Breast Cancer: Epidemiological Panorama and Opportunities for Prevention

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Introduction

Breast cancer has been described from very ancient times. However, given the changes observed worldwide in demographic and epidemiological patterns over several recent decades, the appearance of cases of nontransmittable diseases – linked with the aging of the population and adherence to unhealthy lifestyles – has produced an epidemic pattern in their incidence, including breast cancer.

Breast cancer is at present the most frequently found malignant tumor among women throughout the world. It has also been described as the first cause of death for this population group, making it one of the diseases with the greatest social and economic impact in our times. It represents a serious health problem and one of the most complex challenges of health systems.

The knowledge generated surrounding this problem has been fundamental for offering patients with breast cancer the best care possible. Notwithstanding this, differences in survival among different regions of the world continue to be substantial. Thus, a narration of the epidemiology of the disease addressed to the health personnel charged with the diagnosis, management, and control of the disease will motivate us all to continue working in the search for novel opportunities for its prevention and early detection, a strategy also useful in the control of diseases as poignant as breast cancer.

The purpose of this chapter, in addition to showing the tendencies in the appearance of cases in the world and specifically in Mexico, is to describe the conditions that have been associated with the appearance of the disease, the transcendence of an early diagnosis, and the characteristics related with the survival of those afflicted with the disease. In addition, the importance of screening programs and the difficulties in carrying these out in developing countries such as Mexico will be described. Finally, we present a recapitulation of present and future challenges in health systems with the purpose of reducing the morbimortality of this frequently occurring neoplasm.

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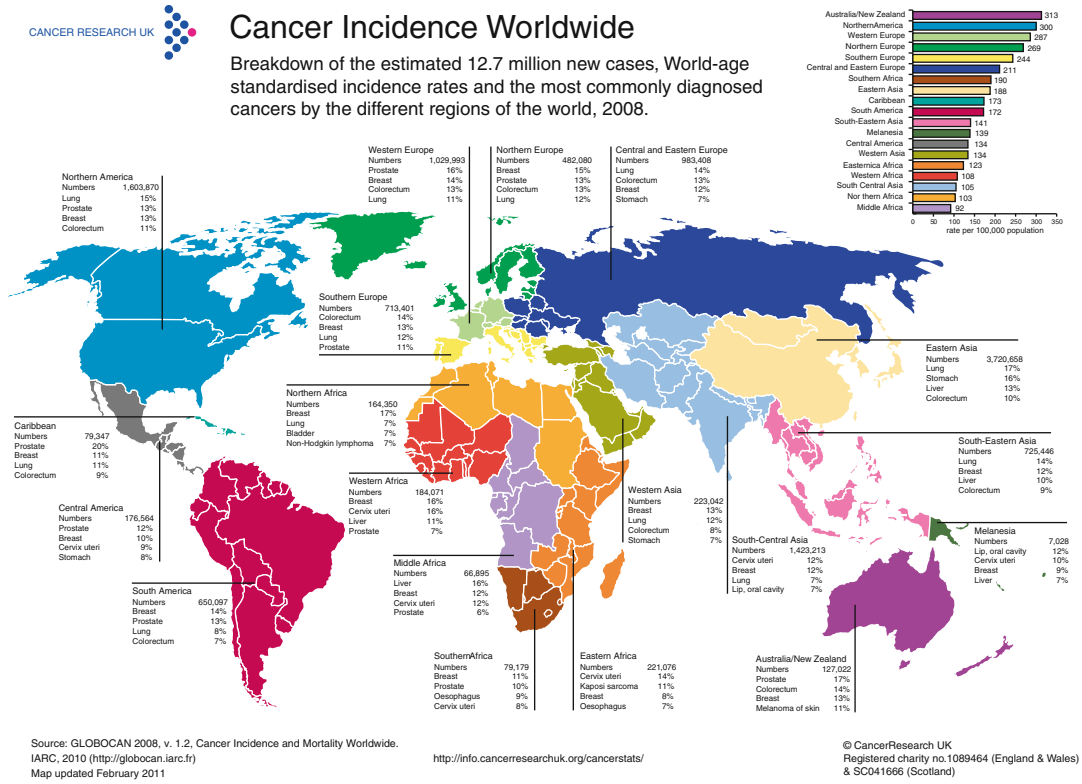


Fig. 2.1 Cancer incidence worldwide, International Agency for Research on Cancer (*IARC*), Cancer Research UK, http://info.cancerresearchuk.org/cancerstats/world/the-global-picture/, April 2012

World Panorama

According to the World Cancer Report 2000, the incidence of cancer at any localization would increase by 50 % by the year 2020, in which there would be 15 million new cases. In 2000, malignant tumors were the cause of 12 % of nearly 56 million deaths that were produced throughout the world; in many countries, more than one-quarter of these deaths were attributable to cancer. In that same year, 5.3 million males and 4.7 million females presented malignant tumors. Likewise, there were 6.2 million cancer-related deaths.

This same report in 2008 informed 12.4 million new cases of cancer, with 7.6 million deaths worldwide. More than one-half of the cases and 60 % of deaths took place in developing countries, with the greatest incidence reported in North America, Australia, and in Northern and Western Europe (Fig. 2.1). The highest rates were observed for breast cancer and prostate cancer, followed by cancer of the lung, stomach, colon and rectum, liver, and uterine cervix, being these the most frequent cancers in the world [1].

Breast cancer is the most frequent malignant tumor in women worldwide, with only 15–30 % of cases corresponding to carcinomas in situ and the remainder to infiltrating carcinomas. In addition, 90 % of carcinomas develop in the ductal epithelium, and 10 % affect the lobular tissue of the breast [2]. In 2008, it was estimated that 1.38 million new cases were diagnosed, which corresponded to 23 % of all causes of cancer identified in females and 10.9 % of all cancers at the general level, that is, also considering the masculine population.

