The Magnitude of the Public Health Problem Posed by the Mycoses Part I: The Lack of Medical Mycologists

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Regardless of race or nation we all live in a microbial world, with fungi being amongst the most common organisms in the environment that humans contact daily. They are abundantly distributed in the air, in the soil or in humans themselves, as in the case of *Candida albicans*. Fungi cause a wide variety of human diseases. Their influence may be indirect as with their toxic or antigenic properties, or direct, as with tissue invasion. Even if the invasion is only superficial, involving the skin and mucous membranes, and is not serious or fatal, it can still have a profound effect on the well being of humans. The fungi which invade subcutaneous tissues are important because they produce chronic diseases and quite often are resistant to chemotherapy. The most serious mycoses are those that invade the internal organs, such as the lungs, the reticuloendothelial system and the nervous system.

Numerous factors are significantly changing our views of medical mycology. Two seemingly unrelated ones, progress in the medical sciences and the mobility of the modern human population, are amongst the most important. The widespread therapeutic use of new drugs has resulted in the alteration of defense mechanisms. These drugs may compromise the physical barriers to infection, suppress the immune system or upset the balance of the normal flora, rendering a patient more susceptible not only to the classical pathogenic fungi, but also to fungi previously not considered to be pathogenic.

The occurrence of infections caused by fungi previously considered contaminants has increased to the point that the clinical laboratory cannot dismiss the isolation of such fungi on isolation plates. Repeated isolation may be of clinical significance. The establishment of the etiology of diseases by opportunistic fungi at least for a developing nation, requires standard cultures. The personnel in every sizable clinical laboratory should be well trained in the isolation and identification of pathogenic fungi and the common opportunistic fungi. The demonstration of fungal elements in diseased tissues or body fluids is a good clue in establishing the role of a particular fungus as a causative agent.

It is clear that the diagnosis of systemic mycoses, particularly those caused by opportunistic fungi, can rarely be made on clinical grounds alone. Without a correct diagnosis, proper treatment cannot be instituted and fatality almost always ensues. Laboratory diagnosis by histopathology, mycology and immunology are essential as basic goals for diagnosis on which treatment depends.

In Thailand, until recently the laboratory diagnosis of mycotic infection was limited to skin diseases. It was carried out mainly in medical schools or large hospitals under the supervision of dermatologists. Prior to 1960, the laboratory diagnosis of subcutaneous and systemic infections was mainly based on histopathology. From 1960 onward, laboratory isolation of fungi was practiced on a small scale in a few medical schools, i.e., Chulalongkorn and Siriraj Hospitals. The serological diagnosis of mycotic diseases began at one of the new medical schools, Ramathibodi Hospital, in 1982. This service is limited to aspergillosis, cryptococcosis, and histoplasmosis. The application of the results from this service for patient care is still under continuing evaluation.

In the pioneer period prior to 1960, the mycologists were medical doctors who had acquired training in medical mycology but did not possess any formal degree in mycology. There was, however, one medical doctor who had obtained a Ph.D. in mycology in this decade. The growing need in Thailand for laboratory medicine for other diseases applies equally to mycotic diseases and thus, scientists have become more interested in medical mycology in recent years. Currently there are about 17 scientists and medical doctors who engaged in medical mycology. Fourteen of them are experts, six of whom obtained Ph.D. deg-
agrees from abroad. Five of these mycologists practice in 4 of the 5 medical schools and one in the National Health Laboratory in Bangkok. The newest medical school, in the south of Thailand, does not have a mycologist. Peripheral health care in Thailand is the responsibility of the Ministry of Public Health which operates 15 Regional Hospitals and 74 Provincial Hospitals. The National Health Plan for six Regional Medical Science Centers to provide public health laboratory services remains in its infancy and only limited mycological laboratory service is currently available for provincial health care. In provincial hospitals, mycological service is limited to the diagnosis of the dermatophytes. Moreover, the service at the National Health Laboratory in Bangkok, where all the referral and consultation services are available, is still under utilized. This is most likely due to the lack of recognition of mycotic diseases as important public health problems.

The factors that contribute to the low interest in medical mycology include the uninteresting educational approach to the subject amplified by the alleged complexity of the nomenclature of the fungi. The scarcity of audio-visual aids for teaching plus the lengthy and unexciting work with unknown organisms are also among the contributing factors.

From the clinical standpoint, the low pathological process characteristic of mycotic infections, particularly the deep seated infections, make patients delay in seeking medical care. The lack of awareness of the common problem from fungal infections in this country contributes to the ignorance in the specific diagnosis and isolation of fungi from tissues. The increasing incidence of disease caused by opportunistic fungi and the emergence of fungi previously unknown as causes of human infection are changing the world of medical mycology. It is of utmost importance to emphasize that only isolation of the causative agents makes possible a definitive diagnosis of a mycosis and the accumulation of information on their susceptibility to the limited antifungal drugs available. This is, without question, the basic and crucial approach in drawing attention to the problem of mycotic infections and creating awareness of this vital information for the control of these diseases.

Realizing the urgent need of training for laboratory personal, a workshop on how to use laboratory methods in the diagnosis of mycotic diseases was carried out at the Department of Pathology, Faculty of Medicine, Ramathibodi Hospital, November 11-22, 1985 under the sponsorship of the Mahidol University, the World Health Organization, the Australian Development Assistance Bureau and the British Council. The practical laboratory sessions and main lectures were given by a medical mycologic team from the Division of mycotic Diseases, Centers for Disease Control, U.S. Department of Health & Human Services, Atlanta, Georgia. The team consisted of Drs Libero Ajello, Arvind A. Padhey and Leo Kaufman. The 25 participants enrolled in the course comprised 22 Thai students and three foreign participants from Bangladesh, Indonesia and Nepal respectively.

The workshop was arranged in such a way that the participants learned to recognize the various diseases caused by the well known pathogenic fungi and by opportunistic fungi as well in patients whose defense mechanisms were compromised. Following each lecture, the students observed how these agents induced histopathological changes and how they appeared morphologically in culture. The various techniques for detecting the antigens or antibodies of the common systemic mycotic agents were covered in lectures and demonstrations. Susceptibility tests of antifungal agents were discussed. These have long been debated and discouraged for wide application due to the various factors that govern accuracy and clinical applicability. Educational materials provided for the participants included hand out sheets for the lectures and the Colour Atlas of Pathogenic Fungi by D. Frey, kindly provided by the British Council. Demonstrations of the microscopic features of the fungi and the histopathology of the mycoses were carried out by a video system.

At the end of the course, the majority of the participants were concerned that they would encounter difficulties when they returned to their respective laboratories due to lack of governmental support for teaching materials, and reference laboratories for confirmation of the organisms they had identified and sources of reference cultures. Despite these reservations, they expressed confidence in their increased ability to carry out work in medical mycology. They requested that similar workshops be arranged every two years to provide an opportunity to update their knowledge on recent taxonomic changes, new diagnostic procedures and new antifungal agents. A workshop on the Dermatophytes was first in their priority requests.

Should the importance of this aspect of laboratory medicine be recognized and continued training be carried out, the development of top quality diagnostic services for medical mycology and of research in this field of growing need and importance would not be an unrealistic goal.

REFERENCES