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Prevention and early detection of cancer – a public health view

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1. INTRODUCTION

Cancer is the second cause of death worldwide, immediately after cardiovascular diseases. As reported by the GLOBOCAN (Global Cancer Statistics), there were 12,7 million cancer cases and 7,6 million cancer deaths in 2008 and these numbers continue to rise *(1)*. The main reasons for these unfavorable cancer statistics have been recognised and include: 1) ageing of the world population, as cancer mostly affects adults of the advanced age, and 2) an increasing adoption of cancer-causing behaviors, due to the processes of modernisation and globalisation *(1, 2)*. Related to the latter, domination of chronic noncommunicable diseases, including cardiovascular diseases, cancer, chronic respiratory diseases, diabetes and dementia, in health statistics of modern societies, have been attributed to modern lifestyles, such as increased consumption of processed foods riched in saturated fats and sugars, cigarette smoking, sedentary lifestyle and weight gain *(3)*.

In developing countries, on the other hand, perinatal mortality, infectious diseases and malnutrition, are still at the leading positions of morbidity and mortality causes, due to poor life conditions, sanitation and medical care *(4)*. The interesting thing is that the correlation between the economic development and the shift in a major disease burden, from acute infections to chronic noncommunicable diseases, is not simple biased, but rather complex-shaped. Namely, as economic development occurs, tobacco and alcohol use and obesity increase, followed by the burden of chronic diseases in decades later. These negative trends in health behaviors and subsequently in morbidity and mortality from chronic diseases start to revert only when very high level of social and economic development is reached *(5)*. During the period of transition, chronic diseases do not simple replace acute infections; rather, there is a double disease burden, having a huge negative impact on the economies of transitional countries *(5, 6)*. It is not surprisingly then that in the coming decades, the burden from chronic diseases, including cancer, is projected to rise, particularly fast in the developing and transitional countries *(6)*.

In regard to cancer, there are some other important facts. Although overall cancer incidence rates in developing countries are comparable to those registred in the developed countries, the cancer mortality generally exceeds *(1)*. The reason is unfavourable cancer survival rates in developing countries, due to a late stage at diagnosis and limited access to timely and standard treatment *(1, 7)*.

Based on these considerations, the greatest opportunity for taking the control over the growing cancer burden worldwide is likely to lie in

TABLE 1

Primary prevention measures (taken before any sign of a disease occures) known to deal with the reduction in total cancer incidence.

- Implementation of principles of a healthy life-style, mainly by means of a healthy diet – low in saturated fats and carbohydrates and high in fruit and vegetable, regular physical activity, no smoking, and only moderate alcohol consumtion
- Changes in sexual behaviour (including the number of partners, partners selection, the type of sex involved, knowledge on infection status of partners, use of barrier contraceptives)
- Immunization against Hepatitis B Virus (HBV) and Human Papilloma Virus (HPV) infection
- Taking the control over occupational hazards
- Avoidance of cancer-causing substances in the global environment and in consumer products
- Avoidance of attentive exposure to sunlight

prevention and early detection of cancer, especially when organised at a global scale. It is estimated that up to one third of the cancer burden could be prevented if implemented strategies aimed at reducing the exposure to cancer risks. Another third of this burden could be cured if detected and treated cancer early *(8)*. The proclaimed aims and initiatives for a global action were set up under some basic documents, such as World Cancer Declaration 2006 *(9)*.

2. CANCER PREVENTION

Important to know, when planning preventive strategies to reduce the burden of chronic noncommunicable diseases, including cancer, is that there are multiple risk factors sharing among these diseases *(2, 10)*. Also important is to understand that there is a complex chain of events linking risk factors. In the proximity, there are more direct causes of the diseases. Factors located further in the back, act through intermediary mechanisms to produce these proximal factors. Causally most distal factors have their background in social conditions and are hardly recognisable. However, if modified, they are likely to have strong amplifying influence, by causing multiple proximal effects *(2)*. Based on these facts, it is not difficult to realise that, besides individually oriented preventive measures, there are also population-based strategies *(2, 3)*. For example, in order to successfully disseminate healthy diet and regular physical activity patterns among individuals of high risk groups, policy makers should also implement strategies at the community level, to ensure an equal access for all population groups to healthy food choices and opportunities for physical activity *(3)*.

