COMPUTER PROGRAM HELPS SEPARATE THE DRINKERS FROM THE DRUNKS

DALLAS--How many cups of holiday cheer equal one drunk driver?

That depends on a wide variety of factors. Body weight is one, but so is the percentage of that weight made up of fat cells. What you drink and how fast you drink it correlate directly to the concentration of alcohol in your blood, measured in grams of ethanol--pure ethyl alcohol--per 100 milliliters of blood. Your body's metabolism rate affects it; so can the decongestant you took this morning.

"The metabolism of alcohol is a very complex chemical process involving many variables," said Dr. Elizabeth Todd, assistant professor of pathology at The University of Texas Southwestern Medical Center at Dallas and a toxicologist at the Southwestern Institute of Forensic Sciences.

Because there are so many variables, even Todd's fellow toxicologists at the institute often have found themselves wrangling over blood-alcohol cases. So Todd's colleague E.H. Foerster designed a computer program that can estimate blood-alcohol concentration as it changes over time. Foerster's program, called Alc-Graph, compares the effect of various hypothetical drinking scenarios on men or women of different weights, body-fat concentrations and metabolic rates. The toxicologist calls it a "what if?" program. It cannot predict the degree of impairment of an individual at a specific blood-alcohol concentration, but it can be used to estimate blood-

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alcohol levels or to calculate the amount of alcohol consumed. Results are displayed as tables or graphs that compare the highest, normal and lowest expected blood-alcohol concentrations at five-minute intervals in a normal population.

In other words, tell Alc-Graph that a hypothetical 180-pound man and a 130-pound woman each drank a six-pack of beer--12 ounces each half hour, starting at 6 p.m.--and it will tell you that at 7 p.m. the man's normal blood-alcohol concentration was in the range of .021, while the woman's was more than twice as high. It also will show that the man's blood-alcohol level never did hit the legal limit in Texas of .10. It peaked at .078 about half an hour after the last beer was consumed. But the woman could have been charged with DWI (driving while intoxicated) at 7:55 p.m., before drinking her fifth beer, and her blood-alcohol level continued to rise until after 9:30 p.m. (See accompanying graph.)

"Women are more sensitive to alcohol, and it's not just because they weigh less than men," says Todd. "Alcohol is water-soluble, not fat-soluble, and a higher percentage of women's weight is made up of fat; therefore, at the same weight they have less body water than men to dilute the alcohol."

Foerster's IBM PC-compatible program has been licensed to a California publisher who is marketing it. The tables and graphs it produces may be admissible in court.

Computer-generated predictions about blood-alcohol levels can be a boon to attorneys in criminal and civil cases, but they remain just that-predictions of alcohol concentration, not descriptions of impairment. They provide good estimates about an expected range of results in a normal

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population, not definitive answers for any individual, Todd emphasized.

Other factors affecting an individual's response to alcohol include a number of common prescription and non-prescription medications. Tranquilizers, antidepressants, antihistamines and decongestants can compound the effect of alcohol dramatically. "When you take them and drink, you're actually taking two sedating drugs," Todd pointed out.

A blood-alcohol concentration of .10 (that's one-tenth of a gram of ethanol per 100 milliliters of blood) is the legal standard for drunk driving in most states, including Texas, but that doesn't mean it's safe to drive until your blood alcohol reaches that level.

"Everyone is going to show some impairment below .10, and many people are going to be dangerously impaired," she said. "The metabolism of alcohol is a very complex chemical process, and no one can predict exactly how alcohol will affect anyone at any given time. The only sure way to go out drinking and know you won't be arrested for DWI or cause an accident is to plan ahead and take a cab or have a designated driver."

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NOTE: The University of Texas Southwestern Medical Center at Dallas comprises Southwestern Medical School, Southwestern Graduate School of Biomedical Sciences, Southwestern Allied Health Sciences School, affiliated teaching hospitals and outpatient clinics.







Estimated Blood-Alcohol Concentration

This graph compares the normal blood-alcohol levels of a hypothetical 130pound woman and 180-pounds man, each drinking a six-pack of beer at the rate of one 12-ounce beer every 30 minutes.

* Blood Alcohol Concentration (BAC)