

CDC's Environmental Health Laboratory

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Highlights

- **Chemical terrorism:** Rapid Toxic Screen
- **Radiologic terrorism:** Urine Radionuclide Screen
- *National Report on Human Exposure to Environmental Chemicals*
- Better anthrax diagnosis
- Tobacco product analysis

Rapid Toxic Screen

- rapidly measure **150 chemical agents** in blood and urine
- **answers important questions:**
 - what is the chemical agent
 - who is exposed
 - how much exposure
- guides treatment and prevention
- large effort involving 80 persons and 21 advanced mass spectrometers

Chemical agents in Rapid Toxic Screen

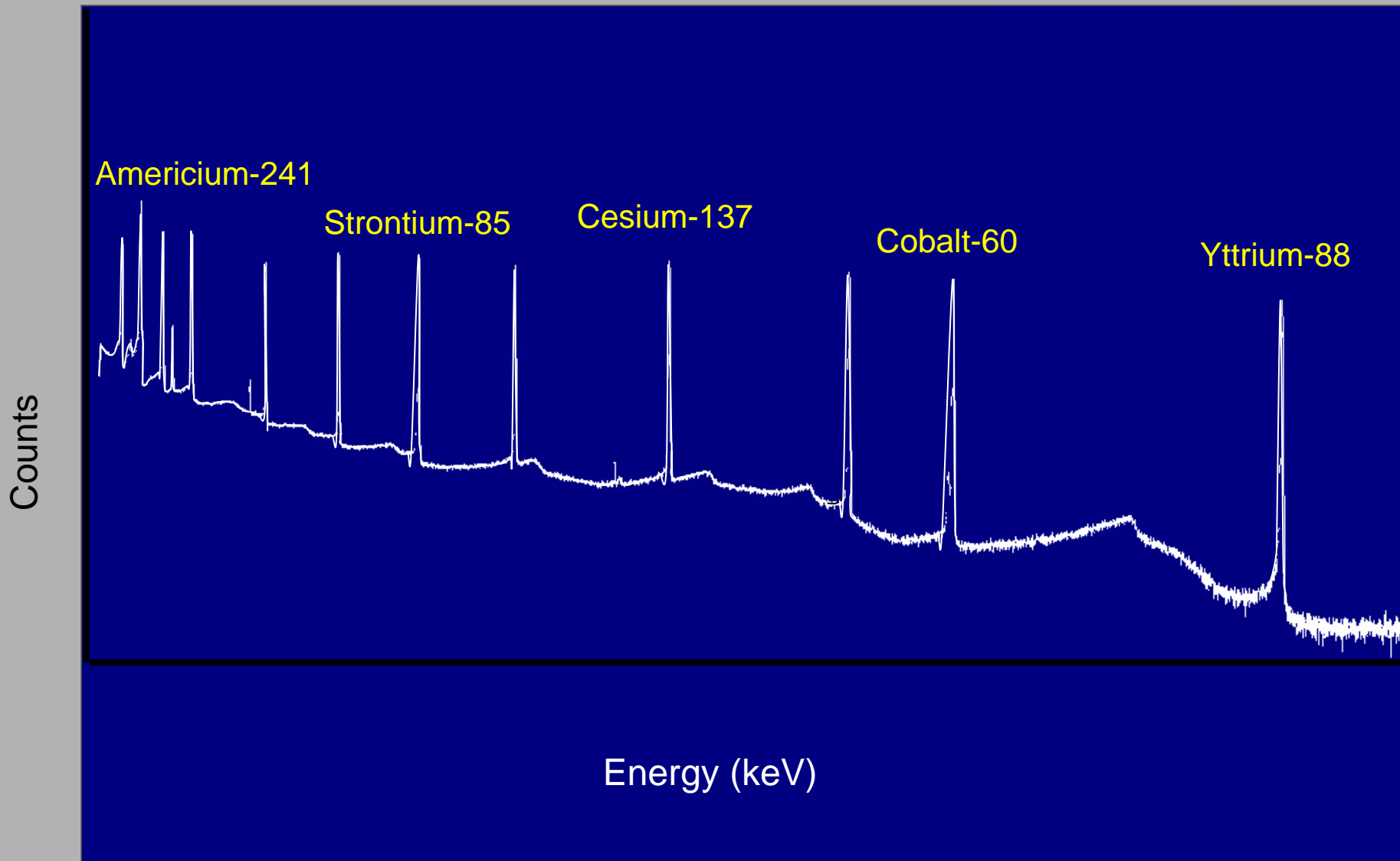
- Nerve agents (including sarin, soman, tabun, VX)
- Nitrogen mustards
- Sulfur mustards
- Lewisites
- Ricin
- Saxitoxin
- Incapacitating agents
- Tricothecene mycotoxins
- Hydrogen cyanide
- Cyanogen chloride
- Toxic metals
- Volatile toxics
- Selected toxic industrial chemicals