The incidence rate of breast cancer is high in developed countries, where more than one-half of cases are concentrated, nearly 36,000 in Europe (27.3 % of the cancers of women in this region) and 230,000 in North America (31.3 %). Only in Japan does breast cancer occupy third place after

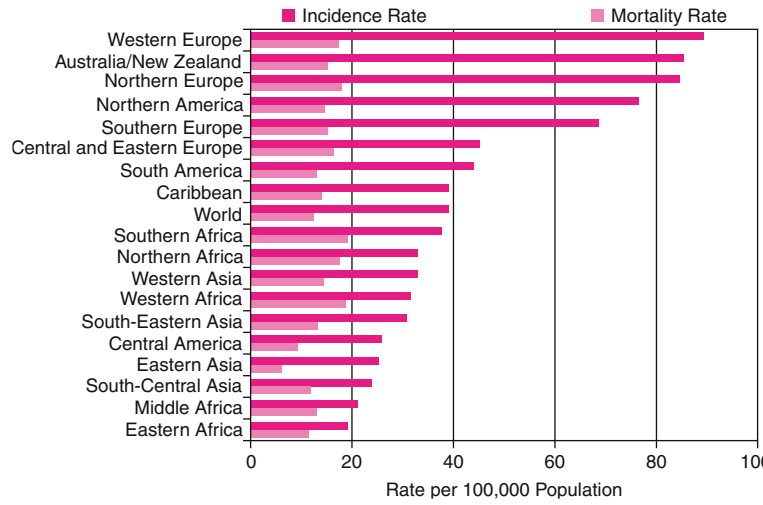


Fig. 2.2 Incidence rate and standardized regional mortality by age of breast cancer, International Agency for Research on Cancer (*IARC*), 2008 (Ferlay et al. [8])

colorectal cancer and cancer of the stomach. The highest age-standardized incidence rate is found in North America, with an incidence of 99.4/100,000 inhabitants, together with some other countries in South America such as Brazil and Argentina, in addition to those of Northwestern Europe and Australia. A moderate incidence has been observed in Eastern Europe, South America, Southern Africa, and Western Asia, but even so, breast cancer in these regions continues to be the most common cancer found among women, and low rates have been described for the populations of Asia and Africa, although recently an increase has been reported in the number of cases in these regions [3, 4].

The World Health Organization (WHO) has described significant changes in the profile of this epidemic; after having arisen in the most developed regions of the planet, it is now affecting in a growing manner women in countries with lesser resources [5]. From the year 2000, breast cancer became the most frequent tumor among women of low-income countries, places where cancer of the uterine cervix had been the leader during the past two decades.

With respect to mortality, breast cancer has been situated in the fifth place as cause of death among all neoplastic diseases, but in the first place in feminine population worldwide (269,000 deaths, 12.7 % of the total) in developing as well as in developed countries. Survival in patients with breast cancer has increased little by little in developed countries, with reports of up to 89 % for the USA [6], while developing countries continue to show survival rates of <50 % [7] (Fig. 2.2).

From 1990, differences in the incidence and mortality of this disease among regions in the entire world were glimpsed, suggesting an important role for environmental factors in the susceptibility for developing cancer for certain populations. The latter has been expressed through some studies conducted in migrant population in which the increase was clearly shown of the risk for having cancer in populations originating in countries with low incidences, such as Italy or Poland, when these have migrated at early ages to countries with a high disease rate, such as Australia [9, 10]. Similarly, on comparing risks in the children of migrants, an increase has been shown in the risk of presenting the disease in the first, second, and third generations [11].

Given the regional differences, some authors describe reproductive factors such as low parity, late age at first pregnancy, obesity, and nutrition as factors that are crucial for the appearance of breast cancer [12]. It has been established that contrasts in mortality rates among the different regions are much less marked than those described regarding incidence rates, which could be the effect of efficient early detection programs in fully developed countries.

