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pyramidal diseases (a term not yet entirely accepted) which began with the work of Browder and Myers, who were among the first to enter the region of the putamen and basal nuclei. Further work was done in France, with radiological control, followed by studies in America and Sweden. The development of anterior choroidal artery ligation had become specially associated with Dr. Cooper.

Dr. Cooper said that on beginning his neurosurgical work some four and a half years ago he had been attracted, as many young neurologists have been, by the two perennial neurological problems—hydrocephalus and the extrapyramidal diseases. He chose to take up the latter. Actually his interest in anterior choroidal artery occlusion arose accidentally. He had been carrying out a pedunculotomy for the relief of tremor, and by chance tore the anterior choroidal artery. With its consequent ligation he found that the tremor disappeared on the opposite side, and did not recur. This recalled to him that the artery was the main supply to the globus pallidus, and he therefore decided to follow up its systematic occlusion as a possible method of controlling tremor and rigidity. He commented on the fact that neurological surgeons have attacked nerve pathways at every level, from the cortex to the spinal cord, in attempting the relief of Parkinsonism. At present attention is being centred on the basal ganglia, especially the globus pallidus, and this is in the area supplied by the anterior choroidal artery. One disadvantage is that the artery frequently has an aberrant course, and therefore arteriograms are all the more essential in carrying out the occlusion. The artery is not constant in its field of supply.

Dr. Cooper then described the technique of approach to the artery, going in under the temporal lobe. He has now developed a second method, by which he coagulates the globus pallidus, using ethyl alcohol and celloidin, the needle being passed in through a burrhole; this second procedure he calls chemo-pallidectomy. His method now is first to inject procaine into the nucleus, and note its effect. There are academic objections to this, but so far he has found no trouble to result from it, and it provides invaluable information as to what effect the occlusion will have, as well as warning the operator of any untoward effects. Patients always know as soon as the procaine is injected, and comment on the disappearance of the rigidity.

Dr. Cooper has performed ligation of the artery in 55 cases, with a mortality of 10%. Three hemiplegias resulted, but 70% of the series have been freed of their tremor and rigidity, and there was no after-paralysis in these. In another series of 100 in which he used the alcohol and celloidin injection method, the results were even better. The beneficial effects were most marked in the tremor, although the rigidity disappeared in some. The difficulty is to produce a lasting effect, and it is usually necessary to repeat the injection.

Asked about the selection of patients for operation, Dr. Cooper said that this is always a very difficult problem. In his opinion the operation should not be done in those over 55, nor where arteriosclerotic changes are marked, especially of the paranoid type. He had found that usually those who had had long-standing symptoms responded better than those who had had them for a short time only. This partly answered a question whether he would advise operation in patients whose symptoms were only just beginning. He did not favour bilateral operations. Often a patient with bilateral symptoms would get such good results on one side that he would ask to have the other side done, but the results in bilateral operations were not good enough, and they might even result in impairment or loss of memory. Often the unilateral result gave quite enough relief to put the patient back on his feet, and there might even be a slight accompanying improvement on the untouched side, but it was not possible to estimate how much.

Dr. Bertrand then showed a series of cases of Parkinsonism, some treated by leukotomy of the ansa lenticularis, others by anterior choroidal arterial occlusion, with excellent results. He spoke of the problem of deciding how much destruction of tissue should be carried out.

A short discussion followed on the mechanism of the effect of these operations upon extrapyramidal function. Dr. Cooper felt that we were at too rudimentary a stage to be able to say how the relief is mediated. Nor do we know what causes the tremor and rigidity. It is possible that these symptoms are due to a discharging lesion in the globus pallidus. H.E.M.

WORLD HEALTH ORGANIZATION

EXPERIENCE OF POLIOMYELITIS VACCINATION IN EIGHT COUNTRIES

Experience of the production and use of polio vaccines in eight different countries was reviewed during the first two days of work of the WHO Study Group on Poliomyelitis Vaccine held in Stockholm under the chairmanship of Dr. Karl Evang (Director General of Health Services, Norway). Approximately 10 million children in five countries have been vaccinated against poliomyelitis with no ill effects, apart from the comparatively few cases in the United States which were traced to the use of certain batches of faulty vaccines.

Polio vaccine of the Salk type has been shown to give good protection to children between the ages of 6 and 10 years. This is the only age group for which sufficient evidence is available to allow a definite opinion to be expressed. It is not yet possible to say how long the immunity conferred by vaccination can last.

Great importance should be given to the continuing need to apply stringent safety tests to all lots of vaccine produced.

In its report to the Director General of WHO the WHO Study Group attempts to give as much guidance as possible to national health authorities who may be considering whether or not to begin polio vaccination programmes.

The report mentions two main considerations on which any decision of this kind should be based. They are: (1) the seriousness of the existing polio situation in the country concerned, particularly with regard to the paralytic form of the disease; and (2) the cost and practicability of a vaccination programme considered in relation to the funds and facilities available, and to the saving in human suffering and in the cost of hospital and social care which may result.

As a general rule, the members recommended that countries with a high incidence of poliomyelitis of the dangerous paralytic form should plan to bring vaccination into routine use at an early date. In countries with a low incidence of paralytic polio, a decision to vaccinate on a large scale should only be made after a careful review of all the relevant circumstances.

The Group also dealt with the very important question of the strains of virus which should be used in the production of vaccines, and listed the characteristics which should be sought in these virus strains. Detailed examination was also made of a large number of other technical questions connected with the laboratory processing and testing of vaccines.

