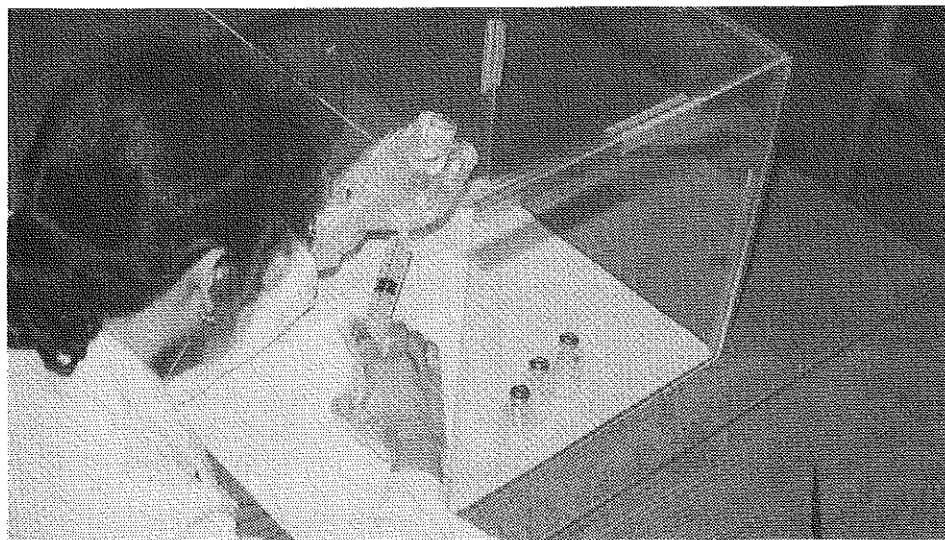


# WOHRC NEWS

WOMEN'S OCCUPATIONAL HEALTH RESOURCE CENTER  
SCHOOL OF PUBLIC HEALTH COLUMBIA UNIVERSITY

## New Test Detects Cancer Drug Exposure



Amy Rosenberg

Using "Chemo Test" materials, a nurse simulates how she prepares cytotoxic drugs in a test to indicate the level of exposure and the effect of her work habits.

### WOHRC Research Fills a Need

"Chemo Test," the first test to monitor potentially hazardous airborne contamination by cancer chemotherapeutic drugs at mixing workstations in hospitals, clinics, cancer centers and physicians' offices, has been announced by WOHRC as part of its program within the Columbia University Comprehensive Cancer Center.

The test is aimed at improved protection of thousands of workers, most of them nurses, who prepare cancer drugs each day. Most of these very potent drugs are delivered in crystal or freeze-dried form and must be mixed with sterile saline solution before they can be given to patients.

In recent years researchers have linked the handling of cancer drugs with mutagenic and physical effects such as liver damage. There also have been anecdotal reports of nausea, lightheadedness, dizziness, and facial flushing.

Added motivation for the creation of the test came from a joint WOHRC/Columbia Cancer Center survey (see WOHRC Fact Sheet, "Handling Chemotherapeutic Drugs") which found marked inconsistency in policies and procedures for safely handling cytotoxic drugs. A further WOHRC survey showed that even when protective devices are used, a varying degree of exposure is still possible. As a research tool, *Chemo Test* can provide in-depth information on the extent and the nature of the exposure problem.

Given the large population of workers at risk and the potential for harm, WOHRC Director, Dr. Jeanne Stellman and Barbara Aufiero, M.P.H., WOHRC Coordinator, also created "*Chemo Test*" to address a very practical problem: how to know whether or not current work safety precautions are effective. This is a very difficult problem to tackle because the generation of drug aerosols is quite elusive.

*Continued on P. 2*

## • • NEWS BRIEFS • •

• **THE MARCH OF DIMES** Birth Defects Foundation offers valuable free health education programs that can be brought to your workplace. Covering such topics as nutrition, genetics, child-bearing, environmental hazards, smoking & alcohol use, as well as a parents' primer on adolescent sexuality, the programs include films, lectures and discussion. For more information contact your local March of Dimes chapter.

• **LEGIONNAIRES' DISEASE** may have faded from the headlines but the guilty organism is still around. In a paper published in "The Lancet," early this year, investigators in England reported that even after significantly effective measures were taken to clear a hospital's water system following an outbreak in 1980, *Legionella pneumophila* could still be found growing in the rubber washers of shower fittings. Other surveys are now underway elsewhere. The authors believe that mandatory rather than voluntary control of the kind of plumbing

hardware in water systems should be considered.