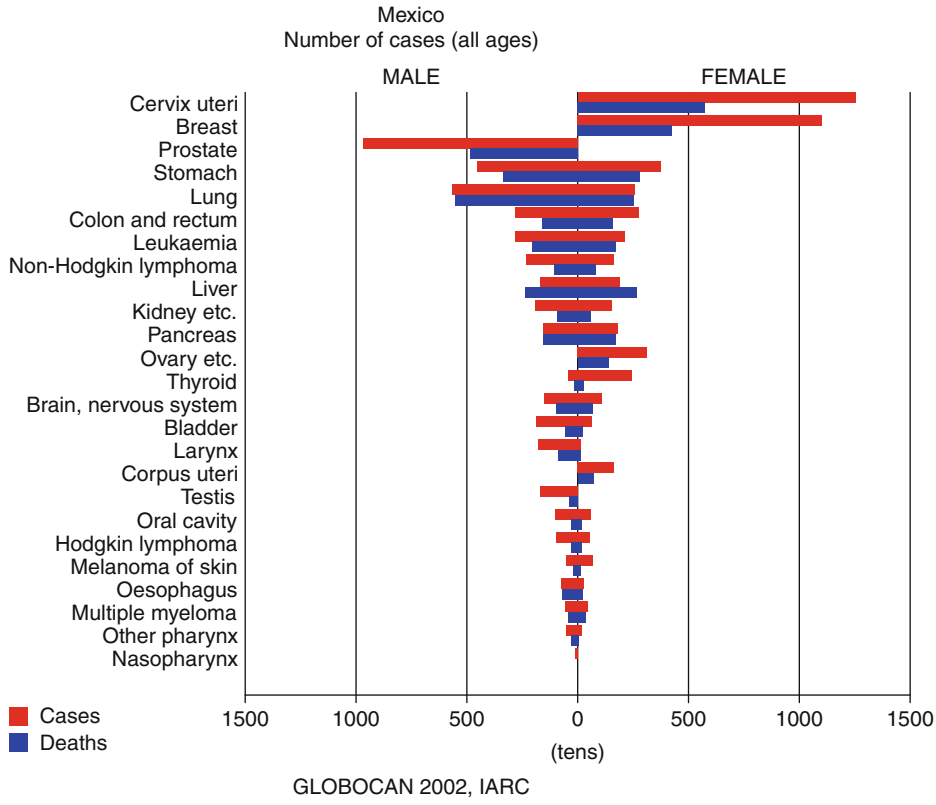


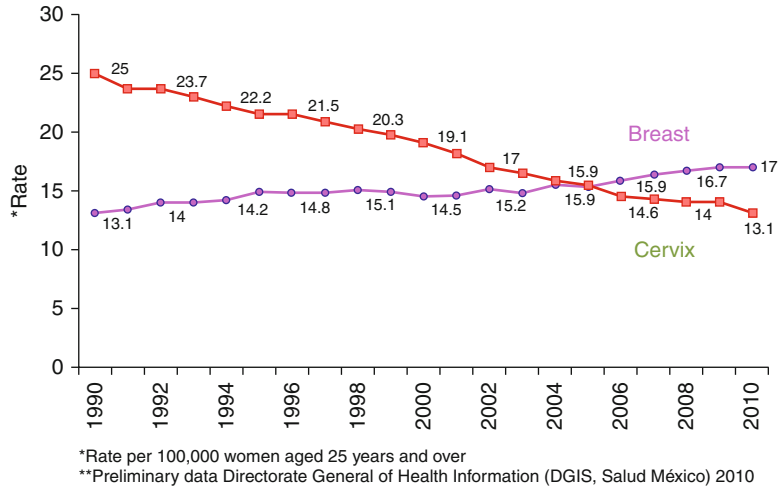
Fig. 2.3 Number of cases and deaths due to cancer in Mexico according to gender, International Agency for Research on Cancer (*IARC*), 2002 (Ferlay et al. [8])

National Panorama

In Mexico, the main neoplastic diseases that affect the masculine population are cancer of the prostate, lung, stomach, leukemias, and colorectal cancer. In women, cancer of the breast, uterine cervix, stomach, liver, and colorectal cancer cause the greatest burden that the country sustains due to this group of diseases [13] (Fig. 2.3).

According to the International Agency for Research on Cancer (IARC), Mexico occupies 101st place in incidence and 135th place in breast cancer-associated deaths of the 172 countries with available epidemiological information. Breast cancer in Mexico has occupied first place in deaths since 2006 due to malignant neoplasms in women, exceeding cervical cancer, which historically occupied first place (Fig. 2.4). The age-adjusted mortality rate reported in Mexico has been important: from 5.9/100,000 in 1980 to nearly nine million in the mid-1990s. For 2007, a rate was notified of 16.5 deaths/100,000 women aged 25 years and over. In 2008, the incidence of breast cancer in Mexico was reported as 7.57 cases/100,000 women 15 years of age and over. In Mexico, this disease is more important in the northern and central states with lower rates in southern states that although these are entities with low socioeconomic levels, they also have breast cancer among the main causes of mortality [14].

Similarly to the rest of the world, the number of cases and the mortality rate also rise with age in Mexico. However, the appearance has been reported of new cases at early ages, which contrasts with those registered in the USA and Europe, where the greatest incidence presents in postmenopausal women aged 50 years or more [15].



*Rate per 100,000 women aged 25 years and over
**Preliminary data Directorate General of Health Information (DGIS, Salud México) 2010

Fig. 2.4 National cancer of the uterine cervix- and breast-cancer-related trends in mortality rates, 1990–2010**. (Figure modified from National Institute of Statistics and Geography (*INEGI*)/ Ministry of Health (*SSA*))

Risk Factors

While the causes and natural history of the disease have not been completely defined, it is recognized that age is the principal risk factor for the development of neoplastic processes. Breast cancer is no exception, with the risk for women >30 years of age ten times greater than that of those aged <20 years, with a proportional increase that reaches >90 times in women of >60 years of age [16]. At the same time, the greatest frequency of this disease has been described among women of high socioeconomic status, those who reside in urban zones, and among those who had never been married.

Other data from epidemiological researches describe the association of some genetic, biological, and environmental factors as cofactors for development of the disease. The prevalence and distribution of risk factors in diverse countries of Latin America and the Caribbean are depicted in Fig. 2.5 and comprise the following:

- Genetic factors. It is known that women who have a direct relative (mother, sister, or daughter) in whom breast cancer has been diagnosed have double the risk of developing the disease. Approximately 10 % of women with breast cancer report having a relative with the same disease, and among these, some present *BRCA1* and *BRCA2* mutations. The risk of developing cancer in the presence of these alterations is 80 %; although it has been described that the absolute risk can vary according to the country of residence [17], the hereditary characteristic of this disease generally accompanies the diagnosis of this at early ages between 30 and 50 years and multiple cases of early-onset breast or ovarian cancer in the family [18, 19].
- Fetal exposure. It has been described that women whose birth weight was >4 kg had a 3.5 times greater risk of developing breast cancer than those who weighed <3 kg at birth; this association has been described in many women who present a diagnosis prior to menopause. This is explained as due to the estrogen levels that determine the size of the placenta related with the fetal growth rate; thus, babies with overweight are also exposed to greater amounts of maternal estrogens [20–22].
- Reproductive factors. The time span from menarche to the birth of the first child also results as a vulnerable period for mammary tissue. The mammary gland terminates its development once pregnancy and lactation are over; therefore, an undifferentiated breast is more sensitive to carcinogens than a completely differentiated breast [23]. Additionally, it has been described that the risk for breast cancer diminishes with the number of deliveries; after the first of these, the risk diminishes by 7 % for each child; likewise, lactation

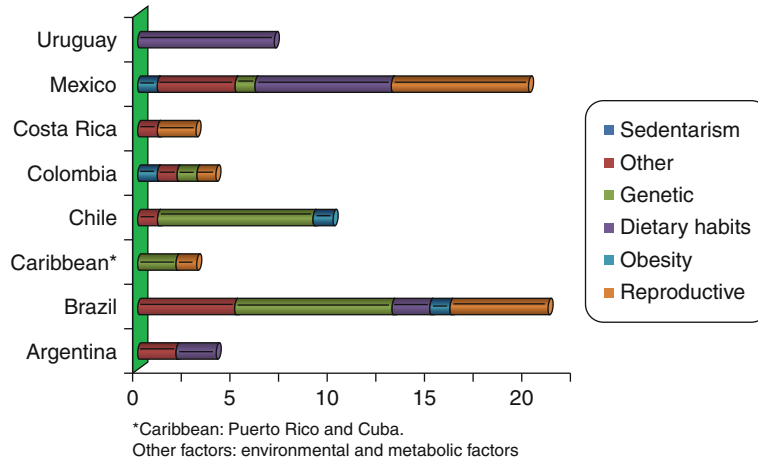


Fig. 2.5 Risk factors in breast cancer in Latin America and the Caribbean (Figure modified from Cancer de mama, Tomatelo a Pecho 2009. Mexican Health Foundation (*FUNSALUD*)/National Public Health Institute (*INSP*))

diminishes by 5 % the risk of developing the disease for each year that the woman breast-feeds. Also, although breast cells proliferate at the middle of the menstrual cycle, these, once pregnancy does not take place, suffer from apoptosis; the number of times that this occurs has also been associated with a higher risk for developing breast cancer. This is one of the reasons that early menarche or very late menopause has also been observed to be related [24].