Also important to know, in this issue, is that more than one third of the world's deaths can be attributed to only a limited number of risk factors *(2, 10)*. The five top-ranked risks include: high blood pressure, cigarette smoking, high blood glucose, low physical activity and overweight/obesity. These risk factors affect countries of all income groups, high, middle and low. When taking into account the fact that two leading causes of death worldwide include cardiovascular diseases and cancers, this is likely to suggest that avoiding tobacco and obesity, and using regular physical activity, can provide the greatest potential to minimise cancer risk (Table 1) *(2, 3)*.

2.1. Infections as a preventable cause of cancer

Based on estimation, approximately 15% of all cancers can be attributed to viral infections. At least six viruses have been recognised as to have a strong oncogenic potential, including Epstein-Barr virus (EBV), Hepatitis B virus (HBV), Hepatitis C virus (HCV), several Human Papillomavirus (HPV) types, Human T-cell Lymphotropic Virus type I (HTLV-I) and Human Immunodeficiency Virus type I (HIV-I) *(11)*. The fact that infected cells may maintain the state of latency for years before turning on the oncogenic pathway, may complicate targeting preventive and therapeutic strategies *(12, 13)*. The beneficial fact is that knowledge about the ways these infections are being spreaded on is available and is likely to provide directions for their prevention. For example, some of these infections are sexually transmitted, so practicing safe sex and use of contraception might be an appropriate way of infection control. Others are associated with using non-sterilised injection equipment, due to opiates addiction, thus providing proposals for planning prevention *(2, 11)*.

Another opportunity lies in the development of antiviral vaccines (Table 1) *(14)*. Commercially available HBV and HPV vaccines are already in use, and the major focus is now on their delivery, especially to low-income countries *(15, 16)*. Such strategy is based on estimates that HBV infection may account for about 60% of the total liver cancer in developing countries, while only for about 23% in developed countries. For cervical cancer (HPV infection was proved as a cause), figures show that more than 85% of all cases and deaths occur in developing countries *(2, 17)*.

2.2. Industrial carcinogenes and environmental pollution as a cause of cancer

The discovery of smoking tobacco as a factor strongly associated with lung cancer (more than 85% of lung

TABLE 2

Leading cancer incidence and mortality rates, females, for more and less developed areas, world (GLOBOCAN 2008).

Estimated Age-standardized Incidence and Mortality Rates (per 100,000) by Sex, Cancer Site, and Level of Economic Development, 2008				
	Females			
	Developed countries		Developing countries	
	Incidence	Mortality	Incidence	Mortality
Breast	66,40	15,30	27,30	10,80
Cervix uteri	9,00	3,20	17,80	9,80
Colon & rectum	24,20	9,70	9,40	5,40
Corpus uteri	12,90	2,40	5,90	1,70
Liver	2,70	2,50	7,60	7,20
Lung & bronchus	18,60	13,60	11,10	9,70
Melanoma of skin	8,60	1,10	0,60	0,30
Ovary	9,40	5,10	5,00	3,10
Pancreas	5,40	5,10	2,10	2,00
Stomach	7,30	4,70	10,00	8,10
Thyroid	9,10	0,40	3,40	0,70
Ali sites*	225,50	87,30	138,00	85,40

TABLE 3

Leading cancer incidence and mortality rates, males, for more and less developed areas, world (GLOBOCAN 2008).

