Currency - Health and Safety Concerns

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PERILS THAT TRAVEL IN PAPER CURRENCY

Prof. Hilditch of Yale Finds That Disease Lurks in Money to Dangerous Extent.

BACTERIA BY THE THOUSAND

Every Sold Bill Found to Contain an Average of 142,000, Although Some Had Lost Their Virulence.
Outline

- Currency is Everywhere!!!
- Types of International Currency in Circulation
- What is Contaminated?
- Types of Contamination and Hazards
Currency is Everywhere!!!

Dead Presidents Everywhere*

*I know, I know — Hamilton and Franklin weren’t presidents...

Millions of bills and coins trade hands each day in America, while many more are lost and destroyed. We look into how much paper currency is in circulation today and some interesting facts surrounding the U.S. Mint’s production.

**VALUE OF PAPER CURRENCY IN CIRCULATION**

as of Dec. 31, 2008:

- $1  $9.5 billion
- $2  $1.7 billion
- $5  $11 billion
- $10 $16.3 billion
- $20 $125.1 billion
- $50 $64.7 billion
- $100 $625 billion
- $500 to $10,000 $300 million

**2008 TOTAL: $853.2 BILLION**

Includes Federal Reserve notes, U.S. notes and currency no longer issued

**NUMBER OF BILLS IN CIRCULATION**

- 9.5 billion
- 850 million
- 2.2 billion
- 1.63 billion
- 6.26 billion
- 1.29 billion
- 6.25 billion

**LIFE EXPECTANCY**

- 1.8 years
- n/a
- 1.3 years
- 1.5 years
- 2 years
- 4.6 years
- 7.4 years
- n/a

Visual Economics, 2008 – Data from U.S. Treasury
Currency is Everywhere!

In fiscal 2008, the U.S. Bureau of Engraving and Printing produced almost 8 billion banknotes (on average 38 million notes per day), for a face value of $629 million.

Approximately $829 billion in U.S. currency in circulation today, the majority outside of the U.S.

Estimated 2.2 million ATM’s worldwide with $6,000 to $10,000 in each machine.

Estimated 500,000 ATM’s in the U.S. with 1 billion transactions per month.

A new ATM is installed every 7 minutes.
Types of International Currency

Two Broad Categories of Notes

- Porous
  - Paper and/or Cloth Notes (U.S., Argentina, Euro, UK)

- Non-Porous
  - Polymer Notes (Australia, Mexico, Singapore, Israel, soon to be Canada)
  - Durable Paper Notes/Resin or Varnish Coated (Switzerland)

Type of Note is a Major Factor in Contamination
What is Contaminated?

Federal Reserve Defines Contaminated Currency as:

“Currency that has been damaged by or exposed to contaminants, poses a health hazard or safety risk and cannot be processed under normal operating procedures”

In general, contamination may be caused by the following:

- Floodwater or prolonged exposure to water or other liquids;
- Exposure to blood, urine, feces or any other bodily fluids, including removal from any body cavity, corpse or animal;
- Exposure to sewerage;
- Exposure to any foreign substance or chemical, including dye packs, which may pose a health hazard or safety risk;
- Mold or mildew.
Types of Contamination on Notes

- **Biological**
  - Viruses
  - Bacteria
  - Fungi

- **Chemical**
  - Drugs
  - Dye Packs
  - Other Chemicals
Biological Contamination -- Viruses

Recent Focus on Influenza (H5N1 and H1N1)

Transmission Routes
- Droplet or Airborne Transmission (coughing/sneezing)
- Contact Transmission (hand to hand, object to hand)

Many Contributing Factors
- Droplet Size
- Temperature and Humidity
- UV Radiation (sunlight)
- Open Air
- Viral Inactivation Rate (Survival Time)
- Presence of Mucus or Other Secretions (increases survival)

Thomas et al, Applied and Environmental Microbiology, May 2008
Tiwari et al, Avian Diseases, 2006
Biological Contamination – Viruses (continued)

Key Transmission Route with Currency is Contact

Primary Variable is Survival Time

- Non-Porous (metal, plastic) – up to 72 hours
- Porous (cloth, paper, tissue) – up to 24 hours
- Survival on Hands After Transfer – 5 minutes

Thomas et al, Applied and Environmental Microbiology, May 2008
Tiwari et al, Avian Diseases, 2006
Biological Contamination – Viruses (continued)

- Study of Swiss Banknotes found survival of influenza viruses up to 3 days.
- Presence of mucus extended survival to 17 days.
- Swiss Banknotes have resin coating, so equate to that of non-porous surface.
- No comparable studies of U.S. Banknotes, but would equate to that of porous surfaces.
- FYI, flu virus survival on coin would equate to non-porous surfaces, ie, 72 hours.

Thomas et al, Applied and Environmental Microbiology, May 2008
Biological Contamination-- Bacteria
Biological Contamination – Bacteria (continued)

Studies of bacterial contamination on currency vary and are very limited.

Two studies of currency from randomly selected individuals found that 7% of notes contained bacteria considered pathogenic to healthy individuals.

Of these, one study found that 87% of notes contained bacteria pathogenic to hospitalized or immune compromised individuals.

A third study by Abrams and Waterman found pathogenic bacteria on 42% of paper currency collected from hospital workers.

Most common pathogens include Staph Aureus and Enterococcal organisms, including E. Coli.

Patricia Gadsby, Discover 1998
Biological Contamination -- Fungi

- Wide range of fungal organisms on currency
- Typically found on currency that has been kept in wet or damp environments for long periods of time
- Generally cause exacerbations of respiratory illnesses, e.g., allergies and asthma, and also skin irritation
Chemical Contamination -- Drugs
Although many drugs found on banknotes, most prevalent is Cocaine

Money from drug busts contribute to some degree

More importantly by snorting through notes – positive tests most common in $1, $5, $10 and $20 bills

In U.S. and Canada, approximately 90% of notes test positive for Cocaine – 95% in Washington D.C., but also high in many urban centers, Boston, Baltimore, Detroit

Outside of U.S., 80% of notes in Brazil, 20% in China and 16% in Japan tested positive for Cocaine

Amounts of Cocaine varied widely, but in most instances, very unlikely to impact health or drug test results
Chemical Contamination – Red Dye

- Only health affects are to those allergic to the specific red dye (there are multiple red dyes)
- Some dye packs contain tear gas, which can cause temporary medical symptoms
Any number of other chemicals potentially able to contaminate currency – mostly irritant effects to skin, mucus membranes and respiratory tract

- Pesticides
- Fertilizers
- Sewage
- Gasoline and Petroleum Based Products
Questions?