THE EARLY DETECTION OF DISEASE AND MODELS

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The early detection of disease presents opportunities for using existing technologies to significantly improve patient benefit. The possibility of diagnosing a chronic disease early, while it is asymptomatic, may result in diagnosing the disease in an earlier stage leading to better prognosis. Many cancers, diabetes, tuberculosis, cardiovascular disease, HIV related diseases, etc. may have better prognosis when combined with an effective treatment. However gathering scientific evidence to demonstrate benefit has proved to be difficult. Clinical trials have been difficult to carry out, because of the need to have large numbers of subjects, long follow-up periods and the necessity of dealing with problems of non-compliance. Implementing public health early detection programs have proved to be costly and unfortunately not based on analytic considerations. Many of these difficulties are a result of not understanding the early disease detection process and the natural histories of the diseases being diagnosed. One way to approach these problems is to model the early detection process. Models may help in understanding the phenomena of early disease diagnosis and perhaps lead to conclusions for which issues where it is not feasible to collect data or little reliable data exist This talk will discuss stochastic models for the early detection of disease. Breast cancer will be used to illustrate the ideas. The talk will discuss: randomized trials, stage shift and benefit, scheduling of examinations, issues of screening younger and older women and the probability of over diagnosis of disease.