Estimated Age-standardized Incidence and Mortality Rates (per 100,000) by Sex, Cancer Site, and Level of Economic Development, 2008				
	Males			
	Developed countries		Developing countries	
	Incidence	Mortalitv	Incidence	Mortalitv
Bladder	16,60	4,60	5,40	2,60
Colon & rectum	37,60	15,10	12,10	6,90
Esophagus	6,50	5,30	11,80	10,10
Liver	8,10	7,20	18,90	17,40
Lung & bronchus	47,40	39,40	27,80	24,60
Pancreas	8,20	7,90	2,70	2,50
Prostate	62,00	10,60	12,00	5,60
Stomach	16,70	10,40	21,10	16,00
Ali sites*	300,10	143,90	160,30	119,30

cancers occur among smokers) has initiated a search for other external factors that could probable cause cancer (termed "*carcinogenes*") *(4, 18)*. Accordingly, at least 150 chemicals and other agents, including ionizing radiation, occupational (workplace) and environmental airborne particles, some drugs, as well as foods and other consumer products, have been listed so far by IARC (International Agency for Research on Cancer) as potential carcinogens (Table 1) *(2, 18)*. For example, it is estimated that occupational exposure to microscopic airborne particles may account for 8% of lung cancer *(2)*. The growing number of evidence also shows that long-term exposure to traffic-related air pollution is the risk factor which can contribute to overall respiratory and cardiovascular mortality, including also lung cancer *(19)*. The encouraging fact is, however, that the majority of occupational cancers can be prevented, either by implementing safety measures into technology processes, or by substituting safer materials. In the area of consumer products, higher level of awareness could be the necessary step before starting transformation towards more adequate legislation, adversiting and technology innovations *(2, 18)*.

3. EARLY CANCER DETECTION

Results of randomised trials showed that the curability of cancer is relatively high if it is detected in the early, localised stage *(20, 21)*. Fundamental thing in early cancer detection is availability of effective, low-cost, simple and safe screening tests. Fortunately, these tests, proved so far as being feasible for wide implementation, correspond with some of the most frequent cancer sites (Table 2, 3) *(2)*.

Currently available screening tests include: high-quality mammography (for breast cancer), Pap cytology test

(for cervical cancer) and testing for occult faecal bleeding (for colorectal cancer) *(22)*. Because strong evidence are lacking, the screening of healthy men on prostate cancer by using prostate-specific antigen (PSA) testing has not yet been established routinely on a population base. However, the growing amount of evidence argues toward cost effectiveness of the systematic use of this test *(22, 23, 24)*.

Another fundamental thing, in this issue, is a need to checking an apparently healthy population by using screening tests, that is, before clinical signs of cancer are detectable, in order to find individuals with the early cancer or pre-cancer stages (25). In terms of that, the screening on cancer can be considered as a measure of a secondary prevention. There are two main approaches for targeting population: 1) targeting high-risk people (a lifetime risk of getting a certain type of cancer is at least 20 to 25%), who are most likely to benefit from the intervention, and 2) targeting risk in the entire population, regardless of each individualžs risk and potential benefit *(2)*.

Based on the growing knowledge and rapid technology progress, new screening methods tend to replace some basic ones, such as the case with the convential FOBT (Faecal Occult Blood Test) and its modifications, including the Faecal Immunochemical Test (FIT) and Stool DNA Test *(26)*. Efforts have also been made in looking for appropriate methods for the early detection of some other frequent and/or hazardous cancer sites, such as lung cancer, or pancreatic cancer *(27, 28)*.

3.1. Screening protocols for particular cancer sites

3.1.1. Breast cancer

Breast cancer is the leading cause of cancer-related deaths in women worldwide. However, in Western countries, the mortality trend has been shown to decreasing in recent years which can be the result of the screening programs implementation and the improvements in treatment *(17)*. Namely, it is estimated that this cancer can be cured in over 90% of cases, if diagnosed in an early stage and adequately treated *(22)*.

