

Testing the waters

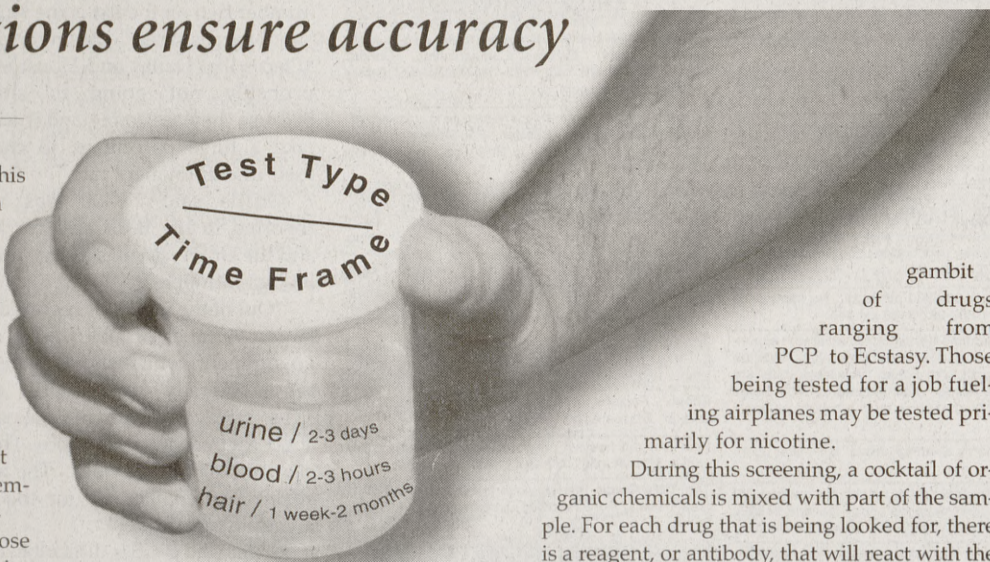
Drug examinations ensure accuracy

STUART HUTSON
The Battalion

John has just spent the last five years of his life in college studying and has now been hired for his dream job, but first, he must pass one more exam — a drug test. As he drops his pants to deliver a urine sample, John's mind swims back to a party one week ago where his friends were partaking of an illegal, post-graduation drink. While he did not participate in the weed smoking, he wonders if the second-hand pot smoke will be enough to send him to the unemployment line.

These are common questions asked by those faced with undergoing a drug test. How precise are drug testing techniques, and what happens after someone fills one of those little cups?

Dr. Jack Zaun, the chief of laboratory operations for One Source Toxicology Laboratories in Deer Park, Texas, said the laboratory technicians begin a drug evaluation by sending the sample through an immunological or "screening" test to determine whether any drugs are present in the sample.



JP BEATO / THE BATTALION

"Your standard urine test is set up to test for five basic drugs: cocaine, heroin, codeine or morphine, amphetamines, and PCP," Zaun said. "But no drug test is just limited to those. Anything that is carried in any fluid within the human body can be tested."

Zaun said the drugs selected for screening are determined by the job or situation of the testing. Those being tested under suspicion for illegal drug use by law enforcement may be tested for a

gambit of drugs ranging from PCP to Ecstasy. Those being tested for a job fueling airplanes may be tested primarily for nicotine.

During this screening, a cocktail of organic chemicals is mixed with part of the sample. For each drug that is being looked for, there is a reagent, or antibody, that will react with the particular drug for which it is designed.

"All drugs are organic in nature — they have to be in order to interact with the organic human body," Zaun said. "As such, there are antibodies that will single each drug out and attack it, just like an antibody in the body would attack a particular bacteria."

The attack may result in chemical reactions that can be determined by microscopic or spectroscopic examination.

The time frame of drug detection measured by the screening process is determined by the kind of sample being examined. For instance, standard urine testing typically will reveal drugs used within the last two or three days.

Blood testing normally will reveal drugs used only within the last two or three hours because of the constant filtering of the blood by the body's waste system.

"Blood testing for drugs is typically used during postmortem work to see if drugs were a factor in the death," Zaun said. "In this case, the drug is still in the blood, and the blood is much easier to access than urine."

Hair testing will reveal a general history of drug use from one week to two months prior to the test.

"Hair grows at about one centimeter a month, so we can't test for

See TESTING on Page 6.

Agent Orange toxin shows possible benefits

STUART HUTSON
The Battalion

A chemical called "the nastiest, most toxic man-made organic chemical ... second only to radioactive waste" in a 1995 Greenpeace report is being studied by Texas A&M toxicologists as a possible means of beating breast cancer.

Dioxin, a toxin formed by combustion of organic materials and a common ingredient in many herbicides, is being studied by Stephen Safe, professor of toxicology, and his research group because it inhibits estrogen's facilitation of the growth of breast cancer cells.

"We were studying the effect of dioxin on liver cancer in rats and saw that those populations who were exposed to it had much lower levels of developing breast cancer," Safe said.

Dioxin interacts with animal cells by binding to a cell's "receptor" protein, resulting in a molecular complex that alters the cell's genetic material.

This alteration often counteracts the effects of hormones, such as estrogen and testosterone, which work in a similar manner within cells. In the case of a breast cancer cell, estrogen detrimentally causes the cancerous cell to quickly grow and spread.

Safe said dioxin's interference with the cell's genetic material can produce many, often unpredictable, results.

"We're not really sure of all the chemical pathways used by dioxin, but it has some very odd and interesting effects," Safe said.

Safe said among the "interesting effects" associated with the chemical is a decreased immune response in mice, while it has been shown to increase immune response in rats. The most drastic response to dioxin in any animal is seen in guinea pigs, which experience a "wasting disease" that causes the animals to starve themselves to death. On the other hand, hamsters seem to have virtually no response to the chemical.

"The effect most commonly seen in humans exposed to it is a really terrible rash," Safe said.

The rash is usually exhibited by those using herbicides containing dioxin.

According to a report released by the American Medical Association (AMA), Vietnam War soldiers exposed to Agent Orange, a herbicide associated with peculiar illnesses, often experienced such a rash due to Agent Orange's high level of dioxin.

The peculiar effects of dioxin may be an advantage when the chemical interacts with breast cancer.

"It seems that the dioxin works in a very selective manner. You don't see effects on all species or even on all organs," Safe said. "It affects breast cancer cells but doesn't do anything to the surrounding cells. It's really unusual. We don't really understand all the responses, but that is part of what makes it fun, scientifically speaking. It is really a puzzle."

Safe and his team are working to produce chemicals that mimic dioxin's interference with estrogen.

"We are trying to produce chemicals that work the same way, but without the potential toxicity levels of dioxin," he said. "We have developed a few, but we are still studying them for full effects or any potential side effects."

Dioxin and its effects have been the center of public controversy for years. The Environmental Protection Agency (EPA) has limited the levels of dioxin that may be put into herbicides and produced by industries since the 1960s. Organizations such as Greenpeace maintain that the chemical is linked to rises in cancer and birth defects among populations near dioxin producers.

"The main thing to realize is that we, as a nation and world, have done a great job at minimizing the level of dioxin in the environment (it has been reduced from 60 to 90 percent)," Safe said. "And, while if you really do look at the research, it is not clear whether or not it causes cancer — it is a toxic chemical and deserves to be treated as such."

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