- External use of hormones. It has been recognized that the use of hormonal contraceptives increases the risk of developing breast cancer by 7 %, this compared with nonexposed women. It has been described that there is no increase in risk in menopausal women who are users of this type of contraceptives, as well as there being no effect on mortality due to breast cancer in these women who use hormonal contraceptives [25]. Evolution of the use of hormones during or after menopause and its relation with the appearance of cancer has given rise to contradictory results. The most recent data confirm that the risk increases depending on hormone type and duration of use; hormones solely based on estrogens do not increase the risk [26, 27].
- Alcohol and obesity. It has also been described that the daily consumption of 24 g of alcohol increases the risk for breast cancer by 21 %, which can be explained as due to the diminution of the hepatic metabolism of the estrogens of the alcohol-drinking woman. On the other hand, it is known that adipose tissue is a source of the formation of estrogens; thus, there is a strong correlation between the amount of adipose tissue and estrogen levels in postmenopausal women. Women with a body mass index (BMI) of 27 or more have a 40 % greater risk of presenting breast cancer [28, 29].
- Physical activity and diet. Several studies have shown a diminution in the risk for cancer when physical activity increases; it has even been described that women engaging in at least 30 min of exercise daily reduce the risk of presenting the disease by 50 % compared with women with a sedentary lifestyle. Greater intake of fruits and vegetables is stipulated as being able to cause a reduction in the risk of presenting the disease; it has been inconsistently described that greater intake of vegetables can prevent breast cancer in young women and that low intake of fats can probably exert a preventive impact in postmenopausal women [30–33].

In this context, it is noteworthy that the demographic and epidemiological transition that the population has undergone has given rise to that some of the factors, described previously, contribute to the increase in the frequency of this disease, mainly those linked with an unhealthy

lifestyle—lack of exercise, an unhealthy diet, and an increase in alcohol consumption—all of which are potentially modifiable factors [34]. These findings, added to the delay in the time of the first pregnancy and the increase in life expectancy, explain the increase in the incidence of breast cancer observed during the past decades.

Diagnosis

Although the description of diagnostic techniques and treatment strategies lies outside of the objective of this chapter, we must remember that diagnostic and treatment strategies have changed throughout the history of breast cancer. At the beginning of the 1960s, when the use of the first mammographies had recently begun, a radical mastectomy was the predominant therapy, and this did not change with the patient's clinical stage or characteristics. At present, there is conservative breast surgery, intraoperative radiotherapy, and hormonal and biological therapy.

Diagnostic techniques have been strengthened in the last 40 years, attempting to cover the need for detecting small tumors of millimetric dimensions [35]. The diagnosis of breast cancer depends on whether the lesion is palpable or not. If the lesion is palpable, diagnosis is performed by means of inspection and palpation, mammography, or biopsy. Nonpalpable lesions present a greater diagnostic challenge; under this circumstance, a suspicious lesion is localized through special mammographic techniques or ultrasonography, and biopsies are carried out by orientation of imaging techniques. The breast represents a true challenge in obtaining its x-ray image; a screening mammography seeks out nonpalpable lesions (i.e., <0.3 cm), microcalcifications, asymmetries in mammary density, and/or distortion of the structure of the gland. The American College of Radiology (ACR) created a classification system denominated BI-RADS (Breast Imaging Reporting and Data System), which aids in standardizing and reducing the possible confusion of mammographic images [36]. The mastography permits the visualization of these indicators, but the gravity of the lesion is determined solely by histopathological analysis.

Prognostic Factors

The management of breast cancer requires a multidisciplinary team and a great investment of the health systems that allows covering the very high cost of antineoplastic drugs, which sometimes is not always reflected in an improvement in the survival rates of this specific population group. As mentioned previously, the 5-year global survival of patients with breast cancer exhibits sufficiently heterogeneous data within the different world regions. The most recent data in the USA describes 5-year survival rates of up to 89 %, while in Europe, this ranges from 22.7 % in Italy to 46.5 % reported for Spain [37].

Among factors known to affect patients' survival, we find mainly clinical stage at the moment of diagnosis; survival will be less if at the time of diagnosis, the cancer is found in an advanced stage. Considering all of the races, survival data have been reported of 98 % for localized disease, of 84 % for regional disease, and of 23 % for infiltrating disease. Survival diminishes according to the size of the tumor; in regional disease, 5-year survival comes to be up to 95 % for tumors <2.0 cm, 82 % for tumors from 2.1 to 5.0 cm, and up to 66 % for tumors >5 cm [38].

Another factor that is known to affect survival is the age of the woman at the time of diagnosis. If this occurs prior to 40 years of age, reported survival is of 83 % compared with those whose diagnosis was performed after this age, whose survival is described as 90 %. One proposed explanation is that, in general, tumors diagnosed in young women tend to be more aggressive and as having a lesser response to treatment [39].

There are also reports showing that Afro-American women have a lesser probability of 5-year survival after a diagnosis of breast cancer than Caucasian women, 78 versus 90 %, respectively. This difference can be explained as much by advanced stage as by poor definition of the stage at the time of diagnosis.

Finally, it is also known that the lack of access to primary health-care services is associated with low survival among patients with cancer. Likewise, women from low socioeconomic strata have a lower possibility of 5-year survival than those in high strata [40].