Several procedures are used to diagnose breast cancer, including clinical (breast self-examination and bimanual palpation peformed by health care professionals), radiological (bilateral mammography and ultrasound) and pathological examination (based on the core needle biopsy). Advanced imaging techniques, such as MRI (magnetic resonance imaging) and digital mammography, have recently been added, because of high diagnostic sensitivity of these methods *(29)*. However, mammography is the only method to date proved as to can reduce mortality from breast cancer, and any other method can only be used as a supplement to mammography *(29)*. For reading mammograms, BI-RADS classification (stages 0-5) is used. Cases suspected on cancer (BI-RADS 4 or 5) are refered for follow up *(30)*.

Based on the fact that breast cancer is strongly age--dependent, screening mammography is generally recommended for women 50-69 years of age, with a 1-year, or 2-year screening interval *(22, 21, 26, 29)*. However, the decision to screen becomes more and more based on weighting benefits against costs, especially concerning consequences such as inconvenience for patients, radiation risk and overdiagnosis *(29, 31)*.

3.1.2. Cervical cancer

Cervical cancer is the third most commonly diagnosed and the fourth leading cause of cancer death in females worldwide, with more than 85% of all cases and deaths occuring in developing countries. This disparity is associated with low level of knowledge about unsafe sex and with inaccessibility to screening and treatment programs, for women in developing countries. In developed countries, the main problem is still insufficient coverage of women in the generative age with screening *(2, 17, 32)*.

Although cervical cytology, based on Pap smears, remains to be the cornerstone of cervical cancer screening, this method has rapidly been developing, due to improved understanding of the natural history of the disease and technology innovations *(26, 33)*. Related to this, it is now well known that a persistent infection with sexually transmittable human papillomaviruses is responsible for virtually all cases of cervical cancer. This evidence has initiated the development of HPV DNA testing, to support more accurate risk stratification, beyond the capacity of conventional Papanicolaou smear testing *(26, 33)*. In addition, primary prevention by prophylactic vaccination against the HPV types that are causally linked with most cervical cancers in Europe, HPV-16 and HPV-18, is now commercially available *(14)*. The vaccine is expected to decrease the number of newly diagnosed cases by up to 70%. However, as prophylactic vaccination is performed in young girls, it will take a time until vaccination provides the visible health gains.

3.1.3. Colorectal cancer

Cancers of the colon and rectum hold the third position in frequency worldwide and are also the most common newly diagnosed cancer in EU *(17)*. In general, incidence is increasing along with industrialisation and urbanisation. Five-year survival rates are worse in the Eastern European countries then in the developed ones (34% compared to 54%) *(17, 34)*. In past decades, as the result of the early detection programs implementation, five-year survival rates in many EU countries show more favourable trends in all regions of Europe, compared to as it was before *(34)*.

In most recommendations, the FOBT is used as a standard screening method and a colonoscopy for follow-up of test-positive cases. The rationale is based on the fact that a pre-cancer lesion (adenoma), or a colorectal tumour at an early stage, may cause minor bleeding, invisible to the naked eye (35). Experiences gained so far showed that 3-5% subjects with positive results of the FOBT can be expected, and 10-15% of them (referred to colonoscopy) can be expected as diagnosed with cancer *(35, 36, 37)*.

TABLE 4

Croatian National Program (started in 2006). Recommendations for screening.

CANCER SITE	RECOMMENDATIONS
Breast	• mammography for women aged 50-69, every two years • special protocol for women with family history of first-degree relatives with breast cancer, with determined non-tumour or tumour breast disease and other risks (earlier controls start, more frequent examinations)
Cervix	• Pap test for women aged 25-64, every three years
Colon Rectum	• Fecal Occult Bleeding Test (FOBT) or Fecal Immunochemical Test (FIT) for persons >50, every three years • Colonoscopy for persons with positive FOBT results to determine bleeding cause • Individuals at increased or high risk of colorectal cancer, including persons with history of colorectal adenoma or cancer, ulcerative colitis, Chronvs disease, family history of polyposis syndromes (FAP, Gardner, Turcot, Peutz-Jaghers syndrome, familial juvenile polyposis, non-polyposis colon cancer, first-degree relative with colorectal cancer should be included in early cancer detection program at younger age.
Prostate	• digitorectal examination and PSA test once a year for; – males at increased risk aged 40 years and older – males with prostatism symptoms aged 50 years and older; • males aged 50 years and older who request an examination
Health Awereness	• persons visiting family physicians should be distributed leaflets and brochures on prevention and early detection of cancer in the most frequent sites.