• • •

• **CORRECTION:** The WOHRC Fashion Show of Personal Protective Equipment described in the last issue *does* require the payment of a nominal fee plus any shipping charges.

• • •

• **"HAZARDS IN the Metal and Electrical Industries,"** (\$1.50) and "How to Inspect Your Plant," (\$1), a companion piece, are two very useful new pamphlets available from the United Electrical, Radio and Machine Workers of America, 11 E. 51st St., N.Y. 10022. Prices include postage. □

### FEATURED IN THIS ISSUE...

**Women Occupational Health Leaders — Page 2**

**New Column On Legal Issues — Page 5**

# Women Leaders in Occupational Health

## BOSTON MEETING

An Alice Hamilton Symposium on Women in Occupational Health was held at Harvard on April 14 to honor a pioneer in the field and to identify future strategies for women in this endeavor—nurses, doctors, toxicologists, industrial hygienists, lawyers, epidemiologists, labor education specialists and policy makers.

Sponsored by the Harvard School of Public Health, and several co-sponsors, including WOHRC, the symposium honored Dr. Alice Hamilton who died in 1970 at the age of 101.

"The symposium captured the progress of history. We all felt as if we knew Alice Hamilton and came away better understanding ourselves and the reasons why we have chosen occupational health and safety as our life's work," said Dr. Jeanne Stellman, WOHRC Director, one of the featured speakers.



Dr. Alice Hamilton

Dr. Hamilton, a pioneer in the field of occupational medicine, became an assistant professor of medicine at the Harvard Medical School in 1920 where she was faced with many obstacles in a male-dominated bastion. Her classic "Industrial Toxicology," was published in 1934. The text was updated repeatedly in later years with Dr. Harriet Hardy, another leader in occupational health who addressed the symposium and whose memoirs are reviewed on this page.

Plans are underway for publication of the proceedings including discussion of the role of mentors, the problems of minority women, the responsibility of women professionals to women workers and career entry and re-entry. □

## IN MEMORIAM



The death of Dr. Anna Baetjer, Professor Emerita, Division of Environmental Hygiene, the Johns Hopkins School of Medicine, in February of this year was a sad day for occupational health. Dr. Baetjer's life was one of total commitment to environmental toxicology and industrial hygiene and her dedication was rare indeed. With the publication of her still-current, "Women in Industry, Their Health and Efficiency," in 1946 she was one of the first to call attention to the plight of women workers. The expertise and vitality she brought to the field of environmental toxicology was notable. □

By Jacqueline Messite, M.D.  
NIOSH Program Consultant

"Chemo Test" continued from P. 1

"Chemo Test" solves that problem while taking into account such variables as differences in protective equipment and the very different ways people go about doing the same job.

"Chemo Test" users first receive an informational brochure and are subsequently asked to fill out a questionnaire which will enable WOHRC staff to determine if a potential problem exists. If the answer is yes, a kit will be sent out containing surrogate drug vials, gloves, arm guards, and a small work box lined with special paper.

WOHRC staff will assess the test results relating them to the questionnaire information and make recommendations for necessary changes.

At present, a preliminary cost estimate is approximately \$200 for a kit to cover one use with far lower charges for each additional person tested. □

## PUBLICATIONS

**Challenging Man-Made Disease: The Memoirs of Harriet L. Hardy, M.D.** Praeger Publishers, 1983. 154 pages. \$24.95.  
COPIES AVAILABLE FROM WOHRC.

In the 1940's, representing the Massachusetts Labor Department's Division of Occupational Health, Dr. Harriet Hardy began to investigate a "new" disease afflicting—and sometimes killing—women working in a fluorescent light factory.

Ultimately, Dr. Hardy was to become world renowned for establishing the toxicity of beryllium and its compounds, keeping a registry of cases and advising powerful agencies, including the Atomic Energy Commission.

In the 1940's, however, she had to battle industry leaders, a hospital superintendent who prevented her from seeing the x rays of the women she was trying to help and a company doctor who helped to scatter "red herrings"—for example, by claiming that the illness was an infection caused by flooding in the plant basement.