Early Detection

At the worldwide level, stage at diagnosis varies substantially. In the USA, for example, the prevalence of metastatic breast cancer at the time of diagnosis is low, around 3.35 % [41], while in Europe, the proportion of new cases in women diagnosed with advanced disease ranges between 3 and 11 %, although for Germany, the proportion of detection of cases of women in advanced stages is around 15 % [37, 42–47], while in Mexico, around 75 % of cases detected are found in women in advanced disease stages [48]. The low proportion of cases detected at early stages, when the probability of 5-year survival is very much higher if adequate treatment is received, is the cause that most cases have a poor prognosis, and in turn, the medical care required is more complex and highly expensive. As previously explained, contrasts in disease incidence and survival between developing and developed countries can be due to the success in the instrumentation of screening programs for achieving the increase of the detection of sick patients at the beginning of the disease. Thus, providing treatment in timely fashion improves the quality of life of the patients and reduces the expenditure for the care of this disease.

Among timely detection techniques, breast self-examination based on observation and palpation that the woman herself performs on her own breasts is recommended by the American Cancer Society (ACS) to be carried out monthly in all women from the menarche, above all in women >20 years of age. Some studies describe this technique as a useless tool for detecting early lesions. In Mexico, there are diverse publications in this respect in which it is concluded that women are capable of detecting lesions of at least 1 cm and when these are superficial, and even of 0.5 cm once they have received training in this technique [49].

The worldwide impact of breast self-examination shows inconsistent data and apparently does not offer an impact on the diminution of mortality. Other reports refer a better prognosis for patients because lesions are detected in clinical stages I and II [50]. In Mexico, 90 % of cases of breast cancer are detected because the patient herself detects a lump or node, and in the majority of these cases, this comprises an advanced disease stage [48].

The mammography is the most utilized diagnostic tool at the worldwide level in screening programs and in the diagnosis of breast cancer; notwithstanding this, the effectiveness of breast self-examination and clinical examination in the mortality of this disease remains an issue for debate in relation to their usefulness as auxiliary diagnostic tools in developing countries, where carrying out mammographic studies is unfeasible [51, 52]. In Mexico, mammographies have been employed nearly fully with diagnostic purposes; it was in 2003 that Official Mexican Norm 041-SSA2-2002 for the prevention, diagnosis, treatment, and control of breast cancer opened the possibility for use of the mammography for the purpose of screening of the population [53].

There are several studies that have evaluated the effect of screening with mammography in the reduction of mortality rates for this disease, observing a diminution that ranges from 28 to 65 % with a mean of 46 % [54–56]. In 2002, the International Agency for Research of Cancer (IARC) concluded that there is sufficient evidence supplied by clinical assays on the effect of screening on the mortality of women between 50 and 69 years of age with breast cancer. A reduction was notified of 25 % in the mortality of this neoplasm on analysis by protocol and of 35 % in intent-to-treat analysis in all women who had regular mammographies. Some studies cite that the effectiveness of the test was greater in the group of women aged 50–69 years than in that of women aged 40–49 years, with a diminution in

Most Recently Published Results of the Breast Cancer Screening Trial son Breast Cancer Mortality Reduction With invitation to Screening

Study	Age Range	Percentage Mortality Reduction (95%CI)**
HIP	40–64	24(7,38)
Malmö	45–69	19(–8,39)
Two-Country Trial, Sweden	40–74	32(20,41)
Edinburgh	45–64	21(–2,40)
Stockholm	40–64	26(–10,50)
Canada NB SS-1	40–49	–3(–26,27)
Canada NB SS-2	50–59	–2(–33,22)
Gothenburg	39–59*	16(–39,49)
All Trials Combined	39–74	24(18,30)

*There are more recent publications from the Gothenburg trial but they refer only to the under 50 age group

**CI = Confidence interval

Fig. 2.6 Results of recently published assays in which the reduction in mortality by means of screening programs was evaluated. American Cancer Society (*ACS*) 2003 (Figure modified from Smith Robert et al. [62])

the mortality rate of 16–35 and 15–20 %, respectively [51]. The beneficial effect for the group aged between 40 and 49 years remains controversial [52, 57]. The ACS recommends a screening mammogram every year for women 40 years of age and over, and the American Medical Association (AMA) and the National Cancer Institute (NCI) recommend a screening mammography once every 1 or 2 years for women between the ages of 40 and 49 years and an annual mammography from the age of 50 years. The Canadian Cancer Society (CCS) recommends that women aged between 50 and 59 years have a mammography and a clinical breast examination once every 2 years [58].

In Sweden, the recommendation for women between 50 and 69 years is for submittal to screening mammographies without indicating the frequency. Recently, the US Preventive Services Task Force (USPSTF) recommended that the decision for carrying out mammography in women aged from 40 to 49 years should be approached together with the physician, taking into account the risk factors and the patient's preference [59, 60], showing the need for studies that support the decision of the best age at which, and the specific criteria for which, women should be submitted to a screening mammography because, on the other hand, the risk of radio inducing a cancer in women with a genetic predisposition has also been recognized in other scientific researches [61] (Fig. 2.6).

Therefore, although screening has been proposed as the main strategy for improving the survival of patients with breast cancer, the impact of this type of program exerted on developing countries has been low due perhaps to limited coverage of women at high risk [63]. It may also be due to the deficient quality in the medical care process and to the lack of homologation of diagnostic criteria due to lack of quality control and ongoing training systems of its personnel, but also to multifactorial obstacles—social, cultural, geographic, economic, behavioral, familial,

and organizational—which have already been described, such as imprecise knowledge of breast cancer and detection methods, the inexistence of data on knowledge on and attitudes toward breast cancer, above all in minority groups, scarce awareness concerning early detection, lack of medical insurance covering mammographic detection, and lack of instruction on early detection and related programs. All of these are factors impede breast cancer from being identified and diagnosed at the earliest stages, when cancer treatment may be effectively and efficiently administered [64, 65].

Prevention

Despite that the management of breast cancer has been surprising in recent years and that strategies have been proposed for early detection of the disease in order to improve the prognosis of patients already suffering from the disease, strong contrasts continue today in the world with respect to success in control of the disease. This is due to the deficiencies in medical coverage and sociocultural barriers that limit timely detection and treatment in developing countries.