Since about 70% of patients are >65 y of age and the disease is rare under the age of 45, target groups for screening usually include population aged 50-74y, with the minimum recommendations for the age range 60-69y *(26, 34)*. Experiences until now showed that if screening strategies are implemented as organised programs based on the screening interval of 1-2 years, it is possible to reduce mortality rate for 18% – 33% *(38)*.

3.1.4. Prostate cancer

Prostate cancer is one of the three major cancer sites in men; commonly occures after 50 years of age, with incidence progressively increasing in later decades of life. Only males with positive family history of a disease are at a higher risk even in age before 50. Although there are evidence indicating that population-based screening may reduce prostate cancer mortality, patients should have an opportunity to make an informed decision on whether to be screened or not. This is because of some uncertainties still being unresolved. Namely, screening increases prostate cancer incidence, including also subclinical forms that will not develop during life, thus leading to unnecessary manipulation and overtreating. Long prospective studies are expected to justify decisions *(24, 39)*.

Screening protocol include digitorectal examination (DRE) and PSA (prostate-specific-antigen) measuring in serum, in patients aged =50 years, in those who refer symptoms of prostatism and urinary tract disorders, or in those who require screening. The decision on whether or not to have a prostate biopsy (performed by transrectal ultrasound, TRUS) should take into account PSA parameters, such as free (f) PSA, fPSA/PSA ratio, DRE findings, prostate size, patient age, comorbidities, patient values and history of previous biopsy *(24, 39)*.

4. EARLY CANCER DETECTION PROGRAMS

Programs, differently from screening protocols, are fairly planned in an advance and performed according to the up to date standards of a medical care, with external finance assured (Table 4, 5). That means that some degree of public responsibility, organisation and supervision is required for screening activities to be qualified as a program. Important element is also a cancer surveillance system, allowing data collection on cancer statistics and risk factors burden, as well as a feedback of measures done. In addition, a public screening policy must be documented in a law, or regulated in some other official way *(32)*. The early cancer detection programs even tend to become a part of more comprehensive national strategies for cancer control, including also primary prevention and health promotion, as well as rehabilitation of cured patients, and palliative care for patients with infaust prognosis *(8)*.

