

# research highlights

## Concerns Raised About Carcinogenic Potential of Chromium from Drinking Water, Supplements

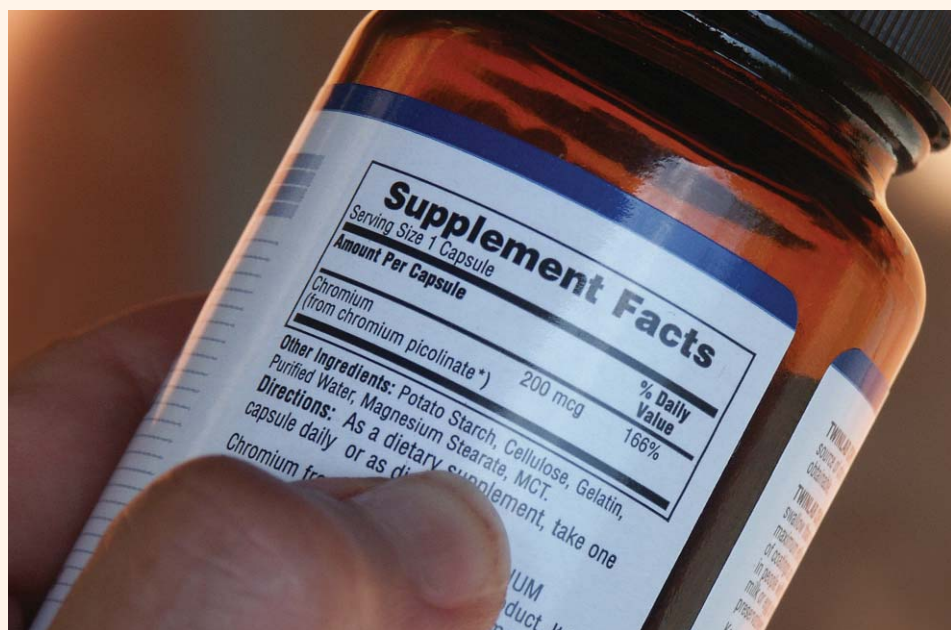
NEW FINDINGS FROM THE LABORATORY of a UCLA School of Public Health faculty member raise questions about the carcinogenic potential of the environmental contaminant chromium VI when consumed via drinking water, and of chromium III, which is widely used in nutritional supplements.

Chromium VI has been identified as a lung carcinogen when inhaled in relatively high concentrations, such as through occupational exposure, but its cancer-causing potential in drinking water has not been confirmed. It is known to be present in high concentrations in the groundwater of certain communities, and concerns about its effects have been widely publicized, most notably in the 2000 film *Erin Brockovich*. A two-year carcinogenesis study in mice and rats is currently ongoing at the National Toxicology Program of the National Institute of Environmental Health Sciences (NIEHS).

In the meantime, results of a smaller study in the laboratory of Dr. Robert Schiestl, professor at the school, raise concerns. Schiestl, director of the Center for Environmental Genomics (based in the UCLA School of Public Health and Jonsson Cancer Center), studied mice exposed for 10 days to chromium VI via drinking water. The doses were equivalent to the two lowest of the four doses currently being studied at the NIEHS. Publishing in the journal *Cancer Research*, Schiestl reported that the exposure induced DNA deletions predictive of cancer.

Schiestl and colleagues also studied the effects of chromium III and found similar harmful effects. Chromium III, ingested by millions of people seeking to boost energy and muscle mass through nutritional supplements and present in 95% of multivitamin preparations, has been assumed to be non-toxic because it is not taken up by cells. But Schiestl's group found that once it is absorbed, chromium III is an even more potent inducer of DNA deletions than chromium VI.

