

tissue, electrical stimulation, nutritional deprivation, environmental manipulation etc. and the effects of these on different aspects of brain development and function were included.

The demonstrations included dissection and separation of different regions of the brain, separation of cell types, isolation of synaptosomal and myelin membranes, culturing of different cell types of nervous tissue, analysis of lipids and incorporation of the labelled precursor into brain lipids, analysis of fatty acids, assay of neurotransmitter levels and enzymes involved in their metabolism, use of stereotaxis for implementation of cannulae and electrodes, studies on self stimulation, drug effects on behaviour of rats, behavioural techniques including those used for assessment of neuromotor development, motor coordi-

nation, learning performance etc.

Round table discussion was arranged on "Methodology of subcellular fractionation". Specialists discussed techniques used in the preparation of monoclonal antibodies, immunohistochemistry, voltage and patch clamp, ligand binding studies and electrophysiology using slides, video etc.

It is proposed to bring out a text book on "Introduction to Neuroscience" which can be used to teach this course. Those interested in this book can contact Prof. L. J. Parekh.

SHAILA TELANG and L. J. PAREKH
Biochemistry Department,
Baroda University,
Baroda 390 002.

NEWS

ANTIBIOTICS: THE RESISTANCE PROBLEM

ABSTRACT

The increasing frequency of acquired resistance to antibiotics is a worldwide health problem which demands international attention. However, the rapidity with which new resistant strains are appearing, and the fact that existing resistant strains are becoming more prevalent, highlight the need for more information about the current situation and for action to control it. To meet the need for national and international surveillance of antibiotic resistance, the World Health Organisation (WHO) recommends that health authorities be informed of the best and most cost-effective ways of using antibiotics and pass this information on to all health professionals.

THE discovery of antibiotics was one of the major events in the history of public health. Antibiotics saved millions of lives and shortened the duration of illness for hundreds of millions or more. However, the dramatic nature of their effects encouraged an explosive increase in their use both for humans and in veterinary medicine. All this contributed to the growing problem of bacterial resistance.

First warnings

The first clinically serious consequence of antibiotic resistance was the widespread dissemination in hospitals, in the 1950s, of strains of *Staphylococcus aureus* that were resistant to penicillin. These strains had developed ability to form an antibiotic-destroying enzyme, penicillinase (beta-lactamase) and they sub-

sequently acquired resistance to several other chemically unrelated antibiotics. From the early 1950s onwards, these so called "multiple-antibiotic" resistant staphylococci became endemically established in many hospitals throughout the world.

Recently the situation has worsened. Surveillance data presented to the World Health Organization (WHO) indicate that serious consequences of antibiotic resistance were no longer confined to hospitals but were increasing in the general population.

The prevalence was even greater in developing countries than in industrialized ones. Resistance to such easily available antibiotics as ampicillin, tetracycline, chloramphenicol and sulfonamides has made its appearance. Patients in developing countries are now in a situation where only the low-cost antibiotics are available to them, yet these are becoming progressively

less effective. It is also clear that the import of expensive "new" antibiotics from developed countries, even if economically feasible, would cause only a temporary improvement in the situation.

Consequences of widespread resistance

Antibiotic resistance limits the effectiveness of antibiotics against bacteria. These bacteria may be resistant to the antibiotic from the start, or they may acquire resistance from another organism in the patient during treatment.

Resistant bacteria may actually grow faster in the presence of antibiotics. This process (known as "superinfection") can have important clinical consequences, especially in hospital patients, many of whom have an increased susceptibility to infection by organisms that seldom invade healthy persons. These organisms are frequently responsible for respiratory or septicemic complications that may be a greater hazard than the infection for which the antibiotic treatment was originally given.

The use of wide-spectrum antibiotics, particularly when not essential, has produced resistance in a wide variety of bacteria, thus seriously limiting the possibilities of controlling infection by any of the existing antibiotics.

Pressures favouring excessive antibiotic use

When antibiotics are available on the open market, the attitude of patient and family are decisive. The desire to do the best for the patient in a situation of fear and anxiety, coupled with public ignorance about the efficacy of antibiotics in particular diseases, leads to unnecessary, and even damaging, treatment. In other cases, the dosage is inappropriate: either insufficient or not taken long enough. Poor choice of antibiotics often results from the multiplicity of names under which they are marketed, the promotion in developing countries of antibiotics that are obsolete or inappropriate, and misleading advertising.