Notwithstanding the latter, speaking out on primary prevention of breast cancer is inexistent and even controversial. While we are not completely sure at present of the manner by which and magnitude at which we can come to prevent the development of malignant lesions in mammary tissue, we do know the potentially modifiable risk factors that are associated with its appearance. Thus, in addition to fortifying timely detection and medical care for patients who already have the disease, we should promote regular physical activity, maintenance of the ideal weight, low alcohol intake, maternal lactation, and rational use of hormone replacement in postmenopausal patients. In addition to this, there are studies, although in debate, that suggest the possibility of applying chemoprevention or even the performance of preventive mastectomy or oophorectomy in women at high risk of having breast cancer [66–72].

Conclusions

The data presented here ratify the magnitude that breast cancer represents as a worldwide epidemic as well as the importance of prevention and offering optimal control for women with this disease.

The control of this disease throughout the world and principally in developing countries is not an easy task. One measurement of control is the intervention of potentially modifiable factors, as well as the registry and epidemiological analysis of the disease, with the purpose of determining risk groups whose members could be submitted to timely screening programs. It is only in this way that we will be able to optimize the limited resources allotted for the control of cancer in Mexico.

According to published in 2008 by Levine P and Veneroso C, the epidemiology of inflammatory breast cancer (IBC) has been of great interest to a number of investigators, but epidemiological research has been hampered by the lack of an agreed upon case definition and the relatively small number of patients available to any single investigator or institution. Several features of IBC have become apparent through population-based studies, which, although varying somewhat in case definition, generally agree on some key features of the disease. These include the incidence of the disease, apparently less than 3 % of breast cancer cases in the USA, the younger age of onset compared to noninflammatory breast cancer, the much higher incidence in Black women compared to White, the generally poor outcome of this disease compared to noninflammatory breast cancer, and the continued increase in reported incidence, particularly as compared with noninflammatory breast cancer in general and locally advanced breast cancer (LABC) in particular. There is an apparent striking geographic pattern, with a higher percentage of cases reported from North Africa, best documented in Tunisia. The risk factors for developing IBC are suggested by smaller studies with concordant conclusions, and some appear to be different than the risk factors for developing breast cancer in

general. For example, obesity appears to be a risk factor for premenopausal IBC but is not for premenopausal noninflammatory breast cancer. In addition, there is evidence that a young age at first birth predisposes to IBC but is protective against developing noninflammatory breast cancer. In some malignancies, the use of molecular markers is helpful in defining subgroups that could assist in improving case definition as well as predicting prognosis. The increasing combination of improved epidemiologic and laboratory methods will hopefully accelerate our understanding of this challenging disease [73].

Of course, investment in health coverage, in health promotion, and in the education of medical personnel are basic tasks in health systems to achieve the reduction of the risk for breast cancer and to attain the reduction of the mortality of this so often encountered disease in our environment.

References

1. World Health Organization WHO. International Agency for Research of Cancer. World cancer report. Lyon: IARC Press; 2008. p. 260.
2. Cotran RS, Robbins SL, Kumar V. Patología estructural y funcional. 6th ed. Madrid: McGraw-Hill; 1999.
3. Parkin DM, Whelan SL, Ferlay J, Storm H. Cancer incidence in five continents, vols. 1–8. IARC Cancer Base no. 6. Lyon: IARC Press. Available at: (http://www-dep.iarc.fr). Accessed 25 Nov 2009.
4. Parkin DM, Bray F, Ferlay J, Pisani P. Global cancer statistics, 2002. CA Cancer J Clin. 2005;55:74–108.
5. Organización Mundial de la Salud. Cáncer 2008. Available at: (http://www.who.int/mediacentre/factsheets/fs297/es/index.html). Accessed 25 Oct 2009.
6. Ries LAG, Eisner MP, Kosary CL, et al., editors. SEER cancer statistics review. Bethesda: National Cancer Institute; 2004. p. 1975–2001. Available at: (http://seer.cancer.gov/csr/1975_2001). Accessed 11 Apr 2005.
7. Robles SC, Galanis E. Breast cancer in Latin America and the Caribbean. Rev Panam Salud Publica/Pan Am J Public Health. 2002;11(3):178–84.
8. Ferlay J, Shin HR, Bray F, Forman D, Mathers C and Parkin DM. GLOBOCAN 2008 v1.2, Cancer incidence and mortality worldwide: IARC Cancer Base no. 10 [Internet]. Lyon, France: International Agency for Research on Cancer; 2010. Available from: (http://globocan.iarc.fr). Accessed on 9th December 2011.
9. Geddes M, Parkin DM, Khlat M, Balzi D, Buiatti E, editors. Cancer in Italian migrant populations. Scientific publication no. 123. Lyon: IARC Press; 1993.
10. Tyczynski J, Tarkowski W, Parkin DM, Zatonski W. Cancer mortality among Polish migrants to Australia. Eur J Cancer. 1994;30A:478–84.
11. Ziegler RG, Hoover RN, Pike MC, et al. Migration patterns and breast cancer risk in Asian-American women. J Natl Cancer Inst. 1993;85:1819–27.
12. Kelsey JL, Bernstein L. Epidemiology and prevention of breast cancer. Annu Rev Public Health. 1996;17:47–67.
13. International Agency for Research on Cancer. GLOBOCAN 2002. Available at: (http://www-dep.iarc.fr). Accessed 18 Oct 2008.
14. González-Pier E, Gutiérrez-Delgado C, Stevens G, Barraza-Lloréns M, Porras-Condey R, Carvalho N, et al. Definición de prioridades para las intervenciones de salud en el Sistema de Protección Social en Salud de México. Salud Publica Mex. 2007;49(Supl 1): S37–52.
15. Rodríguez-Cuevas S, Macías CG, Franceschi D, Labastida S. Breast carcinoma presents a decade earlier in Mexican women than in women in the United States or European countries. Cancer. 2001;91:863–8.
16. Forbes JF. The incidence of breast cancer: the global burden, public health considerations. Semin Oncol. 1997;24(1, Suppl 1):S1–20, S1–S35.
17. Collaborative Group on Hormonal Factors in Breast Cancer. Familial breast cancer: collaborative reanalysis of individual data from 52 epidemiological studies including 58,209 women with breast cancer and 101,986 women without the disease. Lancet. 2001; 358:1389–99.
18. Antoniou A, Pharoah PDP, Narod S, Risch HA, Eyfjord JE, Hopper JL, et al. Average risks of breast and ovarian cancer associated with *BRCA1* or *BRCA2* mutations detected in case series unselected for family history: a combined analysis of 22 studies. Am J Hum Genet. 2003;72:1117–30.
19. Narod SA, Foulkes WD. *BRCA1* and *BRCA2*: 1994 and beyond. Nat Rev Cancer. 2004;4:665–76.
20. Trichopoulos D. Is breast cancer initiated in utero? Epidemiology. 1990;1:95–6.
21. Ahlgren M, Sorensen T, Wohlfahrt J, Haflidadottir A, Holst C, Melbye M. Birth weight and risk of breast cancer in a cohort of 106,504 women. Int J Cancer. 2003;107:997–1000.
22. McCormack VA, Silva IDS, Stavola BLD, Mohsen R, León DA, Lithell HO. Fetal growth and subsequent risk of breast cancer: results from long term follow up of Swedish cohort. BMJ. 2003;326:248–53.
23. Vatten LJ, Maehle BO, Nilsen TLL, Tretli S, Hsieh C, Trichopoulos D, Stuver SO. Birth weight as a predictor of breast cancer: a case control study in Norway. Br J Cancer. 2002;86:89–91.
24. Collaborative Group on Hormonal Factors in Breast Cancer. Breast cancer and breastfeeding. Collaborative reanalysis of individual data from 47 epidemiological