"The supplement industry is a huge business that is not subject to regulation, as pharmaceuticals are," says Schiestl. "There has never been a scientifically reported benefit of chromium III for healthy people, and because these supplements haven't been subjected to rigorous testing, we haven't known about its potential toxicity." While the first long-term carcinogenesis study of chromium III is being planned, it will be several years before results are reported. "Our findings on chromium III and chromium VI should raise some eyebrows," Schiestl says. "We need to be concerned about levels of chromium VI in the drinking water. We also should be wary of consuming chromium III as supplements when there is no evidence of benefit – and the possibility that certain levels may be carcinogenic."



Chromium III, ingested by millions of people seeking to boost energy and muscle mass through nutritional supplements and present in 95% of multivitamin preparations, might not be as safe as previously believed.

## Increasing Nursing Staff Improves Quality; Greater Use of RNs Appears to “Pay for Itself”

INCREASING THE NUMBER OF REGISTERED NURSES and hours of nursing care per patient would save 6,700 lives and 4 million days of patient care in hospitals each year, according to the findings of a study by UCLA School of Public Health and Vanderbilt University School of Nursing researchers.

Their study, published in the journal *Health Affairs*, also found that for hospitals that use both RNs and licensed practical nurses (LPNs), greater use of RNs appears to pay for itself in fewer patient deaths, reduced lengths of hospital stay, and decreased rates of hospital-linked complications such as urinary arrest and upper gastrointestinal bleeding.

“All hospitals are feeling pressure to improve quality and contain costs,” says Dr. Jack Needleman, associate professor of health services at the UCLA School of Public Health, who was joined in the research by Dr. Peter Buerhaus of Vanderbilt. “For hospitals where nurse staffing is low, this study makes an unequivocal business case for using more RNs in nurse staffing and a strong case based on value to patients for increasing the hours of nursing care.”

“We’re entering the ninth consecutive year of a national nursing

shortage,” adds Buerhaus. “We hope this study stimulates a fresh debate on the contributions of nurses in improving the quality of hospital care.”

In 2002, U.S. general hospitals employed 942,000 full-time RNs and 120,000 full-time licensed practical nurses. The study simulated the effect of several options that would increase nurse staffing to a “feasible” level for most hospitals. Among the key findings:

- Greater use of RNs translates into fewer patient deaths, reduced hospital stays and a decreased rate of hospital-linked complications.
- Increasing the number of hours of nursing care provided by both RNs and LPNs would result in fewer deaths, avoidable complications and days of care.
- Expanding both the proportion of RNs and number of hours provided by licensed practical nurses to reach the top quarter of hospitals – a combination of the other two options – would save the most lives and greatest number of patient days.

Needleman and Buerhaus concluded that increasing the proportion of RNs would require hospitals below that top quarter of hospitals to replace more than 37,000 LPNs with RNs, at a cost of \$811 million. But this option also held the most benefits to hospitals and patients alike.

“From a hospital’s perspective, increasing nurse staffing is costly,” the authors wrote. “Nevertheless, greater use of RNs in preference to LPNs appears to pay for itself.”

### Estimated Costs and Avoided Costs, Days and Deaths from Three Approaches to Increasing Nurse Staffing in Hospitals

Approaches to Increasing Nurse Staffing in Hospitals	Raise RN Proportion*	Raise Licensed Hours*	Both
Cost of higher nursing	\$811 Million	\$7.5 Billion	\$8.5 Billion
Avoided costs (full cost)	\$2.6 Billion	\$4.3 Billion	\$6.9 Billion
Avoided days	1.5 million	2.6 million	4.1 million
Avoided deaths	4,997	1,801	6,754
Long term cost increase as a percentage of hospital costs	-0.50%	0.80%	0.40%

\*to that of the top quarter of U.S. hospitals

Note: Long-term savings are based on the assumption that all costs are recovered by the hospital.

Source: Needleman, et al., “Nurse Staffing in Hospitals: Is There a Business Case for Quality?,” *Health Affairs*, 2006.

## One-Fourth of HIV-Infected Adults Perceive Discrimination by Health Care Providers

TWENTY-SIX PERCENT OF HIV-INFECTED ADULTS believe they have been the victims of discrimination by a health care provider, according to a study by a

UCLA School of Public Health and RAND research team headed by Dr. Mark Schuster, professor of health services at the school and pediatrics at the David Geffen School of Medicine at UCLA.

