argue that the enthusiasm of Italy's politicians for participation in projects such as CERN or the atomic energy agency Euratom was motivated partly by a desire to prevent the country from moving too far toward the Left.

Whatever the historical roots, Italy is now an important partner in a variety of technological projects in which other countries have taken the lead, ranging from the French fast breeder nuclear reactor Superphenix, to which Italy is contributing one-third of the costs to Spacelab.

Frequently, as with the case of the superconducting magnets that are being built for CERN's new Large Electron Positron collider, participation in such international projects has been more than justified by the substantial engineering contracts won by Italian companies in fields of high technology for which there is no domestic demand.

The same spin-off effect operates within science itself. Research minister Granelli argues that the emphasis on international projects "is a great help to us," since they can be used "as a push" to justify supporting complementary research at a national level.

Thus although Italy is not likely to be chosen as the site for the new European Synchrotron Radiation Facility (*Science*, 27 July 1984, p. 391), plans are already being discussed for a smaller, national facility (possibly operating at a different wavelength) which, it is argued in Rome, would put Italy in a position to reap the full benefit from its expected participation in the European facility.

In the past, again, it has been high energy physics that has benefited most from the spin off effect. Although a large proportion of the INFN's budget is spent directly on CERN, there is also money in the 4-year program approved by the Parliament for several domestic facilities—including an underground laboratory for studying proton and neutrino decay processes, the so-called "Gran Sasso project."

Not surprisingly, the generous funding provided to high energy physics has generated some resentment in other, less-well-endowed fields and demands for redressing the balance. "It is gradually becoming clearer that you must have a large reservoir of basic research in all fields to be able to compete in the international marketplace," says condensed matter physicist Carlo Rizzuto of the University of Genoa.

Nicolo Cabbibo, the president of INFN, provides three answers to the complaint that support for nuclear physics is distorting the overall shape of Italy's research effort. First, although this support is high by Italian standards, it is in line with that provided by other Western nations. Second, the investment in high energy physics has brought ample rewards in terms of both scientific productivity and national prestige. "Our success is probably due to the fact that we seem to be quite effective in making good use of the money we are given, for example in the number of scientific papers that we produce," says Cabbibo. And third, other fields of science should not be trying to take money away from physics, but to emulate its success. "I do not think that anyone is getting less money because we are getting too much," he says.

Detractors of this argument claim that the current strength and prestige of high energy physics in Italy is also partly the result of patronage received from both the United States and the rest of Western Europe, whose price in terms of lost political independence is seldom acknowledged.

Supporters, in contrast, claim it merely indicates that the bootstrap mentality that led physicists such as Amaldi to conduct advanced experiments in the immediate postwar years on improvised apparatus built from army-surplus equipment—and subsequently played a large part in the petrochemicals-induced "economic miracle" of the 1950's and 1960's—remains alive and well as Italy prepares to meet the challenges of the physics-driven technologies of the 1990's.—**David Dickson**

A Guarded Endorsement for Shock Therapy

NIH panel finds it effective for short-term treatment of severe depression; calls for more training and monitoring

A panel assembled by the National Institutes of Health has given cautious endorsement to electroconvulsive therapy (ECT) as a treatment of last resort for some types of severe depression. The procedure, which the panel notes is "the most controversial treatment in psychiatry," has long been the focus of an intense medical and political debate. Attempts to regulate ECT have occurred in more than half the states, and the procedure was outlawed in Berkeley, California in 1982 (a decision that was later overturned in court).

The panel's conclusions, which were developed at a 3-day consensus conference earlier this month, are based on evidence that the risks of serious side effects are relatively low. In essence, the panel, which was chaired by Robert M. Rose of the University of Texas Medical Branch and consisted of 12 health professionals, a lawyer, and a consumer advocate, said that ECT is effective in treating severe depression that has not responded to drug therapy. It emphasized, however, that patients should be informed as fully as possible of the potential risks.

The treatment was developed following the serendipitous observation that epileptic seizures appeared to have an ameliorative effect on psychosis and depression. Introduced in the United States in 1940, ECT has a checkered past, having been applied indiscriminately to a range of mental disorders and misused for the purpose of making patients more tractable. In the early days, the convulsions often caused bone fracture, but the 1950's saw the gradual adoption of "modified" ECT, which includes the use of muscle relaxants and oxygen to prevent the death of brain cells when normal breathing is interrupted.

The use (and abuse) of ECT has fallen dramatically since the early 1960's, primarily because of the advent of psychotropic drugs. In 1980 the National Institute of Mental Health (NIMH) reported 33,384 cases, but treatment has been on the rise in the past few years, with estimates of the annual number of patients treated ranging up to 100,000—most of them in private general hospitals (which handle the bulk of mental patients outside state hospitals). Outpatient ECT is also increasing.

Experts at the conference felt that research on long-term treatment out-

come and on patient attitudes was inadequate. In fact, David J. Rothman of Columbia University College of Physicians and Surgeons said most of it "stinks." Nonetheless, the panel noted in its final statement that "not a single controlled study has shown another form of treatment to be superior to ECT in the short-term management of severe depressions."

The most troublesome side effect of ECT is memory loss. There is a paucity of long-term data on this question, although researchers say that of patients who receive the usual course of treatment—6 to 12 sessions—only a small minority, or less than 0.5 percent, claim major memory impairment.