Urine Radionuclide Screen

(in progress)

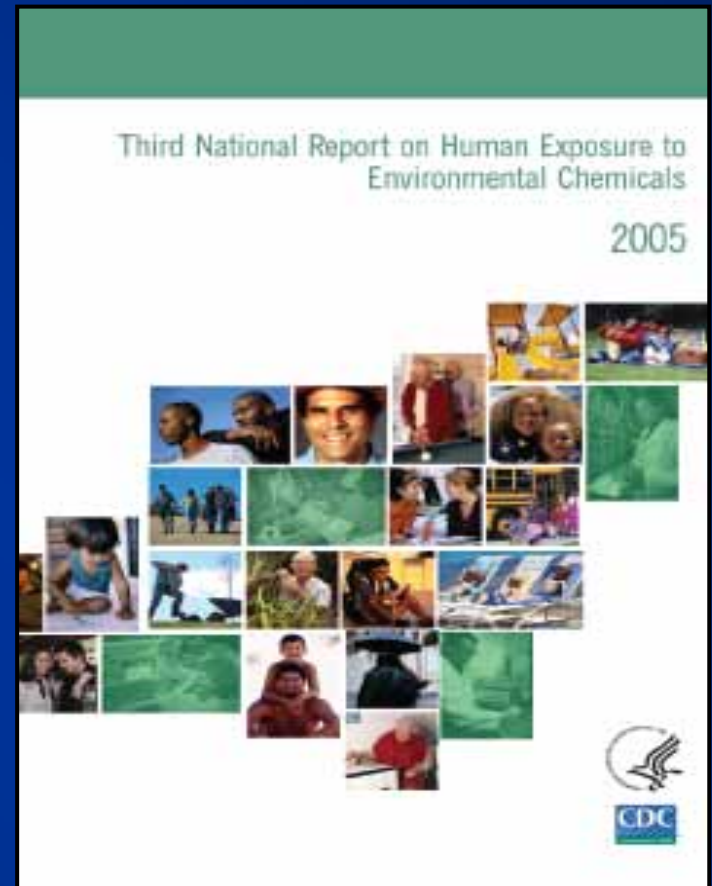
- will measure 22 'dirty bomb' radionuclides in urine
- answers important questions:
 - What radionuclides were used
 - Who is exposed
 - How much exposure
- guides treatment and prevention
- uses advanced detection of alpha, beta, and gamma radiation with high resolution mass spectrometry

Urine levels of radionuclides likely to be used in a **dirty bomb**



National Report on Human Exposure to Environmental Chemicals

- measure more than 300 chemicals in blood and urine
- Approximately 2400 people per sample
- National sample every 2 yrs
- More than 350,000 measurements
- Started in 1999



www.cdc.gov/exposurereport



Public health uses of the *Report*

- Measures chemicals that actually get into people
- Identifies at-risk populations
- Detects trends in exposure over time
- Evaluates effectiveness of public health efforts
- Sets priorities for human health effects research



Chemicals in the *National Report*

(partial list of more than 300 chemicals)

- Lead, mercury, arsenic (speciated)
- Uranium, thallium, cadmium
- 12 other metals
- Polychlorinated biphenyls, dioxins and furans
- Organochlorine pesticides
- Carbamate pesticides
- Organophosphorous pesticides
- Pyrethroid pesticides
- Herbicides
- Polycyclic aromatic hydrocarbons
- Phthalates
- Pest repellants
- Nitrosamine
- Cotinine
- Polyfluorinated chemicals
- Brominated flame retardants (PBDEs)
- Benzene, toluene, bromoform
- halomethanes, methylene chloride
- 26 other volatile chemicals
- Perchlorate
- Bisphenol A & alkylated phenols
- Triclosan
- Benzophenone 3
- Acrylamide
- Phytoestrogens

Table 11. Cadmium in urine (creatinine corrected)

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999-2002.