Schuster and colleagues analyzed data from the HIV Cost and Services Utilization Study, which conducted in-person interviews with a nationally representative sample of 2,466 HIV-infected adults receiving care. The participants were asked whether they felt health care providers had been uncomfortable with them, treated them as inferiors, preferred to avoid them, or refused to provide service. Their findings were reported in the *Journal of General Internal Medicine*.

The study found that nearly one in three white respondents (32%) perceived being discriminated against by a provider, making whites significantly more likely than Latinos (21%) and African Americans (17%) to report the problem. The authors suggest that one possible reason for this result may have to do with the greater likelihood that members of minority populations have been discriminated against previously. "African Americans and Latinos may typically experience worse care and thus be unaware that better care exists," Schuster's team wrote.

Among the HIV-infected adults who reported discrimination, more than half (54%) identified physicians as culprits, with 39% reporting discrimination by clinical staff, 32% by dentists, 31% by hospital staff, and 8% by case managers or social workers. Out of the entire sample, 8% said they had at one time been turned away from receiving services. Respondents whose first positive HIV test was longer ago were more likely to report discrimination.

The authors noted that the perception or experience of discrimination by clinicians could result in HIV-positive patients being less likely to seek care, follow prescribed treatment regimens, or return for follow-up care. "Many HIV-infected adults believe that their clinicians have discriminated against them," says Schuster. "Clinicians should make efforts to address circumstances that lead patients to perceive discrimination, whether real or imagined."

## Impact of Exposure to Residential Magnetic Fields on Childhood Leukemia May Be Limited

ALTHOUGH PREVIOUS STUDIES HAVE FOUND POSITIVE ASSOCIATIONS between exposures to high levels of residential magnetic fields and childhood leukemia, an analysis by two UCLA School of Public Health epidemiologists questions the public health impact of residential fields.

But, publishing in the journal *Risk Analysis*, Dr. Sander Greenland, the study's lead author, and co-author Dr. Leeka Kheifets note that in light of the available data, "a large impact" and "no impact" are both possibilities.

Magnetic fields originate from anything with an electrical current. A field spreads from a source in a manner analogous to a ripple emanating from a pebble thrown in a pool of water, penetrating objects in its path. Elevated field levels can occur in homes close to power lines; improper household wiring is a more common reason for increased exposure to these fields.

Substantial research efforts have been devoted to evaluating the potential risk of cancer in children posed by magnetic field exposure, with most of the research focusing on brain tumors and leukemia. "Nearly every epidemiologic study of residential magnetic fields and childhood leukemia has exhibited a positive association," says Greenland.

But Greenland and Kheifets, professors in the school's Department of Epidemiology, note that these studies suffer from various methodologic limitations, making it uncertain as to how much, if any, of the associations are causal. In addition, because the observed associations between the residential magnetic fields and childhood leukemia are small and involve only the highest and most infrequent levels of exposure, researchers have postulated that the public health impact of an effect would be limited.

### Percentage of Adults Receiving Health Care for HIV Who Perceived Discrimination

Gender	%
Male	26
Female	22
Race/ethnicity	%
African American	17
Latino	21
Other	27
White	32
Date of first HIV-positive test	%
Prior to 1986	34
1986 to 1989	31
1990 to 1993	24
1994 to 1996	20

Using data from 15 studies of residential fields and leukemia along with five surveys of residential-field prevalence, Greenland and Kheifets analyzed the potential impact of high residential field exposure as measured by population-attributable fractions, accounting for uncertainties about study biases and about exposure distribution. Nearly all information on effects and exposure distribution came from fully industrialized countries, with the majority of the data from the United States and Canada.

