

I've been thinking...



Drug Spectrometers
December 2009

I've been thinking about yesterday's JC Penney, tomorrow's airport security, and today's pharmacy (i.e., deeply penetrating material ID technology).

The shoe department at my childhood JC Penney had a snazzy x-ray machine.¹ After shoehorning my feet into a pair of Buster Browns, the salesman had me slip them into the opening near the bottom of an Art Deco shoe-fitting box. On top were three ports through which he, my mother, and I viewed a fluorescent image of the bones of my feet and the outline of the shoes. None of us wore lead aprons to protect our fertility from the gamma rays. Apparently, it didn't matter, as I have five kids.



Sometime in the 1960s, shoe-fitting x-ray machines were banned. I say it's time to pull them out of retirement and put them to work in airport security so we don't have to remove our shoes.

That reminds me of the TSA agent who lay down on the conveyor belt for a ride through x-ray. He wanted to see if there was anything wrong with him. I could have told him there was something wrong with anyone who would do that. But hey, suppose they found scissors or sponges in his abdomen?

Speaking of wrong—early this year, TSA announced that whole-body imagers would replace metal detectors at screening checkpoints across the country. While these low-radiation devices are now operating in 19 airports, it's not looking like mandatory imaging is going to fly. I don't know about you but I'd prefer to carry on my battle with the bulge in the privacy of my own shirt.

About the same time, TSA also indicated that new improved technology would soon enable security scanners to identify dangerous liquids. Reports suggested that sometime in 2009 we'd no longer be forced to toss our water bottles. We could send them through in bins, along with our coats and computers. TSA has less than a month to fulfill our hopes. Darn, another target missed.

Interestingly, the same technology that promises to make our homeland more secure is actually making medication distribution, preparation, and dispensing safer. While pharmacies are not noted for being on technology's cutting edge, some have skipped ahead of airports by installing spectrometers—scanners capable of verifying ingredients in medication containers.

Relying on FDA pharmaceutical cGMPs,² pharmacists have trusted that the medications in the containers they receive are what their labels indicate. However, with increased counterfeiting, drug veracity is in question. Various systems like [Energy-Dispersive X-Ray Diffraction](#)³ are coming to the rescue to validate that contents match containers. These deeply penetrating material ID systems are useful for tracking and tracing drug [e-pedigrees](#)⁴ at all points of sale, purchase, and trade between manufacturers and pharmacies.

After drugs reach pharmacies, spectrometry has more to do with verifying the accuracy of pharmacists and technicians than authenticating pedigrees. In mail-order and retail settings before prescriptions are shipped or handed to customers, they are placed (one at a time) in scanning devices⁵ to make sure that the tablets and capsules in your amber vials match what's on their labels. The chemical composition, size, shape, color, and volume of the pills are verified in several seconds.

For pharmacies already using bar-code-verification scanning and precision scales, spectrometers provide another layer of redundancy. Not a bad idea when one in 55 prescriptions involves an error (e.g., wrong drug, wrong strength, wrong patient, wrong count, etc.).⁶

Spectrometers are also being employed in some inpatient pharmacies, mostly for liquids. Errors are prevented as devices validate the products utilized while compounding high-risk IVs and syringes. This adds time to the process—up to 30 seconds per item. Although spectrometer analysis takes less time for verifying the composition of oral solids, the application doesn't seem practical for dispensing unit doses. Few pharmacies can afford to add several seconds to each pill pick.

Another valuable application: spectrometers help reduce diversion by analyzing the contents of narcotic returns and waste.

I know what you are thinking. Don't worry. Radiation levels are too low to tamper with your fertility. For the record, five children is pretty cool—though I must admit, it is a lot of shoes.

What do you think?



Mark Neuenschwander

PS. Hope you can clear your calendar to include The unSUMMIT for Bedside Barcoding in Atlanta, May 5-7 (<http://www.unsummit.com>)

- 1 <http://www.orau.org/ptp/collection/shoefittingfluor/shoe.htm>
- 2 <http://www.fda.gov/Drugs/DevelopmentApprovalProcess/Manufacturing/ucm169105.htm>
- 3 <http://www.xstreamsistemas.net/technology.html>
- 4 http://www.epcglobalinc.org/standards/pedigree/pedigree_1_0-standard-20070105.pdf
- 5 <http://www.centice.com>
- 6 <http://www.ncbi.nlm.nih.gov/pubmed/12688437>

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