Now retired after a career of more than fifty years, Dr. Hardy developed the Occupational Medical Service at the Massachusetts Institute of Technology and travelled widely as a consultant to the International Labour Organization and the World Health Organization.

Generous to her colleagues, Dr. Hardy is salty in her comments about those who destroy health for gain. □

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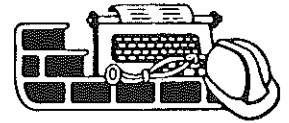
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(Subscription information on page 6)

# WOHRC FACT SHEET



WOMEN'S OCCUPATIONAL HEALTH RESOURCE CENTER

## Formaldehyde Risks in the Workplace

Although formaldehyde has been commercially used for some 90 years, it has only been in recent years that hazards associated with exposure have been enumerated; important new data added, and battles about exposure limits and control have hit the courts and the media.

In 1983, the U.S. used more than 7.5 billion pounds of formaldehyde in some sixty different industrial applications.

Formaldehyde is a flammable gas. The commercial form is made by reacting methanol vapor and air in the presence of a catalyst. This produces a fairly pure form which is sold either as formalin, formaldehyde in a water-base solution or in a solid form.

The popularity of the chemical is not surprising: in its commercial form, formaldehyde is relatively pure, cheap, colorless and most important of all, highly reactive which makes it useful in linking separate molecules to make more complex chemicals.

Formaldehyde helps to make final products better. For example: formaldehyde and its derivatives are used to give paper "wet strength"; formaldehyde is a magic ingredient in transforming raw animal skin and fur into tanned leather; formaldehyde is used to harden and protect the gelatin surface of film and photographic papers.

In addition to its ubiquitous industrial use, formaldehyde works its way into the open air as a component of engine exhaust, incinerator smoke, and photochemical smog.

### Health Effects

Formaldehyde produces both obvious and more insidious health effects.

At exposure levels of 0.1-5 ppm, eyes burn and tear; upper respiratory passages are irritated. At higher concentrations, 10-20 ppm, coughing, tightening in the chest, heart palpitation and a sense of pressure in the head are produced.

When exposure reaches the 50-100 ppm level and above, serious conditions such as pulmonary edema or pneumonitis sometimes leading to death can occur.

Workers whose skin comes in contact with formaldehyde solutions or formalde-

hyde-containing resins, can develop an eczema-like reaction on various body parts including the eyelids, neck, fingers, scrotum, and flexor surfaces of the arm. Dermatitis can even be the result of contact with contaminated work clothes.

Here we present an overview of the problem.

Exposure to formaldehyde can also set off allergic reactions. A worker who has an allergy to formaldehyde may react to even the smallest amount and might even have to leave the job. Sensitization can occur suddenly, even after many years of exposure.

While these various health effects have long been recognized, it was only in 1979 that laboratory studies using rats and mice were done first by the Chemical Industry Institute of Toxicology and subsequently by the New York University Institute of Environmental Medicine which showed a link with the development of nasal cancer. Mutagenic effects in experimental animals also have been demonstrated.

Even before the cancer evidence, formaldehyde was recognized as an industrial hazard requiring imposed limits.

### The Regulation Battle

The OSHA standard requires an 8-hour time-weighted average (TWA) concentration limit of 3 ppm, a ceiling concentration of 5 ppm, and an acceptable maximum peak above the ceiling concentration of 10 ppm for no more than a total of 30 minutes during an 8-hour shift.

In 1976 with information about the irritant effects only, NIOSH recommended that worker exposure be controlled to concentrations no greater than 1 ppm for any 30 minute sampling period.

By 1980-81, an expert panel convened by the Consumer Product Safety Commission and the Interagency Regulatory Liaison Group concluded that "it is prudent to regard formaldehyde as posing a carcinogenic risk to humans" and NIOSH



Jane Wechsler

recommended that formaldehyde be handled in the workplace as a potential occupational carcinogen.

An estimate of the extent of the cancer risk to workers exposed to various levels of formaldehyde at or below the 3 ppm standard has not been formulated but NIOSH has called for engineering controls and stringent work practices to reduce exposure to the lowest feasible limit.

Restriction on formaldehyde exposure is a matter of contention however, and there is disagreement about the meaning of formaldehyde laboratory test results.