The methodologic limitations of the 15 studies, which the authors call “profound,” include unknown and probable low accuracy of measurement, potential selection bias, and very small numbers of exposed cases. After careful accounting for the study biases, the authors conclude, it is “improbable” that magnetic fields account for as much as 20% of childhood leukemias in Canada and the United States, and the percentage is probably much lower – including the possibility that there is no effect at all.

## Access to Medical Interpreters Improves Patient Satisfaction, Reduces Health Disparities

HAVING ACCESS TO MEDICAL INTERPRETERS can significantly improve patients’ satisfaction with their health care and reduce health disparities between whites and Hispanics and between whites and Asian/Pacific Islanders, according to a research team led by Dr. Leo S. Morales of the UCLA School of Public Health.

Morales and colleagues analyzed data collected by the California State Children’s Health Insurance Program (SCHIP) from 26,298 parents of children enrolled in participating plans between 2000 and 2001. The results were published in the journal *Medical Care Research and Review*.

Hispanic and Asian/Pacific Islander members who needed interpreters and didn’t always get them reported significantly worse provider and office-staff communication, access to care, and customer service than members who didn’t need interpreters. On the other hand, Hispanic and Asian/Pacific Islander members who needed and were always provided interpreters gave higher marks to their plan on these measures than members who didn’t need interpreters. “This suggests that interpreters may enhance the health care experience in ways that go beyond language translation,” says Morales. “Interpreters might mediate cultural and educational differences between doctors and their non-English speaking patients, or serve as wayfinders for these patients.” Morales’ team concluded that use of interpreters reduced white-Hispanic disparities in reports of care by up to 28% and white-Asian/Pacific Islander disparities by as much as 21%.

In California, which has the highest percentage of residents with limited English proficiency, all health insurance plans participating in SCHIP are required by state law to provide trained medical interpreters to members who need them. But Morales’ group found that among the 15% of SCHIP members who reported needing an interpreter in the previous six months, less than half (47%) were always provided with one. Another 27% reported that they usually had one, and 26% said they were provided an interpreter only sometimes or never. “Although health plans are contractually required to provide interpreter services by a payer like SCHIP, our study suggests that members with limited English may frequently receive care without the benefit of interpreters,” says Morales.

Patients who speak limited English often struggle to communicate with their clinicians, compromising both the ability of the patient to accurately convey symptoms or ask questions and the physician’s ability to counsel the patient on the care being provided, Morales notes. Many of these patients turn to family members, friends, or other ad hoc interpreters, who are typically unable to match trained interpreters in ensuring that important messages aren’t lost in the translation. “Our findings strongly support the need to expand the use of interpreters by hiring more bilingual staff, expanding the use of telecommunications tools, and increasing providers’ and patients’ awareness of the availability of these services,” Morales concludes.



Use of interpreters reduced white-Hispanic disparities in reports of care by up to 28% and white-Asian/Pacific Islander disparities by up to 21%.

## High Testosterone Lowers Type 2 Diabetes Risk in Men, Increases Risk for Women

HIGHER LEVELS OF THE SEX HORMONE TESTOSTERONE appear to lower the risk of type 2 diabetes in men while increasing the type 2 diabetes risk in women, according to research led by Dr. Simin Liu, professor in the UCLA School of Public Health. The findings, reported in the *Journal of the American Medical Association*, help to explain inconsistent previous data on the role of endogenous sex hormones in the disease, and point the way toward potentially fruitful future studies on how and why hormones affect diabetes risk and complications differently in men and women.

The research team, which included Liu's colleagues from Harvard University, conducted a pooled analysis of 43 large studies that included data on diabetes status and levels of the hormones testosterone, sex hormone-binding globulin (SHBG) and estradiol in more than 13,000 men and women. They found that testosterone worked against type 2 diabetes in men: Those who had the disease had significantly lower testosterone levels than those who didn't. In addition, men with higher testosterone levels were found to have a 42% lower risk for the disease than control subjects.

