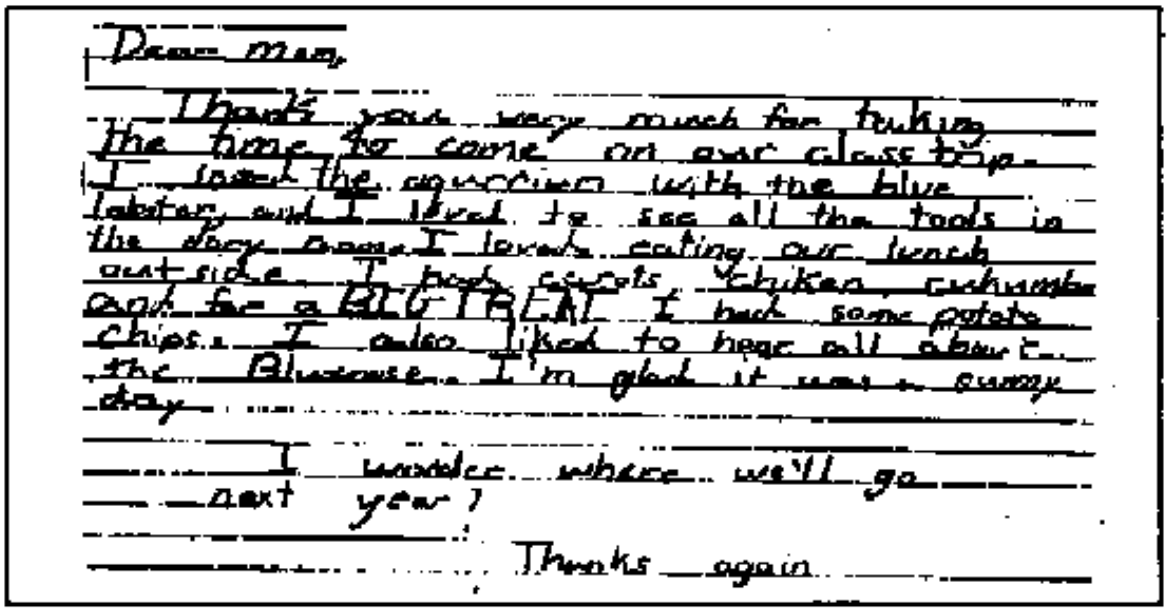
Is this Your Child's World? Dr. Doris Rapp, 1996

These are excerpts from letters by a local 9 year old with environmental sensitivities to perfumes, cleaning materials and construction materials.



Dear, Mom.
I Loved the aquarium and the dry room too! I not liked the bus ride. The dry room was interesting. Thanky you for participating. I had for Lunch is cauliflower and for a dig int I had some chips

The first, above, was written IN SCHOOL. She was trying her best but her teacher had perfume on and the janitor had just finished cleaning the classroom. The second letter, below, was written THE SAME DAY after a 45 minute walk outside. She had no additional help.



Dear mom,
Thank you very much for having the time to come on our class trip. I loved the aquarium with the blue lobster and I liked to see all the tools in the dry room. I loved eating our lunch outside. I had carrots, chicken, cucumber and for a DESSERT I had some potato chips. I also liked to hear all about the Bluenose. I'm glad it was a sunny day.
I wonder where we'll go next year!
Thanks again

The Big Five: method for determining environmental impacts on learning and health

The BIG FIVE are: appearance, actions, pulse, breathing, and writing.

After being exposed to a condition, food, location, medication, or anything else that might be a possible "incitant", check yourself or your child in the following way:

a) **Has pulse inexplicably changed (up or down) 20 pulses from normal?**

b) **Note breathing changes. Use a Peak Flow meter to check air flow. Is there a drop of 15% or more?**

c) **Observe and record how your child looks. (wiggly legs? red ears? dark, red, runny, sore eyes or nose?)**

d) **Note changes in behaviour or how s/he feels. (tired, pains, hyperactive, angry, sad...?)**

e) **Can your child write or draw as well as usual?**

Diagnostic Criteria for ES

- Symptoms are reproducible with repeat exposure
- The condition is chronic
- Low levels of exposure result in symptoms
- Symptoms improve or resolve when the incitants are removed
- Responses occur to multiple chemically related substances
- Symptoms involve multiple organ systems
- Neurological symptoms may be involved