	Survey years	Geometric mean	Selected percentiles				Sample size
		(95% conf. interval)	(95% confidence interval)				
			50th	75th	90th	95th	
Total, age 6 and older	99-00	.181 (.157-.209)	.219 (.199-.238)	.423 (.391-.446)	.712 (.645-.757)	.933 (.826-1.07)	2257
	01-02	.199 (.181-.218)	.212 (.194-.232)	.404 (.377-.440)	.690 (.630-.754)	.917 (.813-.998)	2689
Age group							
6-11 years	99-00	*	.085 (.063-.107)	.147 (.123-.182)	.210 (.171-.316)	.300 (.184-.607)	310
	01-02	.075 (.059-.094)	.100 (.083-.112)	.166 (.136-.192)	.233 (.206-.281)	.291 (.221-.440)	368
12-19 years	99-00	.071 (.051-.098)	.093 (.084-.106)	.147 (.130-.163)	.215 (.204-.240)	.283 (.222-.404)	648
	01-02	.078 (.067-.091)	.091 (.085-.101)	.136 (.123-.143)	.191 (.175-.234)	.280 (.234-.321)	762
20 years and older	99-00	.267 (.247-.289)	.288 (.261-.304)	.484 (.433-.545)	.769 (.727-.818)	1.07 (.927-1.17)	1299
	01-02	.261 (.236-.289)	.273 (.247-.303)	.481 (.426-.518)	.776 (.691-.850)	.979 (.874-1.12)	1559
Gender							
Males	99-00	.154 (.131-.182)	.174 (.158-.191)	.329 (.293-.382)	.617 (.537-.700)	.788 (.696-.929)	1121
	01-02	.159 (.143-.177)	.168 (.157-.182)	.334 (.304-.364)	.532 (.491-.653)	.757 (.690-.856)	1334
Females	99-00	.211 (.170-.261)	.267 (.239-.308)	.473 (.423-.551)	.783 (.690-.917)	1.09 (.813-1.38)	1136
	01-02	.245 (.216-.278)	.263 (.228-.297)	.479 (.414-.541)	.792 (.687-.884)	.985 (.876-1.16)	1355
Race/ethnicity							
Mexican Americans	99-00	.175 (.137-.223)	.181 (.144-.225)	.331 (.266-.418)	.612 (.441-.828)	.843 (.674-1.13)	780
	01-02	.156 (.136-.178)	.170 (.150-.184)	.282 (.263-.340)	.501 (.388-.614)	.693 (.507-.839)	682
Non-Hispanic blacks	99-00	.183 (.140-.240)	.201 (.168-.241)	.414 (.343-.472)	.658 (.516-.827)	.873 (.722-.962)	546
	01-02	.190 (.156-.232)	.195 (.174-.225)	.385 (.336-.449)	.676 (.559-.850)	.917 (.725-1.08)	667
Non-Hispanic whites	99-00	.175 (.146-.209)	.219 (.191-.250)	.432 (.387-.470)	.729 (.666-.783)	1.00 (.826-1.16)	760
	01-02	.205 (.184-.229)	.224 (.208-.242)	.421 (.382-.470)	.719 (.668-.784)	.931 (.806-1.05)	1132

