

connecting the earthquake source and the seismic receivers and having the proper number of reflections and transmissions. He then invents a fake material for which that ray would be correct. Finally, he uses continuation methods to slowly change from the fake material to the real material through which the ray travels. The advantage of these methods, Keller says, is that they allow him to cal-

culate easily 20 to 30 rays in a model, whereas previously seismologists had trouble calculating two.

Smale is using continuation methods to find equilibrium points in economic models. Not only can he find these points, he says, but the computer algorithms he uses provide step-by-step paths to the equilibrium points. This result can provide insight into the funda-

mental problem of how economies can attain equilibrium.

The new continuation methods are still in their infancy. They seem to be applicable to an immense variety of problems and are easier to implement than previous continuation methods. Those who are developing the techniques are confident that they will become an important new tool.—GINA BARI KOLATA

Is Labile Hypertension a Myth?

Doctors are commonly taught to be on the lookout for so-called labile hypertensives. These are people whose blood pressure is high on one or several readings but drops to normal or to the borderline hypertension range on a subsequent reading. The conventional wisdom is that if a patient's lowest reading is normal, his doctor should not treat him, regardless of his other blood pressure readings.

This long-accepted view of labile hypertension is now being challenged by William Kannel, director of the Framingham study. The Framingham study is a 30-year-old longitudinal study of adults living in the town of Framingham, Massachusetts. It has long been a major source of information on the causes and consequences of cardiovascular diseases.

At last month's meeting of the American College of Cardiology in Miami, Florida, Kannel reported that there is no difference in terms of risk of heart disease, stroke, and congestive heart failure between labile and "true" or "stable" hypertensive patients. Kannel's report is now a subject of some controversy among hypertension specialists, a number of whom contend that it does not refute their belief that a group of truly labile hypertensive patients exists and that these patients are at lower risk than stable hypertensives.

The Framingham investigators obtained their results by analyzing data on blood pressure measurements of 5209 Framingham participants. These measurements were taken at 2-year intervals over a period of 20 years. When Kannel and his associates looked to see whether particular people are labile hypertensives every time they are examined, they found that there is a very low correlation of the lability of a person's blood pressure between one exam and another. But they noticed that lability is correlated with blood pressure—the higher the blood pressure, the more labile it is likely to be.

The explanation for their finding, Kannel says, is a statistical phenomenon called regression toward the mean. That is, the blood pressure of someone with severe hypertension is more likely to drop than to increase on a second reading. Conversely, the blood pressure of someone whose pressure is at the low end of the spectrum is more likely to increase than drop on a second reading. Because of this phenomenon, Kannel reports, one-third of hypertensive patients are classified as labile but not true hypertensives, and many are not treated who should be.

As further evidence that lability of blood pressure is a statistical artifact, the Framingham investigators note that when they analyzed their data to see how the risk of cardiovascular disease varies with lability of blood pressure, they found that the risk increases as lability increases. This

would be expected if lability is more likely at higher blood pressures. When they adjusted their analysis for this effect, they found that labile hypertensives are at the same risk as stable ones.

Kannel suggests that doctors use the average of several office blood pressure measurements to determine a patient's blood pressure. Patients whose blood pressure is normal on one or another occasion should not be dismissed if their average pressure is high.

Although these recent findings about labile hypertension are unexpected, Kannel says he is not too surprised by them because they are so logical. Moreover, he is used to unexpected findings about high pressure. "Practically everything we investigate about high blood pressure goes against clinical teaching," he reports. "We used to think that only if the diastolic blood pressure was high the patients had problems. Then we found that the systolic blood pressure is just as important. We used to think hypertension in the elderly was less important than in young people. It turns out to be more important." (Older people with high blood pressure are at greater risk of cardiovascular disease). Thus, in Kannel's view, the myth about labile hypertension is just one more misconception that the Framingham study has exploded.

Kannel's view is challenged, however, by some experts on hypertension, including Edward Freis of the Veterans Administration Hospital in Washington, D.C. Freis explains that hypertensive patients are a heterogeneous population. Some who have labile blood pressure measurements in the doctor's office have perfectly normal blood pressures when they leave the office. These patients seem to be at lower risk of developing cardiovascular diseases. For example, Maurice Sokolow of the University of California at San Francisco found that these patients were less likely to have damaged body organs from high blood pressure. They are thought to have high blood pressure in the doctor's office as a response to their nervousness about seeing a doctor. Other patients with labile hypertension have high blood pressure measurements at home as well as in the doctor's office. Freis suspects that this second group of patients, who are probably at higher risk of developing cardiovascular diseases, is the basis of Kannel's finding. "You can't forecast for an individual on the basis of a group," he says.

Judging from Freis's reaction, the "myth" about labile hypertension has hardly been exploded. But it is likely to be reexamined, and some doctors will undoubtedly change their opinion that patients with labile hypertension should not be treated.—GINA BARI KOLATA