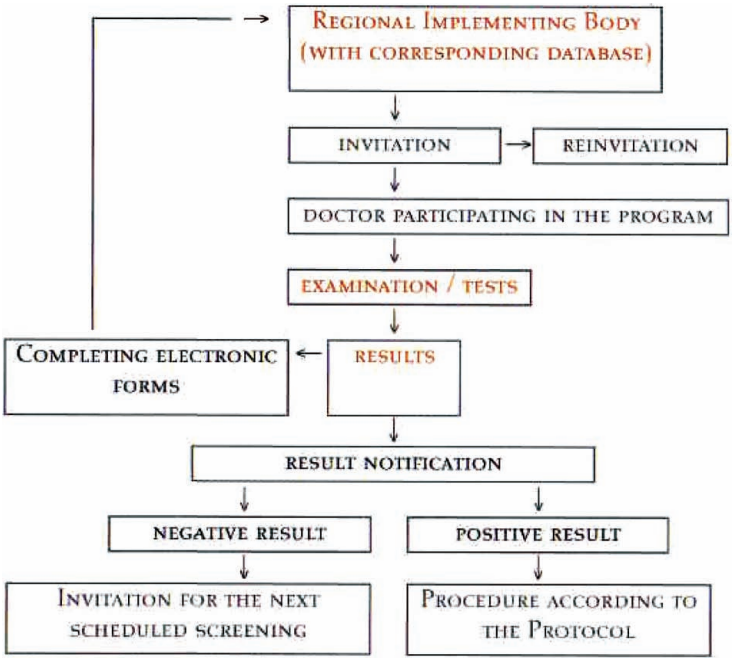
4.1. Situation in EU countries

In the European Union, 2,5 million of people were diagnosed with cancer in 2008 *(17)*. During the past decades, cooperation at the EU level showed that it is possible to add value, beyond the national level, to reduce cancer burden in Europe. The goal, set under the Commission's "Europe Against Cancer" programs (1987–2000), was a 15% reduction in cancer mortality by 2000 *(25)*. Although significant advances have been made, cancer is still a major public health concern in EU, accounting for 29% (3 out of 10) of deaths in men and 23% (2 out of 10) of deaths in women (the facts for 2008) *(40)*.

Nowadays, the situation is characterised with substantial inequalities in cancer control among Member States. Until 2007, 22 Member States (out of 27) have adopted policies for implementing population-based

TABLE 5

Croatian National Program. Program organisation chart



screening programs. In 11 of them, nationwide rollout of population-based programs is completed, in 7 of them, it is ongoing, and in 4 of them, it is being piloted or planned *(32)*. In several countries in Europe, however, including Finland, Sweden, UK and Netherlands, programs were performed in a way to give possibilities for quality and effectiveness evaluation *(41)*.

In order to strengthen efforts by sharing information, capacity and expertise in cancer prevention and control, the European Commission has recently proposed the "European Partnership for Action Against Cancer", for the period 2009–2013 *(42)*.

4.2. Approaches to increase screening coverage

One of the main problem, in mass screening programs, is how to increase the screening rates (*coverage*). This is two-sided problem. On the one side, there are problems of supply (programžs implementation performans), including necessary equipment, professionals, implement of evidence, establishment of the call-recall system, and strictly managed follow up (screening policy). On the other side, there is the problem of motivation of subjects from the target groups for screening (*patients' compliance with screening*). The two key steps of the motivation process can be recognised: 1) a decision to enter the screening cycle (*up-take*) and 2) a decision to stay in (*adherence*) *(43)*. Both processes are subjected to changes by educational and motivational activities. It is important, then, that these activities precede to and/or follow mass screening programs implementation, since it has been recognised that the rate of up-take and adherence to screening may have a long-term effect on program effectiveness *(43, 44)*.

In regard to this, media campaigns and promotional activities are usually organised at the national or the local community level, initiated by policy-makers, public health services, health professionals' associations, or non-governmental organisations. These activities have multifaceted aim to inform the community on: 1) risk factors for the most frequent cancer sites, 2) early symptoms and signs, 3) early detection methods, and 4) the costs and the benefits of acceptance of screening *(45)*.

On the other hand, individually-oriented educational activities, for specific patients' groups or individuals, can be best effective if performed by primary health care workers, especially family physicians. In this case, these activities are transformed into what is termed *encouragment* and *empowerment* of patients for screening *(46)*.

4.3. Models to enhance program performance

There is a general assumption that prevention and early detection of cancer is insufficiently implemented in practice of family physicians. In most countries, they are only partially involved, mainly through opportunistic screening. That means that subjects are referred by a physician for screening outside the program supplied by public services, or only under certain conditions, such as rural and distant areas *(25)*. Although a central role of family physicians in implementating such programs has some advantage compared to the strictly centrally controlled programs, it has been recognised that some tech-

nical and professional support to family physicians are needed, to allow the program to achieve and maintain high quality norms *(47)*.

In highly income countries, characterised with long tradition in organising early cancer detection programs, expected curing and survival rates have already been achieved. These results can not be attributed only to a large number of professionals employed and good technical facilities, but also to the government officials coordinating the programs and comprehensively performed and sustainable driven strategies aimed at cutting the common risks factors burden for the most important chronic diseases, including cardiovascular diseases, diabetes and cancer *(41, 48)*.

In lower income countries, strong orientation towards primary health care in performing programs of prevention and early detection of cancer, are recommended. This is based on evidence showing that primary care resources considerable contribute to reducing the adverse impact of social inequalities on screening *(49)*.

