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Question

- 1. Write on cancers epidemiology in Africa generally, and Nigeria in particular.**
- 2. Critically examine the involvement of angiogenic genes in the development and progression of osteosarcomas.**

1- IN AFRICA : Cancer is an emerging public health problem in Africa. About 715,000 new cancer cases and 542,000 cancer deaths occurred in 2008 on the continent, with these numbers expected to double in the next 20 years simply because of the aging and growth of the population. Furthermore,

cancers such as lung, female breast, and prostate cancers are diagnosed at much higher frequencies than in the past because of changes in lifestyle factors and detection practices associated with urbanization and economic development. Breast cancer in women and prostate cancer in men have now become the most commonly diagnosed cancers in many Sub-Saharan African countries, replacing cervical and liver cancers. In most African countries, cancer control programs and the provision of early detection and treatment services are limited despite this increasing burden. cancer. (Cancer 2012;000:000–000. VC 2012 American Cancer Society.)

Cancer is an increasing problem in Africa because of aging and growth of the population as well as increased prevalence of risk factors associated with economic transition (including smoking, alcohol, obesity, physical inactivity, and reproductive behaviors), and of certain infectious agents of importance in cancer etiology. According to United Nations population estimates the population of Africa between 2010 and 2030 is projected to increase by 60% overall (from 1.03 billion to 1.63 billion) and by 90% for those 60 and older (from 55 million to 103 million), the age at which cancer most frequently occurs.

Despite this growing burden, cancer continues to receive a relatively low public health priority in Africa, largely because of limited resources and other pressing public health problems, including communicable diseases such as Acquired Immune Deficiency Syndrome (AIDS)/Human Immunodeficiency Virus (HIV) infection,

malaria, and tuberculosis. Another factor may be a general lack of awareness among policy makers, the general public, and international private or public health agencies, concerning the magnitude of the current and future cancer burden on the continent and its economic impact.

The incidence of all cancers is however rising. A complex web of poverty, ignorance, inadequate diagnostic and treatment facilities has made cancer outcomes worse in SSA in comparison with other world regions. This chapter provides an overview of cancer burden in SSA using data from cancer epidemiology databases and peer-reviewed publications. Age-standardized Cancer Incidences in SSA were obtained from the International Agency for Research in Cancer (IARC) publication – ‘Cancer incidences in five continents’. Recent cancer estimates were from GLOBOCAN 2008 (Ferlay et al. 2010) and GLOBOCAN 2012 (Ferlay et al. 2013). Cancer mortality was from WHO Mortality Database. The five commonest cancers in males in SSA in (Ferlay et al. 2013)

In the WHO **Africa** region, in 2012, the estimated age-standardized **incidence** rates for all **cancers** (excluding non-melanoma skin **cancer**) were 645 per 100,000 population (both sexes), 265 per 100,000 in males and 381 per 100,000 in females (Ferlay et al. 2012).

IN NIGERIA :

In Nigeria, some 100 000 new cases of cancer occur every year, with high case fatality ratio.[Ferlay J,2010] With approximately 20% of the population of Africa and slightly more than half the population of West Africa, Nigeria contributed 15% to the estimated 681,000 new cases of cancer that occurred in Africa in 2008.[Sylla BS,2011] Similar to the situation in the rest of the developing world, a significant proportion of the increase in incidence of cancer in Nigeria is due to increasing life expectancy, reduced risk of death from infectious diseases, increasing prevalence of smoking, physical inactivity, obesity as well as changing dietary and lifestyle patterns..[Sylla BS,2011]

Despite the threat that cancer poses to public health in sub-Saharan Africa (SSA), few countries in this region have data on cancer incidence.[Curado MP,2008].

In recent times, information on cancer incidence, prevalence and mortality in Nigeria has been based on estimates from case series, medical records, mortality records, hospital based cancer registries and the Ibadan population based cancer registry (IBCR).[Parkin DM, 2003] IBCR, located at the University College Hospital Ibadan and set up in 1962, is the first cancer registry in Nigeria. Cancer incidence data from this registry were published for the time periods 1960–1962, 1960–1965, and 1960–1969

in the first three volumes of Cancer Incidence in 5 Continents (CIV). However, due to logistic problems the registry suffered some setbacks from the 1970s to 2000s.

Since 2009, the Nigerian Federal Ministry of Health (FMOH) and the Institute of Human Virology Nigeria (IHVN) have initiated a program of National System of Cancer Registries to strengthen existing cancer registries and establish new ones through provision of baseline training for newly established registries; continuing education for older registries; mentoring, computer hardware and software provision and support; data management and analysis. In this paper, we present estimates of cancer incidence in Nigeria based on data from 2 population-based cancer registries in the system. These registries cover defined populations and use multiple source reporting.

The Ibadan Cancer Registry is located in one of the oldest cities in Nigeria, Ibadan, a small city in Oyo state, Southwestern Nigeria. The major ethnic group in this region is Yoruba, one of the largest ethnic groups in Africa. The common religions in this area are Islam and Christianity. The major source of income is agriculture and industries. In contrast, the Abuja Cancer Registry (ABCR) is located in the modern capital city of Abuja Nigeria which is centrally located and home to people of varied ethnic groups and religions. Abuja is the more developed of the two cities and houses major multinational companies, foreign embassies, the legislative and executive arms of government, and is attractive to young people seeking job opportunities and career advancement.

2-Osteosarcoma is a malignant tumor of mesenchymal origin and primarily occurs in children, adolescents, and young adults. This pleiomorphic tumor of the bone, based on animal model systems (Gorlick R,2003), depends on new blood vessel development, also known as angiogenesis, for tumor growth and metastasis. Although modern multimodality treatment has significantly improved tumor resectability and the long-term outcome of these patients, 25–35% of patients with initially non-metastatic disease subsequently develop metastasis and this remains the major cause of death (van Maldegem AM *et al*,2012). At the same time, axial skeletal osteosarcoma preliminarily responds poorly to chemotherapy and has been proven to have an even more dismal prognosis (Dickerson ME,2001). From the review of van Maldegem *et al* and Lagmay *et al*, we concluded that in the past two decades, published phase I/II clinical trials on chemotherapy for osteosarcoma failed to make significant progress in refractory cases. With the study of oncogenesis and pathobiological behavior of osteosarcoma, we know that new blood vessel formation (angiogenesis) is fundamental to tumor growth, invasion, and metastatic dissemination.

Several groups have evaluated tumor micro-vessel density and outcome in osteosarcoma (MacGabhann F, *et al*). Expression of VEGF has been suggested as a means of evaluating the prognostic importance of angiogenesis in osteosarcoma (DuBois S,2007). Monotherapy with second-generation broad-spectrum VEGF

receptor tyrosine kinase inhibitors (TKIs) in sarcoma has now become an area of active research and application beyond gastrointestinal stromal tumors (GISTs). Within all of those preclinical experiments and clinical trials the milestone of the treatment on advanced osteosarcoma should count on the application of anti-angiogenesis TKIs sorafenib on refractory cases from the Italian Sarcoma Group which officially raised the 4-month progression-free survival (PFS) from <30–46% for the first time. However, things had seemed not to change as dramatically as was expected since then. The main hurdle that researchers need to get over should be sensitivity and drug-resistance (Neul C, Schaeffeler E,2016).

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