studies in 30 countries, including 50 302 women with breast cancer and 96 973 women without the disease. Lancet. 2002;360:187–95.
25. Collaborative Group on Hormonal Factors in Breast Cancer. Breast cancer and hormonal contraceptives. Collaborative reanalysis of individual data on 53 297 women with breast cancer and 100 239 women without breast cancer from 54 epidemiological studies. Collaborative Group on Hormonal Factors in Breast cancer. Lancet. 1996;347:1713–27.
26. Rossouw JE, Anderson GL, Prentice RL, et al. Risks and benefits of estrogen plus progestin in healthy postmenopausal women. Principal results from the Women's Health Initiative randomized controlled trial. JAMA. 2002;288:321–33.
27. Women's Health Initiative Steering Committee. Effects of conjugated equine estrogen in postmenopausal women with hysterectomy. The Women's Health Initiative randomized controlled trial. JAMA. 2004;291:1701–12.
28. Collaborative Group on Hormonal Factors in Breast Cancer. Alcohol, tobacco and breast cancer- collaborative reanalysis of individual data from 53 epidemiological studies, including 58,515 women with breast cancer and 95,067 women without the disease. Br J Cancer. 2002;87:1234–345.
29. Trentham-Dietz A, Newcomb PA, Storer BE, et al. Body size and risk of breast cancer. Am J Epidemiol. 1997;145:1011–9.
30. Thune I, Brenn T, Lund E, Gaard M. Physical activity and the risk of breast cancer. N Engl J Med. 1997; 336:1269–75.
31. Freudenheim JL, Marshall JR, Vena JE, et al. Premenopausal breast cancer risk and intake of vegetables, fruits, and related nutrients. J Natl Cancer Inst. 1996;88:340–8.
32. Furberg AS, Veierod MB, Wilsgaard T, Bernstein L, Thune I. Serum high-density lipoprotein cholesterol, metabolic profile, and breast cancer risk. J Natl Cancer Inst. 2004;96:1152–560.
33. Key TJ, Allen NE, Spencer EA, Travis RC. Nutrition and breast cancer. Breast. 2003;12:412–6.
34. Henderson BE, Bernstein L. The international variation in breast cancer rates: an epidemiological assessment. Breast Cancer Res Treat. 1991;18 Suppl 1:S11–7.
35. Commission of the European Communities. European guidelines for quality assurance in mammography screening, Europe against cancer programme. 3rd ed. Luxembourg: Office for Official Publications of the European Communities; 2001.
36. D'Orsi CJ, et al. Breast imaging reporting and data system (BI-RADS). 4th ed. Reston: ACR; 2003.
37. Sant M, Allemani C, Capocaccia R, et al. Stage at diagnosis is a key explanation of differences in breast cancer survival across Europe. Int J Cancer. 2003; 106(3):416–22.
38. Horner MJ, Ries LAG, Krapcho M, et al., editors. SEER cancer statistics review, 1975–2006. Bethesda: National Cancer Institute; 2009. Available at: http://seer.cancer.gov/csr/1975_2006/, based on November 2008 SEER data submission posted on the SEER web site. Accessed Dec 2011.
39. Anders CK, Hsu DS, Broadwater G, et al. Young age at diagnosis correlates with worse prognosis and defines a subset of breast cancers with shared patterns of gene expression. J Clin Oncol. 2008;26(20):3324–30.
40. Smedley B, Stith A, Nelson A, editors. Unequal treatment: confronting racial and ethnic disparities in health care, Committee on understanding and eliminating racial and ethnic disparities in health care. Washington, D.C.: Institute of Medicine/National Academy Press; 2002.
41. Commission on Cancer – National Cancer Database. Benchmark reports, V 8.0 – 20 Aug, 2007 – STAGE of breast cancer diagnosed in 2004. Commission on Cancer – National Cancer Database (NCDB); 2007.
42. El Saghir NS, Seoud M, Khalil MK, et al. Effects of young age at presentation on survival in breast cancer (Abstract). BMC Cancer. 2006;6:194.
43. Puglisi F, Follador A, Minisini AM, et al. Baseline staging tests after a new diagnosis of breast cancer: further evidence of their limited indications. Ann Oncol. 2005;16(2):263–6.
44. Remak E, Brazil L. Cost of managing women presenting with stage IV breast cancer in the United Kingdom. Br J Cancer. 2004;91(1):77–83.
45. Schneider C, Fehr MK, Steiner RA, Hagen D, Haller U, Fink D. Frequency and distribution pattern of distant metastases in breast cancer patients at the time of primary presentation. Arch Gynecol Obstet. 2003;269(1):9–12.
46. Traina A, Cusimano R, Liquori M, et al. Breast cancer incidence in the city and province of Palermo in 1999–2002: a breast cancer registry report. Ann N Y Acad Sci. 2004;1028:473–80.
47. Efficace F, Biganzoli L, Piccart M, et al. Baseline health-related quality-of-life data as prognostic factors in a phase III multicentre study of women with metastatic breast cancer. Eur J Cancer. 2004;40(7):1021–30.
48. Secretaría de Salud. Subsecretaría de Prevención y Promoción de la Salud. Programa de Acción Específico 2007–2012: Cáncer de mama.
49. Ortega-Altamirano D, López-Cervantes M. Estrategias de la enseñanza de auto examen del Seno en mujeres en edad reproductiva. Salud Publica Mex. 2000;42: 17–25.
50. Millar AB. What is the role of early detection and screening in cancer control? J Public Health Policy. 1993;14(4):403–11.
51. Advisory Committee on Breast Cancer Screening. Screening for breast cancer in England: past and future. NHSBSP publication no. 61. Perth: Typeset by Prepress Projects Ltd. 2006. Available at: (www.prepress-projects.co.uk). Accessed Oct 2008.
52. Tabar L, Yen MF, Vitak B, Chen HHT, Smith RA, Duffy SW. Mammography service screening and mortality in breast cancer patients: 20-year follow-up before and after introduction and screening. Lancet. 2003;361:1405–10.

