A review on cytomegalovirus causing cancer in human

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Abstract

Cytomegalovirus is a kind of herpes virus, HHV-5. It primarily causes congenital infections and the fetal abnormalities during pregnancies. Sometimes, very serious complications and consequences may occur. As human cytomegalovirus is a ubiquitous virus occurring worldwide in nature their infections are very common in human. It has got lifelong latency in human with their reactivation causing cancer in future. The present paper deals with the study of causes and consequences of disease complex and the development of cancer by primary infection and the reactivation of HCMV in human.

Keywords: Human cytomegalovirus, Congenital infection, Disease complex, Reactivation, Cancer.

INTRODUCTION

Cytomegalovirus, also known as human herpes virus-5 is an enveloped, double stranded linear DNA virus belonging to the family Herpesviridae. It is one of the TORCH infections developing different diseases including cancer in human. Human cytomegalovirus (HCMV) is a ubiquitous herpes virus whose frequency of infection ranges from 50 % to 100 % in the general adult population. It causes significant morbidity and mortality in children during pregnancy (Michaelis et al. 2009 and Georges and Amit 2014) [1, 2]. If a female contracts the virus for the first time while pregnant or reactivated the same hidden virus she has, her unborn baby is at higher risk of receiving the virus vertically (Leung et al. 2003) [3]. The virus produces several anomalies in the developing fetus and the child thus delivered might be suffering from certain fatal myocarditis. It may cause heart failure (Schonian et al. 1995, Kyto et al. 2005, Magno et al. 2016) [22-24]. Similarly, cytomegaloviruses sometimes, developed gastrointestinal infections causing enterocolitis (Patra et al. 1999, Kaufman et al. 1999) [11, 12], inflammatory bowel disease (Rowan and Cannon 2018) [25], gastric mucosal lesions (Himoto et al. 2009) [26], multiple ulcers of the ileum (Taniwaki et al. 1997) [8].

Further, the relationships between cytomegalovirus infection and the development of Gullain Barry Syndrome and the association of CMVs with veneral diseases have also been established (Jordan et al. 1973 and Lunn and Hughes 2011) [19, 20]. In addition, thrombocytopenia is also caused by the cytomegalovirus (Simpson et al. 2016) [21]. The CMV infection of the heart is common in patients with fatal myocarditis. It may cause heart failure (Schonian et al. 1995, Kyto et al. 2005, Magno et al. 2016) [22-24]. Similarly, cytomegaloviruses sometimes, developed gastrointestinal infections causing enterocolitis (Patra et al. 1999, Kaufman et al. 1999) [11, 12], inflammatory bowel disease (Rowan and Cannon 2018) [25], gastric mucosal lesions (Himoto et al. 2009) [26], multiple ulcers of the ileum (Taniwaki et al. 1997) [8].

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Acquired CMV are spreading through liquid transmission via body fluids such as saliva, semen, blood, urine, vaginal fluids and breast milk. It is known to infect most organs of the human body including brain, breast, colon, eye, kidney, liver and lungs. But healthy people very rarely become significantly sick from CMV infection. Although, CMV may be found at any part of the adult human body, their most preferable place has been reported to be the salivary glands (Koichi et al. 2007) [31]. HCMV remains latent within the body throughout life but it may reactivated at any time causing mucocutaneous carcinoma of salivary gland (Melnick et al. 2011) [33] and other malignancies like prostate cancer in men (Geder et al. 1977) [32] and breast cancer in women (Georges and Amit 2014 and Richardson et al. 2019) [2, 34]. Similarly, HCMV significantly accelerated the development and progression of glioblastoma, a deadly form of brain cancer (Price et al. 2013, Wolfgang and Michael 2014, Christian et al. and Rahman et al. 2019) [35-38].

Further, anti CMV antibodies produced as IgM and/or IgG could be used as a marker for acute (IgM) or chronic infections (IgG) of the same virus in the body. A definitive diagnosis is done by culturing the virus or by detecting its DNA or specific protein including the inclusion bodies picture as look like an “owl’s eye” under the microscope (Mattes et al. 2000) [39]. Lastly, there is no vaccine available for CMV infection. However, an antiviral drug named ganciclovir (cytovene) is a first drug of choice these days (Baldanti 2003, Glock et al. 2004 and Revello and Gerna 2004) [30-44].

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CONCLUSION
CMV infections are very common creating no any problem to the carrier because it remains dormant in the body lifelong and can cause complications only during pregnancy or when the body becomes either immunocompromised or immunosuppressive especially after organ transplantations (Razonable and Paya 2003) [40]. Some very serious complications and consequences may occur during pregnancy suffering from CMV infections are premature birth, weight loss, microcephaly, hearing loss, blindness, mental retardation, cerebral calcification causing psychomotor retardation, low I.Q., cerebral palsy, lack of coordination, muscular weakness and seizures. Further, it has also been observed that very rarely healthy people become significantly sick from CMV infections in their later half of life but unfortunately, if the same virus is reactivated it may cause even cancer in human like salivary gland and prostate cancers, brain tumour and breast cancer in human female. Currently, there is no vaccine available for the treatment of CMV infections. However, an antiviral drug named ganciclovir (cytovene) is a drug of choice these days (Baldanti 2003, Landolfo et al. 2003, Rawlinson and Scott 2003, Schottstedt et al. 2010) [5, 6, 40, 46].

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