

percent reduction in cholesterol concentration translates into a 2 percent reduction in heart disease risk.

The side effects of the cholestyramine treatment were minor. The cholestyramine group did not have an increased incidence of cancer or any other major disease and the study participants complained mostly of bloating, heartburn, and constipation. Sixty-five percent of the men taking cholestyramine complained of such symptoms—but so did 45 percent of the men taking the placebo.

The NHLBI is so encouraged by the study results that it is willing to go quite far in extending them. As might be expected, the institute suggests that the 1 to 2 million middle-aged American men who have cholesterol levels of 265 milligrams per deciliter and above might want to take cholestyramine or a similar drug. In addition, says Basil Rifkind of the NHLBI, "the trial's results could and should be extended to younger men with high blood cholesterol." Rifkind also believes that women with high blood cholesterol levels should try to reduce them. "High," to Rifkind, means 230 or 240 milligrams per deciliter, which is the upper 15 to 20 percent of the American cholesterol distribution. There are 35 to 40 million Americans with cholesterol levels in this range.

But, stress Rifkind and Robert I. Levy, who was director of the NHLBI when the study began and who is now at Columbia University, the preferred way for anyone to reduce their blood cholesterol is with diet. For persons with cholesterol levels of 240 or so, a diet might get them down to the American average of 210 milligrams per deciliter, which the NHLBI group recommends as a goal to aim for. Diet can, for some people, reduce cholesterol by 10 to 15 percent. For those who cannot get their cholesterol down far enough with diet, cholestyramine or a similar drug could be tried. In addition to the inconvenience and possible discomfort of taking cholestyramine, the drug is quite expensive. It costs about \$150 a month for the doses used in the NHLBI trial.

Is the NHLBI ready at last to recommend that the general public try to reduce its blood cholesterol levels? Well, says Rifkind, they are still considering the matter. "Before making categorical recommendations we plan to bring experts together to reflect on the results of the study and link them to other evidence," he says. Besides, he remarks, there is no pressing reason to wait for the NHLBI. "Many experts have already made recommendations," he says.

—GINA KOLATA

Another Oil Resource Warning

In a recent U.S. Geological Survey (USGS) report,* government researchers specializing in the estimation of oil resources issued a strong warning—the amount of oil left to slake the world's thirst for energy is smaller than some optimists would like to think and may be even smaller than conservative estimates. A total of 1718 billion barrels of oil (BBO) will ultimately be recovered by conventional means, according to the report by Charles Masters and David Root of the USGS in Reston, Virginia, and William Dietzman of the Energy Information Administration in Dallas. This USGS estimate is near the lower end of the range of recent estimates, most of which have tended to fall slightly above 2000 BBO. Their estimate of the most uncertain portion of ultimate recoverable resources—undiscovered resources—is 550 BBO. That compares with another recent estimate of 987 billion barrels yet to be discovered made by oil consultant and sometime Reagan adviser Michel Halbouty and consultant John Moody. Their estimate is the most likely value in a range of 280 to 2415 billion barrels.

The USGS report finds no support for such large estimates of the maximum amount of oil left to be found. To find 2415 BBO, the report says, industry would have to locate another oil province with the mammoth resources of the Middle East, "and our studies indicate no possibility for such an occurrence." After considering such frontiers of exploration as the Arctic, the deep sea floor, and other relatively untested basins, they note that "most of these basins are untested for good geologic or economic reasons . . . our analysis suggests the likelihood that most of the new oil will come from the established provinces," predominantly the Middle East. This new oil, plus reserves known to exist in the ground, would last the world about 60 years at present rates of consumption. The estimated U.S. supply from undiscovered resources and demonstrated reserves is 36 years at present rates of production or 19 years in the absence of imports.

Things may be worse than they appear. Since the mid-1960's, the amount of oil discovered each year has dropped—from about 38 BBO in the early 1960's to about 10 BBO in the late 1970's, according to the report. At the same time, world consumption was increasing so that, beginning in the early 1970's, more oil was consumed from reserves each year than was added by new discoveries. Reserves declined despite the drilling of more wells in more places. This decrease in the finding rate is evident outside the United States, Canada, and Communist countries, where each wildcat well drilled in search of a new field discovered an average of about 23 million barrels of oil in the early 1950's but only about 10 million barrels in the recent past, according to Root. Within the United States, the cycle of depletion is much farther along, reserves having peaked in the 1950's.

The increasing difficulty of discovering each additional barrel of oil may bode ill for future discoveries. The report's 550-BBO estimate of undiscovered oil in the world is actually the most likely value in a range of possible values. There is a 5 percent probability that as much as 1417 BBO will be found and a 95 percent probability that, on the low side, at least 321 BBO will be found. "[T]he general level of exploration, as measured by numbers of wells, has increased over time," the report says, "yet annual discoveries are declining, suggesting the possible reality of low-side assessments. If the low side be reality, the need for alternate energy sources becomes increasingly critical for most of the world's countries."

Dependence on subjective geologic interpretation, as in the USGS study, has already resulted in unduly optimistic expectations (*Science*, 24 April 1981, p. 427). In U.S. frontier areas, drilling experience has been discouraging enough of late that Root and Masters "strongly suspect" that the USGS's 1981 estimate of U.S. undiscovered resources is too high. Early last month, for example, the much touted Mukluk wildcat well in Alaska's Beaufort Sea, the frontier province that greatly buoyed the 1981 estimate, came up dry. By Christmas, the first well drilled into the buried reef off New Jersey, one of the last hopes of the U.S. Atlantic outer continental shelf, was being abandoned.—RICHARD A. KERR

*U.S. Geological Survey Open-File Report 83-728 (1983).