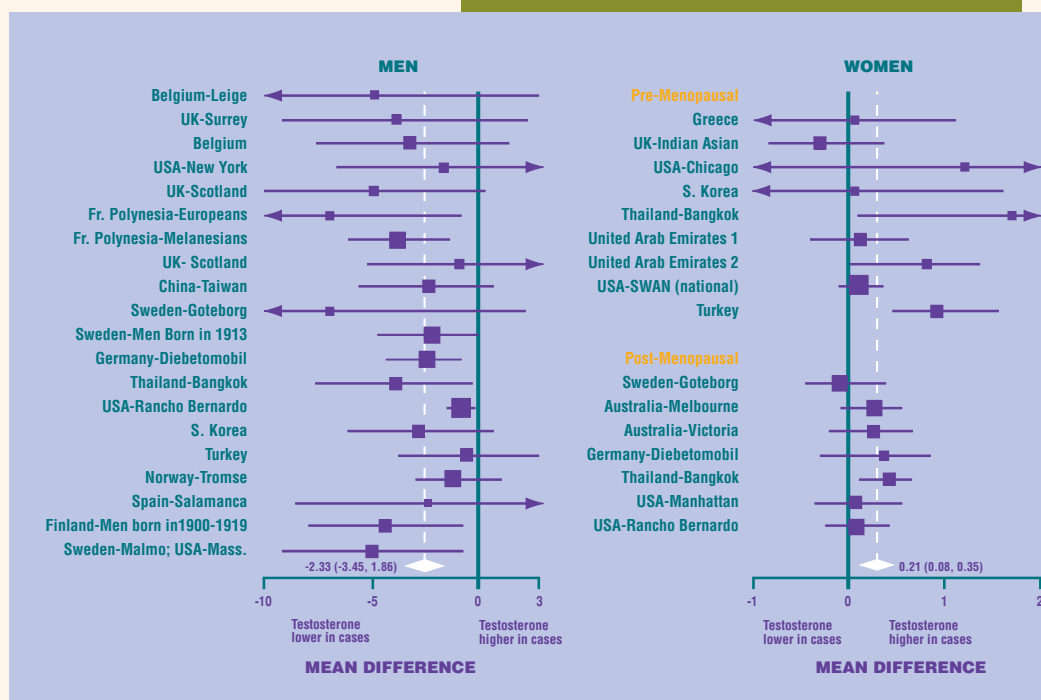
In contrast, women with type 2 diabetes had, on average, higher testosterone levels than those who did not have the disease. Women who had higher levels of SHBG – which is believed to reduce testosterone activity – had an 80% lower risk of the disease. The associations in the effects of sex hormones on type 2 diabetes risk for men and women were significant even after adjusting for body mass index.

The findings suggest that physicians who prescribe testosterone patches to women to improve sexual function should consider the impact it could have in increasing their type 2 diabetes risk, the researchers noted. Similarly, men who undergo prostate cancer treatment to reduce androgen levels could also see increased risk.

Further research to clarify the mechanisms by which the sex hormones differentially affect type 2 diabetes risk in men and women could provide future therapeutic targets. "These age-old sex hormones are extremely powerful and had yet to be carefully evaluated in a comprehensive and formal manner," says Liu.

With support from two large grants from the National Institutes of Health, Liu's team is currently conducting an in-depth investigation of the roles of these plasma sex hormones and related genetic variants in the development of type 2 diabetes in men and women. Says Liu: "It is our hope that data emanating from our studies will help to better characterize the complex pathogenesis of type 2 diabetes, have important therapeutic implications, and increase the potential for plasma hormone biomarkers for the clinical risk assessment and management of type 2 diabetes, ultimately benefiting the public's health."

### Summary of Findings from 36 Testosterone Studies of 3,825 Men and 4,795 Women with Type 2 Diabetes



Sizes of the boxes reflect the relative number of people in each study. Horizontal lines indicating the confidence intervals that cross zero show that on their own, the findings of most of these studies would not be statistically significant. Bottom diamonds, showing overall meta-analysis results by sex, show statistically significant lower levels of testosterone among men with diabetes and higher levels among women.