- *Medical Perspectives on Environmental Sensitivities. M.E. Sears, 2007*

More about ES…

- Approximately 3% of Canadians have been diagnosed with environmental sensitivities.
- All ages and both sexes (Babies can be born with it)
- **ES may develop gradually after chronic exposure to relatively low levels of chemicals as seen in sick buildings, or suddenly after a major exposure…**
- **The condition may be initiated by one or a combination of environmental factors such as mould, pesticides, solvents, chemical off-gassing…**
- There appear to be genetic factors (missing detoxification enzymes…)
- Nutritional balance appears to be involved either as a causal factor or an outcome.

- Reactions occur at levels previously tolerated by the individual.
- Sufferers have their own combination of sensitivities and their own reactions to them.
- The Spreading Phenomenon: Reactions can occur to man-made or to natural materials: mould, foods, pine, light, noise, electromagnetic radiation…
- However, some incitants are “universal”: chemicals, moulds, dust…
- Impacts range from mild (sub-optimal, but still “normal”) to debilitating.
- Reactions may not occur immediately.
- Left untreated, illness can increase.

- Sensitivities vary greatly from one person to another so the **sensitive person should be involved in determining accommodations**.
- Improvement is possible with early recognition, avoidance of factors, and treatment to remove toxins.
- Children respond particularly well.

- *Medical Perspectives on Environmental Sensitivities. M.E. Sears, 2007*

Examples of EI Incitants/Triggers

- **Volatile Organic Compounds:** solvents, fragrance products, glues, fuels, fabric softeners, cleaning agents, paint …
- **Combustion products**: smokers, vehicles, barbecues, wood stoves, furnaces, propane equipment
- **Moulds**
- **Pesticides**
- **Natural inhalants:** pollen, animal dander, terpenes
- **Foods:** proteins, preservatives, flavourings, specific foods
- **Electromagnetic radiation**
- **Other:** temperature, light, noise

Examples of Symptoms

- **Nervous System:** confusion, feeling “spacey”, headaches, trouble finding names or words, seizures, anxiety, depression, memory problems…
- **Respiratory System:** stuffy, itchy nose, blocked ears, sinus pain, stuffiness, infection, cough, asthma, frequent chest infections
- **Eyes:** dark rings, red, watery, pain, blurred vision
- **Gastrointestinal System:** Heartburn, nausea, bloating, pain, diarrhea, constipation
- **Endocrine System:** fatigue, blood sugar fluctuations
- **Musculoskeletal System:** joint and muscle pain, spasms, weakness
- **Cardiovascular System:** rapid or irregular heartbeat, cold extremities, high or low blood pressure
- **Skin:** flushing, hives, eczema, rashes, itching
- **Genitourinary System:** frequency and urgency to urinate, painful bladder spasms

Treatment

- **Avoidance of incitants/triggers**
- **Reduce the body's toxic load:**
  Clean air….clean food….clean water
- **Medical treatment from specialist in ES**

An Environmentally Sensitive Person May Need…

- **Special cleaning products or classroom supplies to accommodate specific sensitivities**
- **An air filter in the classroom (caution: do not use ozone generating purifiers. The EI may require special filters.)**
- **Purified water**
- **List of food ingredients in cafeteria**
- **Outdoor clothing kept in lockers**
- **No pets, plants, mouldy books or compost in the classroom**
- **Seating near a window**
- **At-home schooling sometimes**
- **Compassion, understanding, cooperation**
- **More…**

Work together for solutions

Nova Scotia: a Healthy Schools leader for well over a decade

At conferences I hear this,

"We discuss and develop theories, but in Nova Scotia you are putting them into practice."

