. . . Radiation

review (during the next 18 months) of federal radiation research in order to ensure a comprehensive research program, but one that avoids costly duplication of efforts.

Also, within the next year, the Center for Disease Control will design a "comprehensive research program on occupational exposures to low-level radiation," Califano said.

Details on the design of the largest occupational-exposure study yet undertaken were also announced last week by the Energy Department's Ruth Clusen. The epidemiological study of 90,000 shipyard workers exposed to low levels of radiation (and at least as many unexposed workers with identical jobs) is beginning under the direction of Genevieve Matanoski at Johns Hopkins University. Data collection alone is expected to take up to five years and cost $7 million to $10 million; it will involve past and current workers at all six navy shipyards and one private yard.

And in the Congress, Rep. Bob Eckhardt (D-Tex.) says his Commerce subcommittee on oversight and investigation will launch a "full-scale investigation into all phases of radiation-health dangers," focusing on exposures from weapons tests. □

Strokes decline dramatically

Last autumn, the National Heart, Lung and Blood Institute reported that deaths from heart attacks have fallen off dramatically during the past 15 years. Here is another bit of good news: Strokes, major killers along with heart disease, are also plummeting precipitously.

Actually, evidence that the incidence of strokes has been declining in the United States is not new, but diagnostic inaccuracies, changes in diagnostic fashion, death certification and other factors have made it difficult to make sure that death statistics really reveal trends in stroke occurrence. W. Michael Garraway and his colleagues at the Mayo Clinic in Rochester, Minn., now have taken advantage of an exceptionally comprehensive and accurate diagnostic record system in Rochester in an attempt to confirm a decline in strokes among Rochester residents during a 30-year time span.

In Rochester, nearly all medical diagnoses, whether made at the Mayo Clinic or elsewhere, are entered into an automated record retrieval system. The accuracy of many of these diagnoses is also substantiated by autopsies, which is often not the case with diagnoses in other areas of the United States. Garraway and his co-workers examined data entered into Rochester's diagnosis retrieval system between 1945 and 1974, and they report in the March 1 New England Journal of Medicine that strokes have declined among Rochester residents by approximately 50 percent. Thus, if health trends in Rochester reflect those of the rest of the United States, as they probably do, strokes have undoubtedly been declining among all Americans during the same time span.

The question now, of course, is why this drop? Garraway and his co-workers suggest two possible explanations: the Surgeon General's warning in 1964 about the health hazards of cigarette smoking — a stroke and heart attack risk factor — and the American Heart Association's recommendation that same year that Americans decrease their dietary intake of saturated fats and cholesterol — another stroke and heart attack risk factor. A third possible explanation for a decline in strokes, Robert I. Levy of the National Heart, Lung and Blood Institute writes in an accompanying editorial, is the availability of drugs to treat high blood pressure — yet another stroke and heart attack risk factor — since the early 1950s, and federal-private efforts since 1972, under the National High Blood Pressure Education Program, to have Americans diagnosed and treated for high blood pressure (SN: 12/11/76, p. 377).

Whatever the cause or causes of a reduction in strokes, the elderly have benefited the most, Garraway and colleagues' study reveals. Strokes among persons 80 years or older, at least in Rochester, fell off 60 percent from 1945 to 1974. □

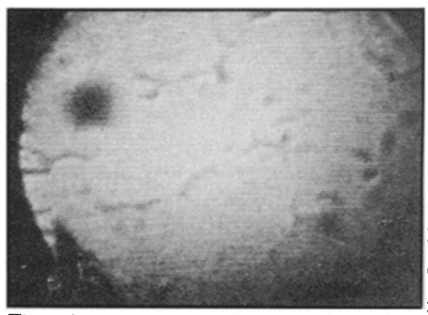
Solid hydrogen produced under pressure

It was, Ho-kwang Mao admits, an emotional moment. As he and colleague Peter M. Bell pressurized the hydrogen-filled chamber to 7.4 million pounds per square inch (57 kilobars), the liquefied gas almost instantaneously popped into a clear, granular solid that resembled sugar or salt. It marked the first time that scientists have produced, and observed, solid hydrogen at room temperature.

"It is an exciting thing just to see," says Mao, who works with Bell at the Geophysical Laboratory of the Carnegie Institution of Washington. But more important, the achievement represents a critical step toward producing room-temperature metallic hydrogen — the suspected superconductor which, if created, might revolutionize electrical and other energy production, according to some scientists. "I would say we have a very good chance to get 1 megabar [the pressure at room temperature at which scientists believe metallic hydrogen would be formed] within a matter of several months," Mao told Science News.

In their experiments, Mao and Bell pumped liquefied hydrogen gas into a diamond-anvil, high pressure cell (SN: 6/10/78, p. 375) at −256° C. The researchers then sealed the diamond-walled chamber — diamonds are used because of their resistance to extremely high pressures — and gradually warmed it to room temperature, 25° C.

After the solidification milestone was passed at 57 kilobars, the pressure was slowly increased to 360 kilobars. At this point the hydrogen took on a denser crystalline formation and a yellowish tint, a puzzling feature that Mao says the researchers will "study more." The hydrogen's denseness at this pressure matched that of ruby crystals placed in the chamber as pressure-measurement devices — a "very interesting" phenomenon, Mao says. No further changes were observed as the pressure rose to a maximum 650 kilobars — 650,000 times the atmospheric pressure at sea level.



Mao, Bell/SCIENCE

Time-lapse photomicrograph taken through a diamond window shows the crystalline form of hydrogen at 57 kilobars.

According to current theory, 1 megabar of pressure will cause hydrogen molecules to break apart into individual atoms. "If they do, we will have metallic hydrogen," Bell says. To reach that point, Bell and Mao are already at work modifying the chamber to accommodate the higher pressures. Microscopic changes in the diamonds' face angles and relative size and in the cell's gasket mechanisms are required to contain the hydrogen, Mao says. At super-high pressures, hydrogen tends to seep, molecule-by-molecule, through whatever presses against it. But Mao is confident that the alterations will lead to total containment at 1 megabar.

Russian physicists reported several years ago that they believed they had produced metallic hydrogen (SN: 9/18/76, p. 181). But the report was sketchy, much of the data unavailable to Western scientists and no follow-up experiments were reported. And, Mao says, Russian pressure measurements were comparatively insensitive, and the Soviets did not actually *see* the metallic form but inferred it from other measures.

Bell and Mao are confident that "a gradual, high order-type transition to the metallic state ... could occur in hydrogen," they say in the March 9 Science. "There is no reason to believe that pressures above [650 kilobars] on hydrogen cannot be achieved." □