SPECIAL ARTICLE

Health Education: Internet Resources for Teaching Units on Primary Prevention of Cancer

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INTRODUCTION

In order to find stimuli for getting young students interested in the study of cancer (C) prevention, internet resources have been searched such as scientific publications, atlases, interactive images, animations and quizzes.

Aims of the teaching unit: The study can increase the awareness of the importance of lifestyle on reducing the risk (R) of C and, perhaps, simultaneously of other diseases. Some R factors, are not modifiable. It is important to know them, since they identify who is at highest R and may benefit from rigorous prevention.

MATERIALS AND METHODS

An online publication dealing with incidence and mortality for C, in several Countries (Parkin et al., 2005), is available. There is also the IARC interactive Atlas[1]. It can be accessed by selecting *Globocan 2002* and then *cancer map*.

The sites of the National Cancer Institute[2] and American Cancer Society[3,4] provide much information. From the home page of the latter, by selecting *Choose a cancer topic*, and then *all about ...* the guide for all types of C can be accessed, full of information on prevention. Typing instead *quiz about cancer*, there are questions and answers usable in teaching activities.

The Tobacco Atlas[5] is available as well.

The sites of PubMed Centra[6] and Entrez-Pubmed[7], are important resources for the search of scientific papers of biomedical and life sciences. To find what factors lower or increase the R, by Entrez Pubmed, you can write in the search bar, for example *tomato cancer risk*, or *water chlorination cancer risk*. After selecting a title, on the left side of the video its abstract appears.

Simultaneously on the right side, notices about the availability of the full text and below, the titles of related articles appear.

A paper, (Anand P. et al., 2008) full of diagrams, is dedicated to the causes of C and some protective substances contained in food. There is also a document of WHO on C[8] and some animations[9,10,11].

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The documents mentioned in this paper, downloaded for free, have been the base of this manuscript. A teaching unit, using these documents, may cut across several disciplines.

DISCUSSION

The graphs and the tables published in the mentioned IARC document, show large R differences between countries. For example, the annual incidence of stomach C, per 100,000 women is 4.2 cases in Australia and 26.1 in Japan. There are large R differences by geographic area that may suggest a clear challenge to prevention. This is also confirmed by the studies of migrants. When they acquire the local lifestyle they also tend to conform to the sanitary R of the host Country.

In Korea the standardized incidence rate of stomach C, is 66.5-72.5 cases per 100,000 men, according to the region. In the U.S., among Korean immigrants, it drops to 30.24 thus approaching the 7.07 rate of white Americans. Stomach C is also associated with the consumption of high-sodium pickled food, frequent in Korea. Tobacco, smoked food and nitrites intensify the R, as well as infection by *Helicobacter pylori*. A high intake of fruits and vegetables is a protection factor.

In Korea (Lee et al., 2007), the standardized rate of incidence for colon C is 7.4-13.1 cases per 100,000 men, according to the region. In the U.S., among Korean immigrants it rises to 20.48 thus approaching the rate of 26.91 of white Americans. Colon C is very common in Western countries. It is also linked to smoking, alcohol, obesity, high fat diet and red meat, especially when cooked at high temperatures.

In the tables of Lee et al., it can also be observed the R differences, in the U.S. population, between white and colored, between males and females.

The lung C is the most widespread in the world. 85% of the cases are caused by *smoking*, which also raises the R for the mouth, larynx, throat, esophagus, bladder, kidney, pancreas, cervix, stomach and leukemia. Smoking has many other negative consequences, as can be seen in the WHO[13.] Atlas of Heart Disease and Stroke.

In many countries *radon* is the first cause of lung C for non-smokers. This radioactive gas exhales from the soil surface. The intensity of the flow depends on the local geology. Water and certain materials for building may emit radon. Its low concentration in the open leads to almost negligible harm. In some buildings, particularly in basements with limited air change, dangerous concentrations can be reached. The intensity of the exhalation may vary over time, e.g., in South Tyrol (Italy), when the soil freezes, the concentration of radon in buildings increases.

It is believed that the obstacles that ice opposes to the exhalation of radon from the soil intensifies the escape through those points where there is no frost, such as basements, especially if there are cracks in the foundations. In some countries, if radon concentration exceeds certain levels, remediation of the building is compulsory. The WHO Handbook on Indoor Radon is available[14]. *Diesel exhaust* can be another R factors for the lungs.

Obesity and generally being overweight, according to many studies raises the C R especially for breast, colon, endometrium, esophagus and kidney; they entail higher cardiovascular R too.

In some emerging countries, as a consequence of modernization, obesity is spreading; this process is continuing also in many industrial countries. Two animations about USA[15], show growing obesity and diabetes in parallel.