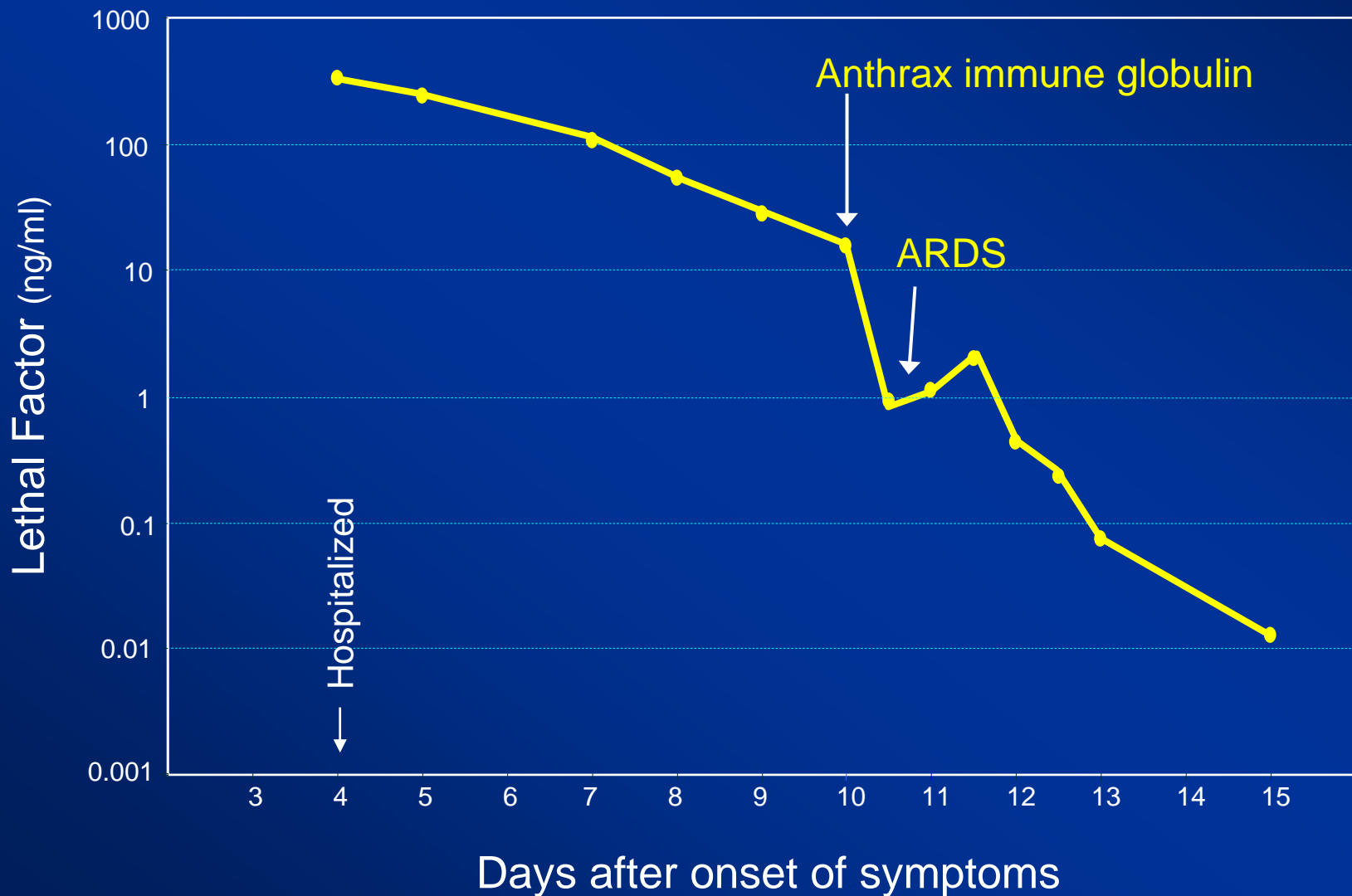
* Not calculated. Proportion of results below limit of detection was too high to provide a valid result.

Three forms of anthrax

- **Cutaneous**
Most common - 20% death rate if untreated
- **Gastrointestinal** colonization
25-60% death rate if untreated
- **Inhalational** - usually fatal if untreated.
hard to diagnose, resembles flu.