Among the Group's recommendations to the World Health Organization are several concerning valuable lines of research which should be followed. Members attached great importance to information presented to them concerning the progress of research on a new "living virus" type of vaccine different in principle from the "inactivated virus" vaccine of Dr. Salk. It was agreed that the "living virus" vaccine was still in an early and experimental stage of development, but that work on it should be encouraged.

The following information was presented to the Group by the scientists attending from the countries concerned:

U.S.A.

In the United States special studies have been undertaken in 11 states of results obtained by large-scale polio vaccination programmes. Typical of the preliminary reports available are those from New York State and from Minnesota. In New York State, out of 450,000 children from 6-10 years of age who were vaccinated, 153 contracted polio. Of these 18 suffered from the paralytic form of the disease. These figures may be compared with a "control" group of 280,000 children of the same age group among whom there were 178 cases, 59 being paralytic. The rates of incidence of the paralytic form obtained by this study were 4 per 100,000 for vaccinated groups and 21 per 100,000 for unvaccinated.

Figures for the state of Minnesota were 24 cases (including 3 paralytic) among 112,000 vaccinated children of 6-9 years against 22 cases (including 10 paralytic) among 33,000 unvaccinated children of the same age group. Incidence rates for the paralytic form of polio are thus 2.7 per 100,000 for vaccinated children against 30.1 for unvaccinated.

Canada

During the period April-July 1955, 860,000 Canadian children in the 5-9 age-group were vaccinated. The vaccine used was made according to the Salk formula by one single Canadian laboratory. Preliminary results available from four provinces indicate that among the children vaccinated only 1.07 per 100,000 had contracted paralytic polio compared with 5.39 per 100,000 among unvaccinated groups. Only three cases of polio had been reported in children during the first four weeks after vaccination. Further investigation showed that there was only one of these for which vaccination could possibly be held responsible.

Denmark

In 1953 Denmark decided to begin production of poliomyelitis vaccine, following principally the Salk method. In April 1955 vaccination was begun among all children from 7-12 years of age. No cases of polio occurred among the 425,000 children vaccinated. On the other hand from April to September 1955 only 7 cases of paralytic polio were reported in the whole of Denmark. In October the vaccination campaign was extended to children from 9 months to school age. To date 250,000 under the age of 7 have been vaccinated. Vaccination on a large scale has been carried out in Greenland and among school-children in the Faroe Islands.

South Africa

At the end of 1954, South Africa was ready to produce a vaccine similar to but not identical with the Salk vaccine. In April 1955 plans were laid to vaccinate 200,000 children, but were not put into effect owing to discouraging reports of experience in the U.S.A. After careful retesting, the vaccine was issued in September 1955 in quantities sufficient to vaccinate 15,000 children under 6 years. No cases of paralysis had been reported among vaccinated children. No figures are yet available concerning the reduction in incidence of polio which might result from the vaccinations.

Germany

In Western Germany the production of vaccine of the Salk type began early in 1954. In all, 100,000 vaccinations had been given. No cases of paralytic polio were reported in vaccinated children. The vaccination programme was stopped in May 1955 after reports from the U.S.A. but Germany is now ready to resume its large-scale vaccination programme using vaccine conforming to the new safety standards approved by the Paul-Ehrlich Institute on the basis of those applied in the U.S.A.

France

The Institut Pasteur of Paris has produced a vaccine similar in principle to the Salk vaccine. Particularly careful study had been given to the physico-chemical aspects of the process involved in the preparation of the vaccine. In France vaccination had been used only for a small group of children selected after serological survey of different age groups. Each vaccinated child was followed up carefully. No ill effects had been observed and no cases of polio had been reported among vaccinated children.

France was expected shortly to decide whether or not to launch polio vaccination on a wider scale.

United Kingdom

In Great Britain Salk vaccine was made but was never issued for use because American experience in May 1955 raised questions as to its safety. Since then alternative strains of virus have been tested, and one has been selected to replace the earlier one. Vaccine incorporating this safer strain is now in commercial preparation. No decision has yet been taken on use of the vaccine expected to be available in spring, 1956.

Sweden

Sweden has also produced vaccine similar to the Salk type. Test inoculations were made during February and March 1955, in 2,000 school-children in the 8-year and the 13-year age groups. In April 1955 it was decided to discontinue use of the vaccine until better proofs could be obtained of its safety. Since then research has continued.

POLIOMYELITIS

"Hopefulness about poliomyelitis vaccines is slowly returning, and the outlook, as the year ends, is brighter than seemed even remotely possible a few months ago. Many people feared that the Salk vaccine had been used for mass inoculation before its safety was assured, and that the understandable enthusiasm of those who were convinced of the vaccine's value had carried them close to catastrophe. Nothing that has happened since has convinced us that these fears were unfounded, but there is now no doubt that the 1955 programme of poliomyelitis vaccination in the United States was a bold step towards the conquest of the disease. The more venturesome policy has been at least partly justified by information quickly gained about the vaccine's powers. With the new safety tests, the Stockholm meeting felt that the chances of producing paralytic disease by vaccination were extremely small. But at least one important question cannot yet be answered: is vaccine which has satisfied the new safety standards undiminished in its protective power? And there are several other unknowns, particularly concerning the duration of protection."—Editorial, *Lancet*, 2: 1279, 1955.