Potential and Limitations in Early Diagnosis of Ovarian Cancer

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1 Ovarian Cancer Screening May Reduce Mortality in the Future but Many Challenges Remain

Five-year survival rates for invasive epithelial ovarian cancer have changed little in recent decades, remaining constant at about 30% when cancer has spread outside the ovaries, and about 90% when disease is confined to the ovaries. Ten-year survival for ovarian carcinoma varies greatly according to the stage at diagnosis (1) and survival is best when cancer is confined to the ovary at the time of diagnosis (Fig. 1); even patients with high-grade serous tumors do well if they are diagnosed while the tumors are confined to the ovary (Fig. 2).

The goal of screening is to reduce mortality by detecting cancer early. The potential reduction in mortality is great, because currently fewer than 25% of cases are confined to the ovary at diagnosis. Interest in diagnostic markers that can be measured in blood products is particularly high, as several promising marker panels have been reported in the last decade (2, 3). However, using these markers to detect ovarian cancer early enough to reduce mortality remains challenging because screening needs to identify cancer before symptoms occur, early enough that the disease is still curable. It is well established that the best screening tests detect cancer before it becomes invasive, by identifying precursor lesions and enabling prevention of invasive cancer through early intervention.

In considering the challenges inherent in ovarian cancer screening, it is helpful to distinguish among diagnostic, early detection, and risk markers. Figure 3 depicts the behavior of three hypothetical markers as cancer progresses through a precursor lesion stage, an early invasive stage, metastasis, and death. Markers A, B, and C are equally elevated at the time of diagnosis, but they are not equally good early detection markers because their behavior prior to diagnosis varies. Marker A performs well as a diagnostic marker because it is highly elevated in women with cancer who present clinically with symptoms, but it does not provide signal until the disease is well advanced. Marker B is a better early detection marker because it elevates while the disease is still potentially curable, signaling preinvasive as well as invasive disease. Marker C elevates even earlier; hence, it might be useful as a risk marker to predict disease in the future especially if precursor conditions are unknown or
Fig. 1 Ten-year survival for ovarian cancer varies greatly according to FIGO stage at diagnosis, only when the cancer is confined to the ovary is long-term survival above 80%.

Fig. 2 Ten-year survival is over 60% when the cancer is confined to the ovary at the time of diagnosis even for serous ovarian cancers that are poorly differentiated.