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Virus linked cancers, what they are, and how they are treated today

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Abstract

Viruses are ow known to be linked to cancer. Six viruses are responsible for approximately 15% of the worlds cancer diagnoses. Both DNA and RNA viruses can lead to cancerous tumors. Hepatitis B and C, Epstein-Barr virus, human herpesvirus 8, human papillomavirus, and human T lymphotropic virus type 1 are the six viruses responsible for cancer related to a viral infection.

Introduction

In the world there are approximately one million viruses, with about 15% of these viruses being linked to cancer. According to Tristan A. Scott and Kevin V. Morris in their review paper, *"Designer nucleases to treat malignant cancers driven by viral oncogenes",* about 15% of known caners are caused by viruses. This 15% of virus-linked cancer is caused by only six viruses. In John B. Liao's *"Viruses and human cancer"* he mentions the most common viruses linked to cancer. In *Viruses and human cancer*, John B. Liao the viruses that are considered to be cancer-linked, "Epstein-Barr virus, human papilloma virus, hepatitis B virus, and human herpes virus-8 are the four DNA viruses that are capable of causing the development of human cancers. Human T lymphotrophic virus type 1 and hepatitis C viruses are the two RNA viruses that contribute to human cancers." These viruses do not always lead to cancer; it can take years to progress to cancer. "The path from viral infection to tumorgenesis is slow and inefficient; only a minority of infected individuals progress to cancer, usually years or even decades after primary infection."

Viruses are also not the only thing needed for them to lead to cancers, according to John B. Liao other factors also have to be present to possibly lead to cancer. In *Viruses and human cancer* the author, John B. Liao, mentions what other factors need to be present to aid in the formation of cancer where he says, "Virus infection also is generally not sufficient for cancer, and additional events and host factors, such as immunosuppression, somatic mutations, genetic predisposition, and exposure to carcinogens must also play a role." Virus-linked cancers may be a small percentage of 15%, but this percentage is made up of only six viruses.

Two of the viruses mentioned, are Hepatitis B and C, these viruses are what are known as RNA viruses. Hepatitis infects the liver and it is estimated to be about 3% of the world's population are actually carries for the Hepatitis C

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virus. This virus is transmittable through blood. Hepatitis C can cause hepatocellular carcinoma. While Hepatitis B is a DNA virus it is very similar to Hepatitis C. Hepatitis B is also transmittable through blood and can also be contagious for up to three months. A chronic infection caused by Hepatitis B can also lead to hepatocellular carcinoma. Hepatocellular carcinoma is a tumor that is a result from liver disease. There are multiple resolutions to treat hepatocellular carcinoma including, "The traditional foundation of treatment is surgical, whether tumor resection or transplantation. However, nonsurgical options such as percutaneous ethanol injection, transarterial embolization, radiofrequency ablation, chemotherapy, and radiotherapy are also utilized.", according to John B. Liao in *Viruses and human cancer*. According to John B. Liao vaccines utilized in the treatment of Hepatitis B and Hepititis C are the first cancer prevention vaccine available. In direct quote from his paper *Viruses and human cancer*, "The introduction of vaccines against hepatitis B virus in the early 1980s marked a major milestone with what might be considered the first cancer prevention vaccine."

The next cancer-linked viruses are the Epstein-Barr virus and human herpes virus 8.

Recent Progress

The most recent discovered virus that is related to cancer is the Merkel cell polyomavirus (MCPyV), metioned by Tristan A. Scott and Kevin V. Morris. Tristan A. Scott and Kevin V. Morris mention Merkel cell polyomavirus in "*Designer nucleases to treat malignant cancers driven by viral oncogenes*", saying, "Merkel cell polyomavirus (MCPyV) is the most recently discovered oncogenic virus [93] and is ubiquitously present in the human population as it is acquired in the first years of life, and generally does not cause any symptoms. Polyomaviruses have long been known to transform cultured cells (SV40) [94], but it was many years before MCPyV, the first human oncogenic polyomavirus agent, was found in 80% of Merkel cell carcinomas (MCC), a rare and aggressive skin cancer [93]. MCC occurs in immunocompromised individuals, but mostly in the elderly with a median diagnosis age of ~ 70 years old [95], but with a 95% increase in MCC diagnoses since 2000 [96] and a 5-year mortality rate of > 40%, makes it an aggressive skin cancer in need of therapeutic solutions."

Discussion

[Discussion here]

References

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