New York patient: Lethal factor in plasma/serum

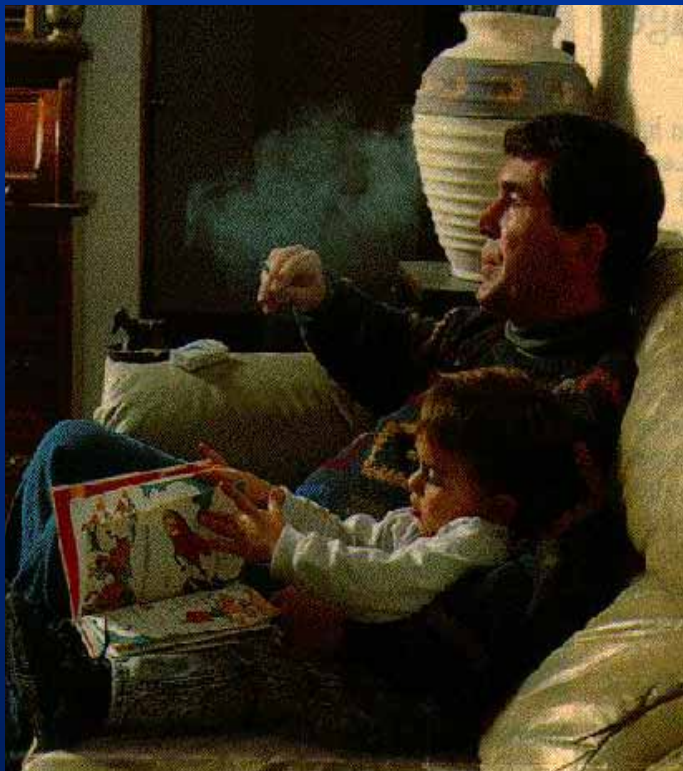


Recovered Anthrax Patient at Press Conference at Release from Hospital



CDC Smoking Laboratory

Environmental tobacco
smoke exposure



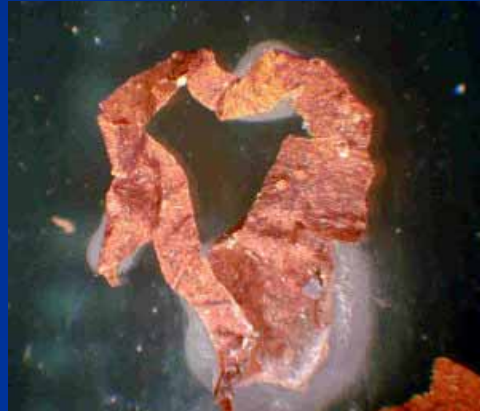
Addictive and harmful chemicals
in cigarettes and cigarette smoke



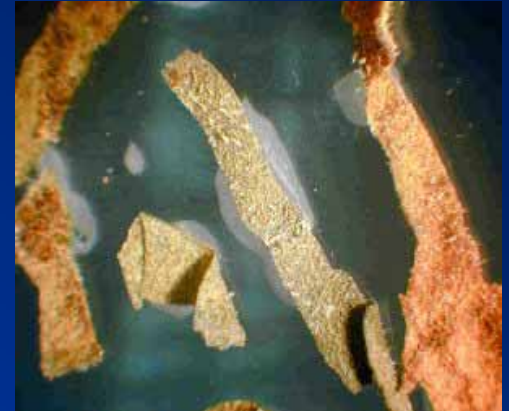
Tobacco components



Bright tobacco



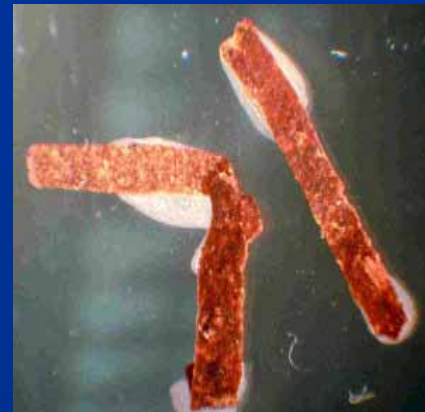
Burley tobacco



Oriental tobacco



Stems



Bandcast recon or
Paper recon

Ventilation holes dilute puff with air
producing **artificially low tar and nicotine levels**