According to Young et al. (2002), obesity has been spreading in the USA since the 70s, also in relation to the growth of the commercial portions of foods and drinks in markets as well as in restaurants. The WHO dedicated a site to childhood obesity[16], providing suggestions for schools and families. Two related documents are the "walking bus"[17] and the school garden[18] projects.

Fruit and vegetables are protection factors for the C of lung, mouth, esophagus, stomach and colon. It is advisable to eat daily 5 or more servings of vegetables and fruit, in addition to pulses, as well as to prefer whole grains rich in fiber rather than refined ones. A moderate consumption of red meat, especially if preserved, is advised. It is also better to avoid high temperature cooking.

Alcohol abuse increases R for the mouth, pharynx, larynx, esophagus, liver and breast.

Breast C is very common in Western countries. The R is intensified by factors not modifiable (or difficult to change) including e.g., menstrual activity started at early age, cases of breast C among family members, menopause at late age, nulliparity or first childbirth after age 30. But there are also modifiable R factors. Weight gain during adulthood is associated with a higher R after menopause. Alcohol is clearly linked to an increased R for the breast, particularly for women whose folate intake is low. Breastfeeding, especially if continued 1.5-2 years is linked to a slightly lower R. Exercise has a beneficial effect on body weight and on the production of hormones involved in the R. According to several authors e.g. Carpenter et al. (1999), the R drops significantly due to intense physical activity. According to Mittendorf et al. (2004), available in the internet only as an abstract, the R is halved by a strenuous physical activity between 14 and 22 years of age.

Physical activity reduces the R for breast, prostate, colon and endometrium; it may also prevent cardiovascular diseases[19] and is beneficial for the bones (Karlsson et al. 2008)

According to the IARC[20], professions that involve night shifts over long periods are probably carcinogenic. This is associated with disruption of circadian rhythms, which suppresses the production of melatonin, a hormone to which a protective effect against C is attributed.

According to Pukkala et al. (2009) the profession influences the R, as observed over 15 million Scandinavian workers followed up between 1960 and 2005. The study provides data on all cancers R, as well as the R for single parts of the body and for each occupational category.

The standardized incidence rate for all malignant neoplasms, for example, is 1.48 for waiters and 0.83 for farmers. The standardized R rate for the colon is 1.52 for chimney sweeps and 0.75 for forestry workers. In other countries, where environments and laws are different, the R might be different (Author's note).

Among the R factors for the esophagus are tobacco, alcohol, obesity and *gastroesophageal reflux*. This latter, is shown by an animation[21]; gastric acid and partially digested food refluxes up in the esophagus thus irritating its lining and causing symptoms such as heartburn. In the long term the complications that may follow increase the R by 30-125 times.

A study of Festi et al. (2009) deals with the prevention of reflux. The intake of large amounts of foods and drinks at high temperature, according to some studies, raises the R. Continued exposure to chemical fumes or solvents, as happens for dry cleaning workers, increases the R of esophagus C. Children saved after accidental swallowing of lye are also more exposed to R of esophageal C, which occurs on average about 40 years after the ingestion.

A high *salt* intake (preserved foods often contain a lot of sodium chloride), increases R for stomach, nose and throat and can also increase blood pressure.

The American Cancer Society advises that we should use with caution nutritional supplements,

letting a natural and balanced diet supply to the body what it needs. Greater lung C R for smokers as a consequence of supplements with beta carotene has been reported. Diets providing the right amount of calcium, as compared to others poor in this element, are linked with a lower C R of the left colon. According to some studies, but not all, an excessive intake of calcium increases the R for prostate C. Prostate C is among the most common in the world. It is worth observing that mortality in China is 15-20 times lower than in Western countries. The R can be lowered by avoiding tobacco, remaining lean and physically active.

In tropical countries exposure to aflatoxins contained in cereals contaminated with *Aspergillus fumigatus* increases the R for the liver. Prolonged use of anabolic steroids can slightly raise the R.

The infection by *B or C hepatitis*, inter alia, greatly raises the R to the liver; 75% of cases worldwide are caused by these two viruses. Infection from *human papillomavirus* increases the R for cervix, vulva and anus. In Africa *HIV* infection brings a higher R of contracting Kaposi's sarcoma. Protected sex can decrease the chances of transmitting the viruses mentioned above.

Many studies have been carried out investigating the relationships with stressful life events, personality and C risk. According to several authors, further investigations are needed for a better understanding of this subject. The papers of Chen et al. (1995) and Bergelt et al. (2006) are mentioned in this regard.

CONCLUSION

The notes set out above are intended only to provide just an idea about how various and perhaps sometimes unexpected situations may affect the R. A reflection about the most suitable behavioural patterns can be stimulated.

From the IARC home page[22], selecting *publications* and then *PDFs online*, several publications including monographs that allow further deepening can be accessed.

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