Based on these facts, it is possible to conclude that the programs for early cancer detection are best performed if well organised and coordinated, independently on whether they are conducted by governmental, or public health institutiones, or predominantly supplied by family medicine teams.

5. CURRENT TRENDS AND FUTURE CHALLENGES

5.1. Personalised screening

There is no doubt any more that the early detection of cancer is effective approach to fighting against cancer. There are no clear attitudes, however, on which strategy is more efficient than another, especially in the context of a real social situation, or within the framework of the current health care system organisation. Awareness is increasing that variables such as "*a benefit-to-risk*" and "a *benefit-to-cost*" ratio, or "a *quality of life measures*", should also be taken into consideration when planning screening strategies *(2, 50)*.

In addition, new, more specific screening tests, such as a digital mammography, or immunochemical tests for testing on occult faecal bleeding, are now available and increase our chance to detect cancer early. However, higher prices of these tests, compared to conventional ones, require more specifically elaborated screening strategies, including a precise definition of who should be included in screening, by using which tests, and under which conditions *(29, 51, 52)*. Evidence also suggests that variables such as the patient's context, including co-morbid health disorders and patient's values, are to be taken into account *(29)*.

5.2. Cancer risk prediction models

The average risk of getting a cancer (for a 5-years, or a 10-years time period, or expressed as a lifetime risk) are estimated on the basis of the incidence data for the population. Many factors that can change these estimates to the higher or to the lower, for some of the most common cancers sites, have been identified. Besides classical cancer-related risk factors, some biochemical and molecular biomarkers and information on a personal genome analysis, have recently been added. Knowledge on this issue allows personalisation of risk assessments, based on the estimates such as the score charts, or mathematical risk prediction models, which can help physicians and policy-makers to more accurately identify individuals who might benefit from screening *(53, 54, 55)*.

5.3. Genetic risk estimates

Two Mendelian genetic tests have been established so far and are expected to improve the cancer risk assessment. These tests include 1) BRCA1 and BRCA2 – highly penetrant breast and ovarian cancer predisposition genes, and 2) the mismatch repair (MMR) genes – carriers of which have a high risk of the hereditary colorectal cancer and/or endometrial cancer *(56, 57)*.

The dominant problem, when trying to implement these tests into routine practice, is a lack of the clinical assessments of genetic risk estimates. For example, is there an added value of testing on BRCA 1/2 genes in women with a positive family history of breast cancer, beyond the standard screening with mammography, especially when taking into account that familial susceptibility to breast cancer accounts for less than 25% of all cases? Another concern includes low level of knowledge on variation in penetrance and expression of cancer-prone genes. In addition, evidence is insufficient of how a genetic counseling might have an impact on the ethical issues *(57, 58)*.

5.4. Genomics and proteomics

The rapid progress in biotechnology has been expected to provide huge benefits in prevention and early detection of chronic noncommunicable diseases, notably cancer, by implementing genomics, proteomics and other -omics techniques in practice. The main principle these techniques relies on, is a possibility to identify subjects at an early clinical or subclinical stage of a disease development, by obtaining the whole-genome sequencing (genomics), or by characterising the protein and peptide profiles of various biological fluids or tissues (proteomics) *(59, 60, 61)*.

The problem is that these techniques are rapidly emerging, far more than their clinical utility can be evaluated. Therefore, there is no clear understanding yet, of what would be real expectations of implementing these techniques in practice, and what are the obstacles that should be overcome *(61, 62)*.

5.5. The chronic care model

Improvements in the early detection, diagnosis and treatment of cancer enable people with cancer living longer and managing their cancers as a chronic illness. This consideres a long-term surveillance, including pre-

vention, early detection, diagnosis, treatment, long-term care after the treatment and survivorship.

Demands are predominantly put on patients and their families, in managing care on their own, and on family physicians, in providing them education and support, as well as a follow up *(63)*.

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