53. NOM-041-SSA2-2002, Para la prevención, diagnóstico, tratamiento, control y vigilancia epidemiológica del cancer de mama. Diario Oficial, 17 Sept 2003.
54. Humphrey LL, Helfand M, Chan BK, Woolf SH. Breast cancer screening: a summary of the evidence for the U.S. Preventive Services Task Force. Ann Intern Med. 2002;137(5 Part 1):347–60.
55. Fletcher SW, Elmore JG. Clinical practice. Mammographic screening for breast cancer. N Engl J Med. 2003;348(17):1672–80.
56. Pisano ED, Gatsonis C, Hendrick E, Yaffe M, Baum JK, Acharyya S, et al. Diagnostic performance of digital versus film mammography for breast-cancer screening. N Engl J Med. 2005;353(17):1773–83 [Epub 2005 Sep 16].
57. Olsen O, Gozsche PC. Cochrane review on screening for breast cancer with mammography. Lancet. 2001; 358:1340–2.
58. Canadian Cancer Society/National Cancer Institute of Canada. Canadian cancer statistics 2006. Toronto. 2006. Available at: (http://www.cancer.ca). Accessed Dec 2010.
59. Nass S, Ball J, Committee on Improving Mammography Quality Standards, National Cancer Policy Board, Institute of Medicine and National Research Council of the National Academies, editors. Improving breast imaging quality standards. Washington, D.C.: The National Academies Press; 2005.
60. Preventive Services Task Force. Screening for breast cancer. U.S. Preventive Services Task Force recommendation statement. Ann Intern Med. 2009; 151:716–26.
61. Andrieu N, et al. Effect of chest X-rays on the risk of breast cancer among *BRCA1/2* mutation carriers in the international *BRCA1/2* Carrier Cohort Study: a report from the EMBRACE, GENESPO, GEO-HEBON, and IBCCS Collaborator's Group. J Clin Oncol. 2006;24:3361–6.
62. Smith Robert A, et al. American cancer society guidelines for breast cancer screening: update 2003. CA Cancer J Clin. 2003;54:141–69.
63. Mishra SI, Bastani R, Crespi CM, Chang LC, Luc PH, Baquet CR. Results of a randomized trial to increase mammogram usage among Samoan women. Cancer Epidemiol Biomarkers Prev. 2007;16:2594–604.
64. Bailey E, Erwin D, Belin P. Using cultural beliefs and patterns to improve mammography utilization among African American women: the witness project. J Natl Med Assoc. 2000;92:136–42.
65. Nigenda G, Caballero M, González-Robledo LM. Barreras de acceso al diagnóstico temprano del cáncer de mama en el Distrito Federal y en Oaxaca. Salud Publica Mex. 2009;51(Supl 2):S254–62.
66. Visvanathan K, Chlebowski RT, Hurley P, et al. American society of clinical oncology clinical practice guideline update on the Use of pharmacologic interventions including tamoxifen, raloxifene, and aromatase inhibition for breast cancer risk reduction. J Clin Oncol. 2009;27(19):3235–58.
67. Cuzick J, Forbes JF, Sestak I, et al. Long-term results of tamoxifen prophylaxis for breast cancer- 96-month follow-up of the randomized IBIS-I trial. J Natl Cancer Inst. 2007;99(4):272–82.
68. Vogel VG, Costantino JP, Wickerham DL, et al. Effects of tamoxifen vs raloxifene on the risk of developing invasive breast cancer and other disease outcomes: the NSABP Study of Tamoxifen and Raloxifene (STAR) P-2 trial. JAMA. 2006;295(23): 2727–41.
69. Hartmann LC, Schaid DJ, Woods JE, et al. Efficacy of bilateral prophylactic mastectomy in women with a family history of breast cancer. N Engl J Med. 1999;340(2):77–84.
70. Hartmann LC, Sellers TA, Schaid DJ, et al. Efficacy of bilateral prophylactic mastectomy in *BRCA1* and *BRCA2* gene mutation carriers. J Natl Cancer Inst. 2001;93(21):1633–7.
71. Rebbeck TR, Lynch HT, Neuhausen SL, et al. Prophylactic oophorectomy in carriers of *BRCA1* or *BRCA2* mutations. N Engl J Med. 2002;346(21): 1616–22.
72. Kauff ND, Satagopan JM, Robson ME, et al. Risk-reducing salpingo-oophorectomy in women with a *BRCA1* or *BRCA2* mutation. N Engl J Med. 2002; 346(21):1609–15.
73. Levine P, Veneroso C. Epidemiology of inflammatory of breast cancer. Semin Oncol. 2008;35(1):11–6.



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