Currently, while labor unions such as the United Automobile Workers, are pressuring OSHA for new tougher standards and immediate steps to limit exposure, and NIOSH is doing mortality studies on apparel workers, several courts have struck down bans on urea-formaldehyde (UF) foam insulation, a decision supported by the industry-sponsored Formaldehyde Institute.

Given an issue yet to be fully resolved, what can be done to provide protection in the interim?

#### Who Is at Risk?

OSHA estimates that some 2.6 million workers—many of them women—are exposed to formaldehyde in a wide variety of industries.

Approximately half of the formaldehyde produced is used to make synthetic resins such as urea- and phenol-formaldehyde resins which in turn are used to make particleboard, fiberboard, and plywood.

Formaldehyde is extremely important to the textile and clothing trades because it is used in making creaseproof, crush roof, flame-resistant, and shrink-proof fabrics.

Formaldehyde is used in the hospital and health care sector for certain medications, sterilizing jobs,—including in kidney dialysis—and anatomical dissection. The use of formaldehyde in embalming fluids is required in all states.

The following list gives an idea of other products made with or containing formaldehyde:

Adhesives	Insulation Foam
Cosmetics	Laminates
Detergents	Synthetic Lubricants
Dyes	Garden Hardware
Explosives	Surface Coatings
Food	Watersoftening
Fuels	Chemicals
Fungicides	Plastics/ moldings
Filters	(autos; appliances,
Paints	sports goods)
Rubber	Friction Material
Paper	Fertilizers

Although it is not the subject of this Fact Sheet, the general public also may be at risk. For example, when insulation foam is pumped into a home, formaldehyde gas is released and can remain for long periods causing eye and respiratory irritation.

#### What to Do

The above descriptions of the use of formaldehyde and the product list point to jobs where exposure is probable.

In the workplace, a tip-off to the presence of formaldehyde can be its characteristic pungent odor. Noticeable signals such as eye tearing make its presence a reasonable suspicion. Tearing usually occurs at the 2-3 ppm level.

In general, the fewer the number of employees working with formaldehyde, the better.

There are several approaches to control, each with points to keep in mind. Before a control program is established, an exposure survey should be done.

#### ASSESSMENT

An initial exposure survey should be done by competent industrial hygienists or engineers and repeat surveys done thereafter. There are monitoring devices including a portable, direct-reading survey instrument available for measuring trace quantities of atmospheric formaldehyde.

Recently, NIOSH has found that passive monitoring done by badges that can be worn are not as accurate as traditional methods. According to "Workers' Compensation Monthly," Feb. 1984, NIOSH has informed the manufacturer that the device, as marketed, cannot be relied on for consistently-accurate readings.

#### PRODUCT SUBSTITUTION

The fact that controlling formaldehyde exposure is not a simple matter is quickly illustrated by the idea of product substitution. While this is a seemingly easy approach, it's difficult in practice because substitutes can in themselves be hazardous.

#### CONTAMINANT CONTROLS

Airborne concentrations of formaldehyde can be effectively contained by enclosing the source of fumes within the work area/and or using local exhaust ventilation. Ventilation should be regularly checked. Whenever there is a change in production or the work process, a reassessment should be done.

#### ISOLATION

Sometimes, employees can be isolated in a control booth or room where they can direct automatic equipment to do the job in a hazardous area. Air in the control

center should be at greater pressure so that air will flow out—not in—to the protected area. While such a set-up is effective, it does not protect employees who must do on-site checks or maintenance.

#### PERSONAL EQUIPMENT

Protective gear—respirators, special clothes, goggles, gloves—is useful but it should not be the primary means of controlling exposure to formaldehyde. In emergencies, during installation or maintenance activities or when engineering and work practice controls have failed to do the job, PPE is a must.

#### EDUCATION

Informed employees, who know about the nature of the problem they face and how it is being controlled, can contribute to a safer workplace. In addition to the facts, employees need to know about appropriate personal hygiene measures. Worker should also be aware of the need to inform their physicians of their work with formaldehyde.

Information about formaldehyde exposure and effects constantly increases and it is important to keep up with scientific publications as well as regulatory agency announcements. Journals are a critical source of information.