Unless physicians have a good knowledge of the management of microbial infections, they may be tempted to give unnecessary treatment, in an effort to do the best for the patient.

Irrational use

Moreover, recent surveys in North America and Britain indicate that about one-quarter of all patients receive one or more courses of antibiotics while in hospital. In a Canadian survey in 1976, only 41% of all

courses of antibiotics that were prescribed could be considered as "rational", and 22% were "questionable".

In hospitals, the most frequent form of therapeutic misuse is to give unnecessary courses of antibiotics. This is true in general practice as well; in one survey in the USA, nearly 60% of physicians used antibiotics to treat the common cold, which is a virus infection no antibiotic can combat. The possible benefits of preventing secondary bacterial infection in the patient are more than cancelled out by the danger of promoting resistance to antibiotics.

Antibiotics in animals

Antibiotics are regularly used to treat and prevent animal disease and to promote the growth of livestock. Unfortunately, the administration of antibiotics to animals for any purpose leads to an accumulation of resistant bacteria in their gut. The importance of this for human is that (1) antibiotic resistant pathogens common to animals may reach humans by cross-infection, and (2) antibiotic resistant, non-pathogenic organisms in the animal may pass to and colonize humans and thus transfer this resistance. Evidence now available confirms that these resistant strains reach man via the food chain.

Plan of action

The increasing frequency of acquired resistance to antibiotics is a worldwide health problem which demands international attention. However, the rapidity with which new resistant strains are appearing, and the fact that existing resistant strains are becoming more prevalent, highlight the need for more information about the current situation and for action to control it. To meet the need for national and international surveillance of antibiotic resistance, the World Health Organization (WHO) recommends that health authorities be informed of the best and most cost-effective ways of using antibiotics and pass this information on to all health professionals.

Veterinarians

WHO has recommended that no antibiotic of therapeutic value in humans, or showing cross-resistance with such an antibiotic, should be used to promote growth in animals. However, this policy will not work, unless the use of such antibiotics to prevent and treat diseases in animals is also restricted.

Since the use of antibiotics is an important means of

treating bacterial diseases in animals, (a) countries should prohibit the therapeutic use in animals of newer antibiotics used to treat serious infections in humans (*e.g.* gentamicin and related aminoglycosides, spectinomycin, rifampicin); (b) chloramphenicol should be reserved for use in humans in order not to destroy its effectiveness for treating typhoid; (c) the routine use of antibiotic prophylaxis in the absence of proven infection should not become a substitute for food hygiene in animal-rearing establishments.

Hospitals

Hospital authorities should agree upon a limited list giving the minimum number of antibiotics required for effective treatment. The pharmacist should, under normal circumstances, dispense antibiotics only from this list, and ought to try to give the least expensive and most effective of a class of suitable agents. Generic names should be required in all prescriptions and in labelling.

Hospital authorities ought to enforce the following rules:

- (1) all drugs sales representatives should report to the pharmacy for registration;
- (2) they should visit physicians only by appointment, and should not, in general, enter the patient-care areas of the hospital;
- (3) they should be permitted to mount displays of their products only for limited times and in designated places;
- (4) offers to sponsor speakers at scientific meetings and to provide free samples, test kits, etc need to be accepted with caution and only after consultation with specialized staff.

General practitioners

The unrestricted sale of antibiotics to the general public encourages their inappropriate use. Legislation making them available only on prescription by designated classes of health professionals, is therefore strongly recommended. They should also be kept informed of the best use of these substances.

Information is urgently needed about the pattern of antibiotic use in each country to assess the extent of overuse, misuse (and underuse) in common clinical situations encountered in various countries.

Special mention must be made of the widespread use, particularly in developing countries, of preparations containing two or more antibiotics in fixed ratios. Their spectrum of activity is often so wide that they have undesirable effects on the body, few of them have notable therapeutic advantages, and they are generally costly.

Manufacturers and importers of antibiotics should be required to provide the same information to users in all countries in which their products are sold. This information should always include the generic name of the product, the indications and contraindications for use, and the side-effects.

In conclusion unless steps are taken to check the misuse of antibiotics, which leads to resistance, one of the best weapons humanity has devised for the protection and restoration of health could be placed in jeopardy. (*WHO FEATURES*, No. 89, October 1984; WHO Organization, Media Service, 1211 Geneva 27, Switzerland.)

