Colorectal cancer epidemiology

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Colorectal cancer (CRC) is the third most common cancer worldwide after lung and breast cancers with almost 60% of all colorectal cancers occurring in the more developed regions. Nearly 1.2 million new colorectal cancer cases are registered in 2008 (9.7% of the total), CRC is responsible for some 688,845 deaths (8.8 %) worldwide.

There is significant geographical variation in age-standardized and cumulative, 0-74 year incidence and mortality rates. Incidence rates vary tenfold in both sexes worldwide. The highest rates are estimated in Australia/New Zealand (39/100000), Western Europe (33.1/100000) North America (30.1/100000), Eastern Asia (18/100000) and more recently in Japan. The highest incidence rate of CRC is estimated in the Czech Republic (43/100000). The lowest incidence rates are estimated in Africa (3.6/100000 except South Africa) and South-Central Asia (4.5/100000). The highest mortality rates in both sexes are estimated in Central Europe (20.3/100000 for male patients, 12.1/100000 for female patients), and the lowest in the Middle Africa (3.5 and 2.7 respectively).

Current likelihood of risk of developing CRC by the age of 75 is one in 42 male and one in 61 female patients worldwide.

Incidence and mortality rates are higher in men than in women (sex ratio 1.4:1). The incidence of colorectal cancer increases with age beginning at 40 but remains relatively low until the age of 50 and then rapidly accelerates. The majority of deaths occur in older people, around 65 and above, and almost two-thirds of deaths appear in the group with age over 80.

In Europe, the incidence of colorectal cancer is increasing, particularly in Southern and Eastern Europe, where rates were originally lower than in Western Europe. In the USA, incidence rose until the mid-1980s but in the last two decades the rates have fallen for both men and women. Countries that have a rapid ‘westernization’ of diet, such as Japan, have seen a rapid increase in incidence of colorectal cancer.

Consumption of meat and dairy products in Japan increased tenfold between the 1950s and 1990s. In contrast to incidence trends, CRC mortality has been falling continuously since the early 1990s.

Mortality rates have been declining in most European countries from the 1990s onwards and further falls are expected. In the countries of the European Union (EU-27), colorectal cancer was responsible for an estimated 148,000 deaths in 2008.

The five-year relative survival rates for both male and female colon and rectal cancer have doubled between the early 1970s and mid 2000s. In the more developed regions, five-year relative survival for male colon cancer rose from 22% in the early 1970s to 50% in the mid 2000s. For female patients, it rose from 23% to 51%. Five-year survival rates for male rectal cancer rose from 25% in the early 1970s to 51% in mid 2000s and from 27% to 55% for female rectal cancer. These improvements are the result of earlier diagnosis and better treatment but there is still much space for further progress. Ten-year survival rates are only a little lower than those at five-years indicating that most patients who survive five years are cured from this disease.

Colorectal cancer is the second most common cancer in the Province of Vojvodina in all new cancer cases and all cancer deaths. About 1235 new cases (12.76 % of all cancer cases) and 778 deaths (12.56% of all deaths) have been registered in 2007 in Vojvodina. Like worldwide, incidence and mortality rates are higher in men than in women (sex ratio 1.5:1). Age-specific incidence and mortality rates are increasing rapidly from the age of 50, reaching the highest level in the age group of 75-79.

Time trends have been increasing significantly over the period from 1973 to 2007 in both sexes. In men, incidence increased from 19.81/100000 to 73.6/100000 and mortality from 13.47/100000 to 47/100000. In women, incidence increased from 20.02/100000 to 48.7/100000 and mortality from 15.46/100000 to 31.2/100000.

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Screening for colorectal cancer

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Colorectal cancer (CRC) is one of the most commonly diagnosed cancers and a leading cause of cancer deaths in the developed regions of the world. CRC screening (secondary prevention of population at average risk of CRC) and case finding (secondary prevention at individuals who have one or more risk factors such as family history of colorectal adenoma/carcinoma, family history of polyposis syndromes, past CRC or adenomatous polyp and inflammatory bowel disease) can prevent the development of colorectal cancer and reduce the risk for death.