For example, in February 1984, the "American Industrial Hygiene Association Journal" published a study of how formaldehyde is used to sterilize autopsy rooms and their ventilation system. To effectively disinfect a room, concentrations of 8600-14,000 ppm must be used. The article describes how such rooms can be sealed off, exposure reduced and emergencies like fires dealt with. Another article in the AIHA Journal, published a month later in March, discussed the exposure of embalmers to formaldehyde and other chemicals. □

Much of the above material reflects information in publications of NIOSH—particularly Current Intelligence Bulletin 34: "Formaldehyde: Evidence of Carcinogenicity"—and of the Chemical Industry Institute of Toxicology. The Amalgamated Textile Workers union also was helpful.

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## LEGALLY SPEAKING . . .

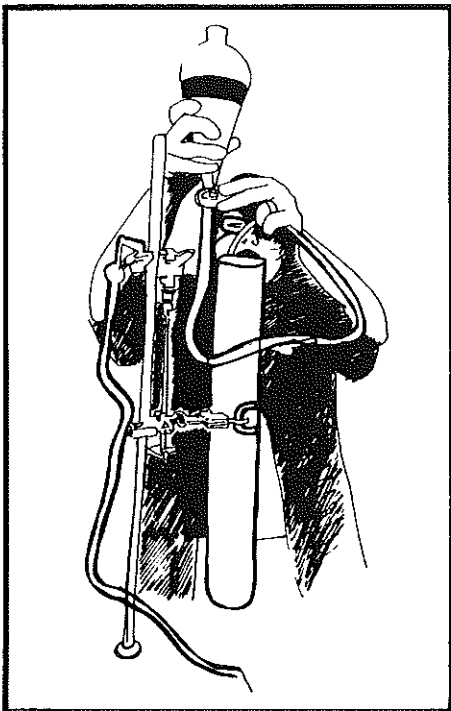
By Leo Uzych, J.D., M.P.H.

*Attorney, Consultant in Forensic Sciences*

It's estimated that 20 million jobs may involve exposure to reproductive hazards prompting some major American companies to bar women from certain jobs.

On the basis of recent Federal case law, however, workplace policies which explicitly treat women differently from men are considered sex discrimination unless the employer can show a direct relationship between the policy and the actual ability of a pregnant woman to perform her job.

In December, 1982, the U.S. Court of Appeals for the Fifth Circuit ruled that an unwritten hospital policy requiring x-ray technicians to resign or be terminated without a guarantee of reinstatement violates Federal law which bans sex discrimination.



Jane Wechsler

In August 1982, a U.S. District Court in Alabama ruled similarly that the abrupt termination of a pregnant technician in a hospital radiology department was discriminatory because pregnancy in no way affected her job performance. This ruling was appealed but in March 1984 the ruling of liability was affirmed. This is the most recent ruling on the exclusionary policy issue.

These two cases also point to the need for employers to have acceptable alternative policies with a less discriminatory impact.

Employment-related sterilization is another issue receiving attention.

• **AMERICAN CYANAMID**-In 1977



## Office Work in Japan

Japanese women face many contradictory workplace conditions according to several experts.

On the one hand, Japan is ahead of the U.S. in laws regulating office safety and comfort (see box) and providing menstrual leave; on the other hand, the female worker must deal with harsh traditions.

In their book, "Working Women in Japan," Alice H. Cook and Hiroko Hayashi, note that great numbers of women are forced to do part-time work without benefits such as retirement pay. Women college graduates have great difficulty in finding and holding jobs commensurate with their education and that women in general are outside of the well-known lifetime employment system and are clearly treated differently than male employees.

Women working in a government tax office had this to say: "men are promoted rapidly, women progress very slowly . . . men think of women as children, and this view is prevalent among male fellow workers . . ."

a "fetus protection" policy was implemented at a Willow Island, West. Va. plant. Five women underwent sterilization to keep their jobs. The company's policy was subsequently challenged in Federal Court as being discriminatory. The case was settled with monetary recompense;

• **OLIN CORP.**-In 1978, a "fetal vulnerability" program was adopted barring fertile women from jobs which might require contact with known or suspected abortifacient or teratogenic agents, principally lead. While a Federal Appeals Court ruled in 1982 that the company policy was discriminatory, the case was sent to a lower court which ruled in February of this year that the basis for Olin's policy reflects maternal exposure, compared with a negligible risk through paternal exposure and therefore the policy does not violate anti-sex discrimination law. However, this ruling ignores much research about the risks of paternal exposure. A notice of appeal has been filed.