- A&WMA Conference attendee

- Schools are being repaired, upgraded and replaced
- Safer maintenance practices, with children in mind
- Healthier cleaning
  - ✓ no chlorine bleach cleaners
  - ✓ no citrus cleaners
  - ✓ no mop-oil sprayed on dust mops
  - ✓ no endocrine disrupters in cleaning materials
  - ✓ No chemical deodorizers…
- Pesticide-free pest control
- Hard-surface flooring throughout
- “Scent Smart” programs
- Vehicle-idling reduction programs
- Less toxic teaching products
- Classroom, chemistry, art and science materials are carefully selected, used and stored

When leaks are found, they are usually now fixed - fast - because **mould** can grow in less than 48 hours.

• 60 species of moulds have spores that are allergenic. Some are toxic to humans.

• 30% of patients with respiratory allergies are particularly sensitive to moulds

• Odds of death from asthma is twice as high on days with outdoor mould spore counts ≥1000 spores/m3

How can students help?

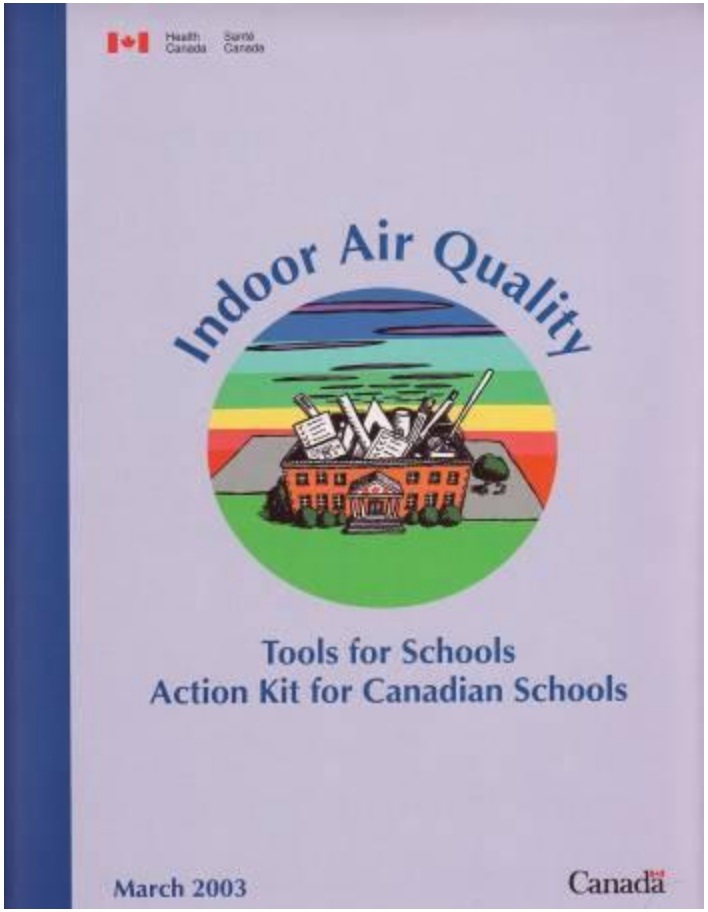
- **Select non-toxic, water-based glues, markers, art and classroom supplies…**
- **Avoid**
  - Liquid white out
  - Fragrances, smelly stickers/markers
  - Hot lamination
  - Mouldy books

- **Air dry-cleaned clothing well before wearing**
- **Choose safer plastic binders etc. or substitute natural materials**
- **Help protect classmates with EI**

How can School Boards Help?

- **Train principals well – they are the gatekeepers**
- **Use least toxic cleaning, maintenance and building materials**
- **Service and balance HVAC systems**
- **Fix leaks fast - mould can grow in less than 48 hours**
  (Do not use antimicrobial chemical treatments)
- **Photocopiers, laminators, printers…in isolated areas with exhaust**
- **Clean/dust daily using healthy methods (HEPA vacuum, damp mop)**
- **Scent-free program (including laundry soaps & fabric softeners)**
- **REQUIRE FLUSH OUTS of new construction or renovations**
- **Pesticide-free pest control**
- **Reduced vehicle idling**
- **Remove carpeting**
- **Isolate or schedule renovations**
- **Use Tools for Schools Action Kit**

