

cific antigen that depends on the lymphoid system or the development of suppressive cells. When persons not sensitized to BCG and incapable of discarding *M. leprae* from their tissues are injected with a mixture of BCG + *M. leprae*, both microorganisms are eliminated from the site of the injection after two weeks. This may be due to the fact that macrophages have a specific defect for initiating the cell-mediated immunity mechanism that can be overcome by the activation produced by another *Mycobacterium* for which there is no immunologic defect.

The mechanism initiated by the second *Mycobacterium* implies that the development of cell-mediated immunity includes two elements: one that depends on the macrophage and can be induced nonspecifically, and another that depends on the lymphocyte and is specific.

The postulation of a specific macrophagic defect as a mechanism for the development of leprosy is apparently the first example of this type of disorder, but a similar mechanism could be invoked in diseases induced by intracellular parasites, especially when these parasites have a complex cell wall.

Two observations have been decisive in the work of developing a leprosy vaccine at CEPIALET: 1) the local response to the combination of killed *M. leprae* + viable BCG which served as a model in efforts to induce a systemic cell-mediated type of immune response; 2) experience has demonstrated that separate applications of BCG or *M. leprae* are not effective in inducing cell-mediated immunity responses to *M. leprae* in healthy or in sick persons who have a persistently negative Mitsuda. Results obtained in experimental animals (mice and guinea pigs) cannot be extrapolated to man because these animal models do not present the specific immunologic defect that has been demonstrated in man.

The combination of *M. leprae* (killed with heat and purified by the Draper method) with viable BCG has been used in studies in Venezuela as a vaccine for contacts and as immunotherapy in patients who present clinical disease.

The Mitsuda-negative contacts experienced a complete immunologic change eight weeks after vaccination. Patients with indeterminate leprosy and negative Mitsuda (potentially lepromatous) needed more than one vaccination, and, to date, of the 45 patients, 43 presented favorable immunologic changes, the remaining two being under observation.

Repeated vaccinations (from 4 to 6 times) have induced favorable clinical and histopathological modifications in the serious forms of the disease [lepromatous (LL) and borderline lepromatous (BL)] where an appreciable number of cases presented immunologic changes as well as a significant reduction in bacterial population.

The secondary effects of the vaccination have been very limited, and the few observed cases with neuritis and reactions have been easily controlled with thalidomide and dexamethasone.

Clinical, anatomopathologic, bacteriologic, and immunologic results observed both in contacts and in the low resistance forms of the disease support the idea that vaccine therapy will take a prominent place in leprosy treatment. In areas where leprosy is endemic, the vaccine would be administered as a preventive measure to the group at high risk of contracting and developing the disease, such as domiciliary and extradomiciliary contacts.

(Source: *Epidemiological Bulletin* No. 3, 1983, Ministry of Health and Social Welfare, Office of Public Health, Venezuela.)

The Health Field Concept — A Canadian Perspective

A basic problem in analyzing the health field has been the absence of an agreed conceptual framework for subdividing it into its principal elements. Without such a framework, it has been difficult to communicate properly or to break up the field into manageable segments which are amenable to analysis and evaluation. It was felt keenly that there was a need to organize the thousands of pieces into an orderly pattern that was both intellectually acceptable and sufficiently simple to

permit a quick location, in the pattern, of almost any idea, problem or activity related to health: a sort of map of the health territory.

Such a health field concept envisages that the health field can be broken up into four broad elements: *human biology, environment, lifestyle, and health care organization*. These four elements were identified through an examination of the causes and underlying factors of sickness and death in Canada, and from an assessment

of the parts the elements play in affecting the level of health in Canada.

Human Biology

The *human biology* element includes all those aspects of health, both physical and mental, which are developed within the human body as a consequence of the basic biology of man and the organic makeup of the individual. This element includes the genetic inheritance of the individual, the processes of maturation and aging, and the many complex internal systems in the body, such as skeletal, nervous, muscular, cardiovascular, endocrine, digestive and so on. The human body being such a complicated organism, the health implications of human biology are numerous, varied, and serious, and the things that can go wrong with it are legion. This element contributes to all kinds of ill health and mortality, including many chronic diseases (such as arthritis, diabetes, atherosclerosis, cancer), and others (genetic disorders, congenital malformation, mental retardation). Health problems originating from human biology are causing untold miseries and costing billions of dollars in treatment services.

Environment

The *environment* category includes all those matters related to health which are external to the human body and over which the individual has little or no control. Individuals cannot, by themselves, ensure that foods, drugs, cosmetics, devices, water supply, etc. are safe and uncontaminated; that the health hazards of air, water, and noise pollution are controlled; that the spread of communicable diseases is prevented; that effective garbage and sewage disposal is carried out; and that the social environment, including the rapid changes in it, do not have harmful effects on health.

Lifestyle

The *lifestyle* category in the health field concept consists of the aggregation of decisions by individuals which affect their health and over which they more or less have control. Personal decisions and habits that are bad, from a health point of view, create self-imposed risks. When those risks result in illness or death, the victim's lifestyle can be said to have contributed to, or caused, his own illness or death.

Health Care Organization

The fourth category in the concept is *health care organization* which consists of the quantity, quality, arrangement, nature, and relationships of people and resources in the provision of health care. It includes

medical practice, nursing, hospitals, nursing homes, medical drugs, public and community health care services, ambulances, dental treatment, and other health services such as optometry, chiropractics, and podiatry. This fourth element is what is generally defined as the health care system.