• **STATE ACTION**-Connecticut law bars employers from conditioning employment on sterilization. Oregon law provides that "informed consent" obtained for sterilization be free of coercion. □

The Computer Age may be having curious effects in Japan.

In an article reprinted in "New Woman Times," titled, "From Pouring Tea to VDT," Yoshiko Miya notes "the high tech office is a mixed blessing."

According to Miya, automation often costs jobs: one bank phased out some 12,000 employees over a five-year period; most were women.

In addition, new technology has produced a two-tier system.

On the bottom level, there are women in dead-end clerical jobs whose work in an automated office can be "...dull, simple and boring and full of repetitive tasks." Many of these women complain of neck problems and eyestrain.

On the upper status level are found women with advanced training who find challenging jobs in the software industry.

According to the article, the life of a programmer involves a good deal of overtime and weekend work. Women still have to deal with prejudice that assumes that they are unreliable, i.e. they will drop out because of marriage or childbirth. Nonetheless, the new breed of "techno-women" appears to represent progress.

As one professor of management put it, "office automation is gender blind . . . computers don't respond differently on the basis of sex." □

In the 1970's, Ministry of Labor Ordinances were passed in Japan which set standards for office environmental control, cleanliness, and special provisions for workers. These include:

- Climate control, including indoor-outdoor air temperature balance;
- Clean air with standards of carbon monoxide, carbon dioxide balance;
- Lighting adjusted according to kind of work performed;
- Office design planned to cut noise and vibration;
- Clean drinking water; proper lavatory facilities according to number of workers;
- Facilities for rest or naps; chairs for workers who must stand often;
- Attention to workers' health by means of medical exams, assignment changes, reduced working hours for those exposed to dust.

## Work History

# Protective Legislation

By **Vilma R. Hunt**

*Professor of Environmental Sciences  
Pennsylvania State University*

When I am too tired to think and my feet are sore I try to imagine how working women struggled at the turn of the century when there was no limit on hours—60-80 hours a week—and sweated labor meant tolerating work conditions, however unpleasant.

Malnutrition, pregnancy and post-partum fatigue soon sapped the strength of young women. Pictures and paintings of those times clearly show the rapid transition from youthful good looks and energy to gaunt drawn faces and bowed shoulders wrapped in shawls. Men also suffered; drink was the solace of many.

Protective legislation to limit work hours got its start on behalf of women treated as a class different from men.

### Massachusetts Law

In 1876 Massachusetts imposed a maximum hour limit of 58 hours a week, ten hours a day, for women and children in the textile mills. Women were considered wards of the State until they married, when they became their husband's ward.

Men were not included because of their right to enter freely into employment contracts—liberty of contract. Men could assert and care for themselves without the protection of the State interfering

with their independence of judgment and action.

In 1908 the Supreme Court upheld an Oregon statute that limited a woman's work day to ten hours.

### "Protecting Women"

The Court explained: "that woman's physical structure and the performance of maternal functions place her at a disadvantage in the struggle for subsistence is obvious. This is especially true when the burdens of motherhood are upon her. Even when they are not, by abundant testimony of the medical fraternity, continuance for a long time on her feet at work, repeating this from day to day, tends to injurious effects upon the body, and as healthy mothers are essential to vigorous offspring, the physical well-being of women becomes an object of public interest and care in order to preserve the strength and vigor of the race.

"Still again, history discloses the fact that woman has always been dependent upon man. He established his control at the outset by superior physical strength, and this control in various forms, with diminishing intensity has continued to the present. As minors, though not to the

same extent, she has been looked upon in the courts as needing special care that her rights may be preserved. . . ."

Woman's ". . . physical nature and the evil effects of overwork upon her and her future children justify legislation to protect her from the greed as well as the passion of men."

### A Mistaken View

Although today we cannot accept this view of woman's place in Society, the immediate effect was to improve the unhealthy working and living conditions of working women.

Unfortunately, the long-term effect was to provide a legal excuse to restrict the employment opportunities of women out of concern for their health and the health of their offspring.

But the door was opened. In 1917 arguments about the adverse effects of long work hours were applied to men from a different perspective: overworked men would not be good citizens. □

**Prof. Hunt's column about how issues of the past relate to problems of today appears in "WOHRC NEWS" regularly. For source references, contact WOHRC.**

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