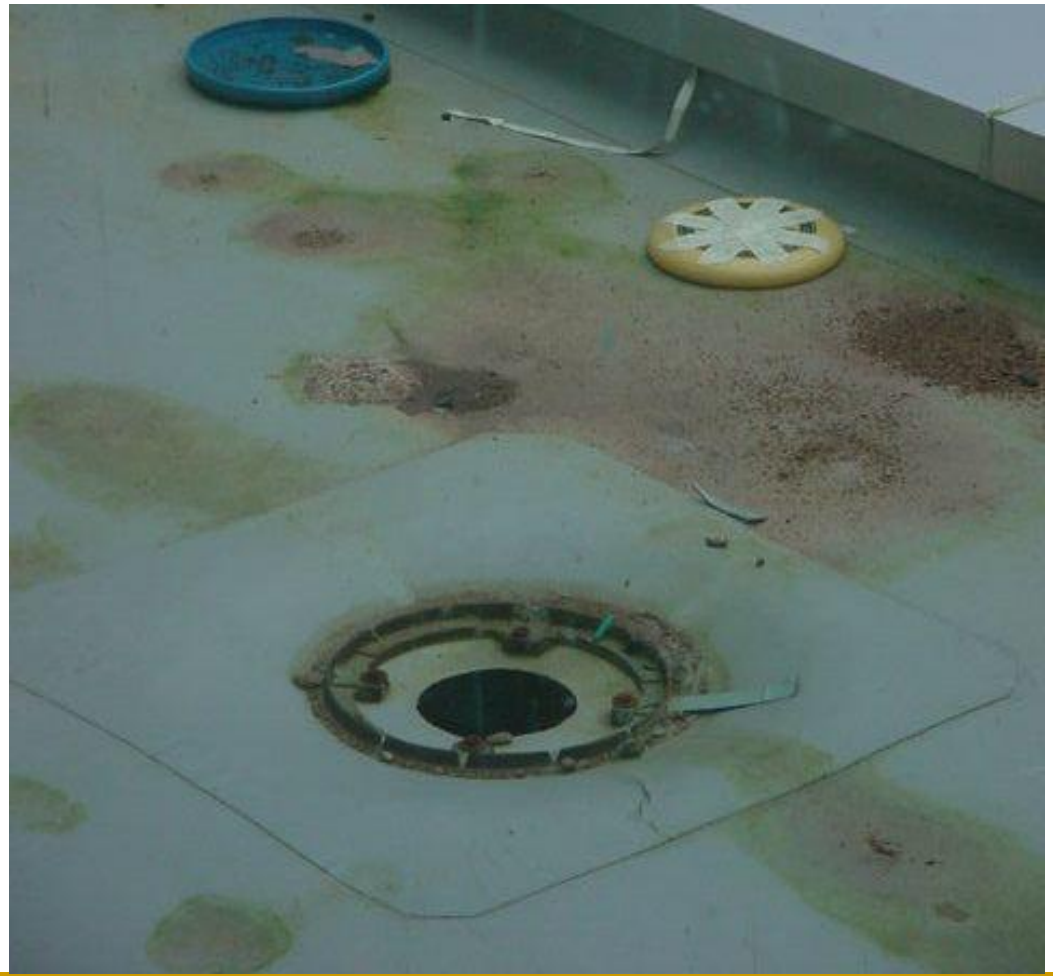
The Canadian IAQ Tools for Schools Action Kit



A Quick Virtual Walk-Through…

an unvented photocopier…

a plugged roof drain…
(builders forgot to install a grille)



water damaged ceiling tiles indicate a leak…

unapproved cleaning materials containing toxic ingredients…

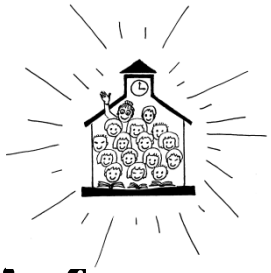
An office printer that needs ventilation

www.casle.ca/HealthySchoolsDay

Some are more vulnerable than others, but…

Improving school indoor environments to accommodate the environmentally sensitive can benefit everyone.


I'm sure glad the
hole isn't in our end...



For more information and links

www.casle.ca

Canadians for A Safe Learning Environment

www.lesstoxicguide.ca

www.casle.ca/HealthySchoolsDay

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