Until now most of society's efforts to improve health, and the bulk of direct health expenditures, have been focused on the health care organization. Yet, when we identify the present main causes of sickness and death in Canada, we find that they are rooted in the other three elements of the concept: human biology, environment, and lifestyle. It is apparent, therefore, that vast sums are being spent treating diseases that could have been prevented in the first place. Greater attention to the first three conceptual elements is needed if we are to continue to reduce disability and early death.

Characteristics of the Health Field Concept

The *health field concept* has many characteristics which make it a powerful tool for analyzing health problems, determining the health needs of Canadians and choosing the means by which those needs can be met.

One of the evident consequences of the health field concept has been to raise human biology, environment, and lifestyle to a level of categorical importance equal to that of health care organization. This, in itself, is a radical step in view of the clear preeminence that health care organization has had in past concepts of the health field.

A second attribute of the concept is that it is comprehensive. Any health problem can be traced to one, or a combination of the four elements. This comprehensiveness is important because it ensures that all aspects of health will be given due consideration and that all who contribute to health, individually and collectively, patient, physician, scientist, and government, are aware of their roles and their influence on the level of health.

A third feature is that the concept permits a system of analysis by which any question can be examined under the four elements in order to assess their relative significance and interaction. For example, the underlying causes of death from traffic accidents can be found to be due mainly to risks taken by individuals, with lesser importance given to the design of cars and roads, and to the availability of emergency treatment; human biology has little or no significance in this area. In order of importance, therefore, lifestyle, environment, and health care organization contribute to traffic deaths in the proportions of something like 75 per cent, 20 per cent, and 5 per cent, respectively. This analysis permits program planners to focus their attention on the most important contributing factors. Similar assessments of the relative importance of contributing factors can be made for many other health problems.

A fourth feature of the concept is that it permits a further subdivision of factors. Again for traffic deaths in the lifestyle category, the risks taken by individuals can be classed under impaired driving, carelessness, failure to wear seat belts, and speeding. In many ways the concept thus provides a road map which shows the most direct links between health problems, and their underlying causes, and the relative importance of various contributing factors.

Finally, the health field concept provides a new perspective on health, a perspective which frees creative minds for the recognition and exploration of hitherto neglected fields. The importance to their own health of the behavior and habits of individual Canadians is an example of the kind of conclusion that is obtainable by using the health field concept as an analytical tool.

One of the main problems in improving the health of Canadians is that the essential power to do so is widely dispersed among individual citizens, governments, health professions, and institutions. This fragmentation of responsibility has sometimes led to imbalanced approaches, with each participant in the health field pursuing solutions only within his area of interest. Under the health field concept, the fragments are brought together into a unified whole which permits

everyone to see the importance of all factors, including those which are the responsibility of others.

This unified view of the health field may well turn out to be one of the concept's main contributions to progress in improving the level of health.

(Source: Reprinted from: Marc Lalonde. "A New Perspective on the Health of Canadians: a Working Document." Ottawa, Canada, Information Canada, 1975.)

Editorial Comment

The health field concept has been developed in Canada as a framework for analyzing health problems and as a method for adjusting health policies toward the achievement of health for all by the year 2000. The preceding article has been selected for publication because it represents one of the new and controversial approaches to the use of epidemiology in the solution of health problems and because the dissemination of these approaches constitutes one of the central objectives of the PAHO *Epidemiological Bulletin*.

WHO Collaborating Centers for Viral Diseases

The development of a network of collaborating centers for reference and research on viruses began in 1947 with the establishment of a World Influenza Center in London by the Interim Commission of WHO to carry out worldwide surveillance of influenza. A second Center was soon created for the Americas (Centers for Disease Control, CDC, Atlanta, Georgia, USA). At present, institutions from national influenza centers are linked with the two collaborating centers through WHO. The Centers in Atlanta have agreed to:

- obtain, fully characterize, and preserve representative strains from outbreaks in different parts of the world and distribute them to research and vaccine production laboratories;
- advise on the strains which should be included in influenza vaccines;
- arrange for the training of research workers in specialized techniques;
- collect and distribute, in coordination with PAHO and WHO, epidemiological information about the occurrence of influenza in different parts of the world; and
- provide reagent kits for the national influenza centers.

The problems raised by large poliomyelitis epidemics, together with the development of an inactivated poliovirus vaccine (IPV) in the early 1950s and the need to identify properly many strains of coxsackie and echoviruses isolated in that decade, led to a series of collaborative studies under the aegis of WHO and to the creation of a network of WHO reference centers in 1953. In 1958 this scheme was extended to all other viruses of public health importance. In 1973 the distinction between centers dealing with enteroviruses and respiratory viruses was abolished since many of the centers were in fact working in both fields. Recent advances in certain fields such as hepatitis and special pathogens have led to the addition of new centers to cover these subjects. At present there are in the Region 18 collaborating centers in four countries: 14 in the United States, two in Brazil, and one each in Canada and Jamaica (Table 1). For practical reasons, a distinction has been maintained for influenza, viral hepatitis, mycoplasma, arboviruses, special pathogens, rickettsiae, and those centers which have a specific task rather than a wide range of reference activities.