The mechanisms of action are still undetermined. Seymour Kety of NIMH has described the immediate effects of ECT as follows: it "involves massive discharges of wide areas of the brain, activation of the peripheral autonomic nervous system, release of secretions of many endocrine glands, tonic and clonic convulsions of much of the muscle mass of the body. All of these activities cause so many changes in the chemical homeostasis of the body, that there is no dearth of demonstrable biochemical changes. Indeed, the difficulty lies not in demonstrating such changes, but in attempting to discern which may be related to the important antidepressant or amnestic effects and which are quite irrelevant to these."

According to Bernard Lerer of the Jerusalem Mental Health Center in Israel, most current interest is focused on the similarity of action between ECT and antidepressants (both tricyclics and monoamine oxidase inhibitors). Lerer reported that animal research shows that shock activates noradrenergic systems, reduces serotonin uptake, and enhances dopamine receptor sensitivity. He concluded that the amnestic effect of ECT is not the operative one since degree of memory loss does not correlate with treatment outcome, and some patients suffer no memory loss at all.

Although research on the long-term benefits of ECT is lacking, there is some question as to both its feasibility and its relevance. First of all, the vast majority of patients receive antidepressant medication as follow-up care, so a pure finding cannot be made. Then, too, ECT is by its nature an acute treatment. Depressive illness is usually episodic, and a course of ECT will often terminate an episode. But it has never been presented as a permanent cure—thus it might be likened to a drug that clears up a flare-up of a chronic disease.

As for safety, the panel noted that the complication rate is about 1 in 1700 treatments, and the mortality risk "is not different from that associated with the use of short-acting barbiturate anesthetics. . . . "

The most significant safety problem, of course, relates to degree of memory loss and the point at which this amounts to "brain damage." The critics of ECT are ferocious on this point. Several of them testified that they knew people whose entire store of professional knowledge had been wiped out by ECT. One expatient, who has become a playwright since her illness and got a Masters degree at the age of 57, nonetheless claimed radical debilitation of memory. Another, who writes books and appears on TV talk shows, compared herself in a poem to a Hiroshima survivor. Other expatients, however, claimed they would most certainly be dead were it not for ECT.

The mortality risk is the same as that for anesthetics alone.

Research on memory loss would seem to indicate that severe impairment is extremely rare. (There are no systematic studies of persons on whom the treatment has been grossly overused.) Larry Squire of the University of California (San Diego) School of Medicine has found that memory problems completely clear up within 7 months following treatment, leaving only a gap for the period—ranging from a few days to a few weeks—immediately surrounding the treatment.

Christopher Freeman of the Royal Edinburgh Hospital suggested that memory impairment might be labeled brain damage at the point where ability to learn and retain information was compromised. But this he has rarely found. He conducted a study in 1980 of 65 subjects who responded to a newspaper advertisement calling for people who felt they had suffered permanent damage. Some of this group had persisting memory problems, but no "severe impairment" was observed.

If research findings are accurate there is good reason to ask why there is such persistent and fierce opposition to ECT. The answer may lie in its peculiar position as kind of a lone wolf of psychiatric treatments. Having been adopted prior to the biological revolution which swept psychiatry in the 1970's, it has always been on a separate track. There is widespread ignorance about it in the medical profession. A 1978 survey by the American Psychiatric Association, for example, found one-third of psychiatrists "generally opposed" to ECT—which reflects the schism within the profession on biological versus psychodynamic approaches to treatment. Public information has largely come in the form of fictional portrayals, such as the shock treatments in "One Flew Over the Cuckoo's Nest," which foster the belief that ECT is painful and violent.

ECT now seems to be making a comeback as the limitations of drug treatment have become more apparent. The research community is still small, but this year saw the creation of a new journal, *Convulsive Therapy*. Medline citations increased from 9.5 in 1979 to 13 in the last half of 1984. Applications for conditions other than depression may be established—for example, some uncontrolled studies indicate that ECT relieves symptoms of Parkinson's disease.

The consensus panel's statement reflects considerable dissatisfaction with the state of knowledge and regulation regarding ECT. It recommends a national survey on the status of training and treatment, modeled along the lines of a 1981 British survey done for the Royal College of Psychiatry. It calls for systematic inclusion of ECT training in medical schools and psychiatric residencies; new mechanisms for standards setting and monitoring; review committees in institutions using ECT, and periodic inspection of equipment (the Food and Drug Administration is currently considering performance standards for the machines).

The panel also recommends "immediate" research on patient attitudes toward ECT, identification of biological mechanisms behind the treatment, long-term effects on affective changes and memory, subgroups of patients that will be benefited or harmed by the procedure, and electrode placement and stimulus parameters.

The shortage both of scientific knowledge and general awareness about ECT is unusual for a treatment that has been in use for over 40 years. Rothman, in a speech about the controversy, laid much of the blame for ECT's reputation on the "ambivalence" of psychiatry itself. He quoted a 1981 *Lancet* editorial to the effect that it is "not ECT which has brought psychiatry into disrepute. Psychiatry has done just that for ECT" because of the profession's failure to adequately supervise or monitor the procedure.—**CONSTANCE HOLDEN**