Four randomized trials have shown that fecal occult blood testing (FOBT) is effective in lowering colorectal cancer mortality rate (15-33%) and its incidence in individuals who undergo screening. FOBTs available for screening are based on two principal technologies: chemical tests and immunochromatographic tests. The chemical tests use guaiac to detect the peroxidase activity of heme; so, they react to any peroxidase in feces (e.g. plant foods and heme in red meat) and are affected by certain chemicals (e.g. vitamin C). These tests may detect bleeding from any site of gastrointestinal tract. The fecal immunochromatographic tests use antibodies specific for human globin; so they are not affected by diet and are highly selective for occult bleeding of colorectal origin. Although the sensitivity of a single FOBT is low, in the range of 30-50%, a program of repeated annual testing can detect as many as 52% of cancers. After 18 years of follow-up in the Minnesota trial, FOBT screening performed every year was found to reduce colorectal cancer mortality by 33% and every other year by 21%, a rate consistent with the results of the biennial screening in the European trials. Furthermore, in a recent FOBT screening in 479 250 residents of the pilot areas in England and Scotland, the overall positive tests were 1.9% and the rate of detecting cancer was 1.62 per 1000 screened people. The positive predictive value was 10.9% for cancer and 35% for adenoma. Of 552 colorectal cancers detected by screening, 49% of all screen-detected cancers were stage I, and only 1% metastasized at the time of diagnosis. The cost per life year saved by FOBT screening is similar to less or that of breast cancer screening. Despite the cost of FOBT screening, it has been accepted as feasible for national health care. The main disadvantages of FOBT screening being its low compliance rate for the first and repeated screening (20-70%) as well as its moderate sensitivity for detecting colorectal cancer and low sensitivity for polyps. The FOBG screening performed every year combined with flexible sigmoidoscopy every 3 years is more effective than either of the methods alone. However, despite FOBT may be less sensitive for distal colon lesions, both methods together do not greatly improve the detection rates for proximal lesions. The disadvantage of this type of screening are inconvenience, high cost and complications with an uncertain gain in effectiveness.

Although there are no randomized studies evaluating whether screening colonoscopy alone reduces the incidence and mortality from colorectal cancer, several guidelines have included colonoscopy as a screening option. Colonoscopy has a proven high sensitivity for detecting polyps and carcinomas of the whole colon. One meta-analysis found perforation rates between 0.06% and 0.2% and mortality between 0% and 0.36% for diagnostic colonoscopy. The choice of a 5 to 10-year interval between screening colonoscopies for people at average risk is based on the estimated rates of sensitivity of colonoscopy and the rate at which advanced adenomas or cancers develop. The disadvantages include vigorous bowel preparation and need for trained examiners. Adequate withdrawal times of colonoscopy from cecum to area of minimum 6 minutes are required to ensure sufficient neoplastic lesion detection.

Computed tomography colonography and magnetic resonance imaging colonography or virtual colonoscopy have also been evaluated as possible colorectal cancer screening methods. However, due to many disadvantages and higher cost at that time, the use of virtual colonoscopy outside of clinical trials cannot be recommended.

Genetic stool testing (e.g. fecal DNA testing) every 5 years was considered to be effective compared to no screening, but inferior to other screening strategies. In 2003, the European Commission issued the recommendations for screening for breast, cervical and colorectal cancer valid in all member countries. The Republic of Slovenia adopted this program and national guidelines for colorectal cancer screening were published. After successful pilot phase of screening (using immunochemical FOBT in 10,000 people older than 50 years) in June 2008, a nation wide screening was launched on the 17.4.2009 in population aged 50–79 years. By the end of 2009, 170,217 invitation letters were sent out with compliance of 36%. 43,510 person were tested, 2441 FOBTs were positive. We preformed 1622 colonoscopies and found carcinoma in 118 patients and adenomatous polyps in 727 patients. Therapeutical polypectomies were done in the same procedure. In 118 colorectal cancer cases, 50% were stage I, 21% were stage II. Organized colorectal cancer screening has greater potential to reduce cancer incidence and mortality due to higher achievable levels of population coverage, follow-up and quality compared with opportunistic screening. However, due to low compliance for colorectal screening in many EU countries, only improved awareness and knowledge of general population about the colorectal cancer risk factors and the benefits of screening can improve compliance.