EMBRYO TECHNOLOGIES PROMISING

... Embryo transfer techniques "could replace amniocentesis, the prenatal test for Down's syndrome and some other diseases; an embryo removed from its mother's womb could be tested for as many as 2,000 diseases and safely returned to her. . . . Eventually, with the development of new gene-altering techniques, doctors could remove an embryo from a woman with [a genetically transferred] disease, alter the defective chromosomes, and return the embryo to the mother. These prospects move Lawrence G. Sucusy [Fertility &

Genetics Inc., Chicago] to declare that embryo transfers will become commonplace in spite of the moral questions and legal barriers. He predicts: 'The power of motherhood will overcome the flak.'" [(Fern Schumer Chapman in *Fortune*, 17 Sep 84, p. 41-7) (Reproduced with permission from Press Digest, *Current Contents*®, No. 52, December 24, 1984, p. 13. Published by the Institute for Scientific Information®, Philadelphia, PA, USA.)]

CYCLOSPORINE AS DIABETES TREATMENT STIRS DEBATE

... "There is growing evidence that [diabetes] is an autoimmune disease, one in which the immune system somehow goes awry and attacks the body's own tissues, in this case the insulin-secreting cells located in the islets of Langerhans of the pancreas. . . . Calvin Stiller, John Dupré and their colleagues [U. Hosp., London, Ontario] have now treated more than 40 patients, all of whom had been diagnosed as having insulin-dependent diabetes . . . with the immunosuppressive drug cyclosporine. The treated patients experienced, Dupré says, 'an unexpectedly high reduction in insulin requirements'. . . . Despite the success of the cyclosporine study, questions have been raised

about giving immunosuppressive drugs to insulin-dependent diabetics at this time. Aldo Rossini [U. Massachusetts Medical Sch., Worcester] says, 'I feel that the potential ill effects of the immunosuppression outweigh the disease.' The potential ill effects depend the particular immunosuppressive regimen used but among the more common and serious are increased susceptibility to infections and to cancer." [(Jean L. Marx in *Science* 225(4668):1381-3, 21 Sep. 84) (Reproduced with permission from Press Digest, *Current Contents*®, No. 50, December 10, 1984, p. 19. Published by the Institute for Scientific Information®, Philadelphia, PA, USA.)]

OLD AGE MEMORY GOOD IN PARTS

... "To investigate age differences in everyday memory we constructed a 'practical memory questionnaire,' similar to one devised by Maryanne Martin [U. Oxford]. We asked subjects to rate their memory ability for the kind of things people need to remember in daily life on a 5-point scale from 1 (Very Poor) . . . to 5 (Very Good). The questionnaire included 26 items querying memory for prices, names of people, dates of birthdays, shopping lists, articles in newspapers, TV programmes, conversations, faces, childhood events, addresses, routes, answering letters, and so on. One hundred and fifty-seven people completed the questionnaires—a young group aged

20-39, a middle-aged group aged 40-59, and an elderly group aged over 60. . . . The age groups differed little in their memory for factual and personal information. . . . But for names and numbers the age differences are marked: the elderly group consistently rated their ability as poorer. The decrement with age is most evident for telephone numbers, postcodes, and names of acquaintances." [(Gillian Cohen & Dorothy Faulkner (Open U., UK) in *New Scientist* 104(1425): 49-51, 11 Oct 84) (Reproduced with permission from Press Digest, *Current Contents*®, No. 52, December 24, 1984, p. 15. Published by the Institute for Scientific Information®, Philadelphia, PA, USA.)]

INDUSTRY GROWTH VS. AIR POLLUTION CONTROL

... "In a major victory for the Reagan administration, the Supreme Court . . . upheld a controversial environmental policy allowing industries to expand in regions with the dirtiest air, even if it results in an increase in pollution. The Environmental Protection Agency [EPA] regulation allows a company to add a polluting operation—a boiler, for example—to a plant so long as the company reduces emissions in some other part of its facility. The plant's net pollution is not allowed to increase by more than what the EPA considers a minimal amount. Challenged by environmental organizations, the policy was struck down by

an appeals court panel . . . as a breach of the Clean Air Act's mandate for improved air quality in the country's industrialized sections. However, the Supreme Court said the policy was a proper accommodation between the competing congressional objectives of clean air and industrial growth." [(Fred Barbash in *Washington Post*, 26 June 84, p. A1, A5) (Reproduced with permission from Press Digest, *Current Contents*®, No. 42, October 15, 1984, p. 15. Published by the Institute for Scientific Information®, Philadelphia, PA, USA.)]