INTRODUCTION

This OTA Background paper presents an analysis of the cost-effectiveness of colorectal cancer (CRC) screening in average-risk adults beginning at age 50. It examines the relative cost-effectiveness of competing CRC screening technologies and schedules. This paper draws on an earlier study of CRC screening in the elderly (OTA, 1990; Wagner et al., 1991). That study was limited to screening strategies that start at age 65. The earlier OTA study had other limitations as well. First, it examined screening strategies involving only the fecal occult blood test (FOBT) and flexible sigmoidoscopy (FSIG). It did not examine the cost-effectiveness of screening with full colonoscopy (CSCPY) or with double contrast barium enema (DCBE), both of which have been advocated by some as reasonable alternative CRC screening technologies. The current paper examines all four potential screening technologies.

Second, the earlier OTA study, which was undertaken at the request of Congress to support a Yes/No Medicare coverage decision, utilized conservative assumptions. That is, the values of uncertain parameters were chosen to bias the results against finding screening to be cost-effective. Despite this conservative bias, the OTA study showed that colorectal cancer screening in the elderly is at least as cost-effective as biannual screening mammography in Medicare beneficiaries (OTA, 1991). New evidence now exists to support claims for effectiveness of CRC screening (Selby, 1992; Mandel et al. 1993,) and to provide greater confidence about the "correct" values of certain important parameters of OTA's analysis. In this paper, we make assumptions about key parameters that represent the best available evidence about their true values and examine the effects of uncertainty through sensitivity analyses.

OTA'S CRC SCREENING MODEL

OTA's expanded CRC screening model is a natural-history-based model that traces the health status and health care costs of a population from age 50, when a specific screening

strategy begins, through age 85, when screening stops. Improvements in mortality from early detection and prevention of cancer are translated into added years of life lived in the population compared with a no-screening scenario. The model estimates the incremental costs of screening, diagnostic followup of positive screening tests, and periodic surveillance of patients found through screening to have a polyp, as well as the potential savings from treating cancer in earlier stages or from preventing CRC altogether. The OTA model also accounts for the extra costs and lost years of life resulting from detection and treatment of some cancers that would have remained silent throughout a person's life in the absence of the screening program.

The cost-effectiveness of a particular screening strategy (one or more screening technologies applied at scheduled intervals throughout an individual's lifetime) is defined as the net present value of the incremental health care costs associated with the strategy divided by the net present value of the added years of life gained as a result of the strategy.[1]

All models of disease processes or health interventions are to some extent abstractions from reality and therefore present a rough map of what can be expected from the implementation of a program. The OTA model has three important restrictions:

. The analysis does not address possible radiation hazards associated with the DCBE procedure.

. CRC is assumed to have two stages -- early and late. These stages correspond to Dukes A&B and Dukes C&D respectively. We opted for a simplified model because of data limitations. A more detailed model would improve the predicted cost-effectiveness of screening strategies, because survival improvements between more refined disease categories would be included. The importance of this limitation in affecting the qualitative results is probably minor, however, because most colorectal cancers destined to progress appear to move quickly from earlier to later stages.

[1]Costs and effects occurring in future years (after age 50) are discounted to their present value in the year of program initiation (when the population is age 50) at an annual rate of 5 percent. The discount rate takes account of the time preferences associated with costs and benefits. (Receiving medical benefits earlier is preferred to receiving them later, while bearing costs later is preferred to bearing them today.)