Promoting Cardiovascular Health in Patients Living with Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome

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KEYWORDS

• HIV/AIDS • Cardiovascular disease • Cardiomyopathy • Coronary disease

KEY POINTS

- Human immunodeficiency virus infection is a chronic health condition.
- Cardiovascular disease has increased in patients living with human immunodeficiency virus/acquired immunodeficiency syndrome (PLWHA) because of increased life expectancy.
- Early detection and treatment of cardiovascular disease is essential for health promotion in PLWHA.

INTRODUCTION

Approximately 37 million people around the world are living with human immunodeficiency virus (HIV).[1] HIV infection alters normal immune system function and can progress to advanced-stage acquired immunodeficiency syndrome (AIDS). Since the beginning of the HIV/AIDS epidemic in the 1980s, more than 35 million HIV/AIDS-related deaths have been reported.[2] Worldwide, close to 1.1 million people died of HIV/AIDS-related causes in 2015.[3] Sub-Saharan Africa has the highest number of patients with AIDS and the highest number of new cases of HIV infection diagnosed each year, accounting for 65% of all new cases of HIV diagnosis annually.[2] In the United States, new cases of HIV infection decreased 18% from 2008 to 2014.[3] It is estimated that there are 1.1 million adults and children in the United States living with HIV infection. A reported 15% of individuals with HIV infection in the United States are unaware of their HIV status and are undiagnosed.[3]

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Despite research and advances in treatment of individuals with HIV infection, there remains no cure for this disease. Use of antiretroviral treatments (ART) has decreased HIV-related morbidity and mortality because of effects on viral replication and progression of the disease to AIDS.[4] The World Health Organization (WHO) reports that 18.2 million people worldwide were receiving ART by mid-2016.[2] Access to ART could prevent an estimated 21 million deaths and 28 million new cases of HIV/AIDS by 2030.[2] Current evidence-based guidelines recommend use of ART for all individuals infected with HIV regardless of age or CD4+ cell count.[1,2]

As HIV-related morbidity and mortality have decreased with the use of ART, the number of people living with HIV/AIDS (PLWHA) has increased.[1] With increased life expectancy, the effects of HIV infection on major body systems and resulting heart, lung, and blood diseases have become more apparent.[5,6] Cardiovascular disease conditions, including dyslipidemia, coronary artery disease, peripheral vascular disease, cardiomyopathy, cardiac arrhythmias, myocardial disease, pericardial disease, and valvular disease, have increased in PLWHA as a result of the direct effects of the HIV virus on cardiovascular tissue and the effects of ART regimens.[1,7,8] An overview of the effects of the HIV virus and ART on the cardiovascular system is presented in this article.

HISTORY

The earliest cases of HIV/AIDS were first identified in the early 1980s. All early cases were similar in presentation with pulmonary infection and profound immune deficiency. The extreme immune deficiency was determined to be from a viral infection identified as a retrovirus and named HIV. Unlike other viruses, a retrovirus has its genetic transcription on 2 copies of a single RNA strand rather than on double-stranded DNA.[4] The HIV retrovirus gains access to the immune system by invading CD4+ T-helper cells. Through a multistep process, the enzyme reverse transcriptase converts single-strand viral RNA to double-strand DNA, which is then integrated via the enzyme integrase into the genetic DNA molecule of the host cell. New viral cells can form in the host cell and cause lysis of the host cell and release of the newly formed viral particles if the host cell is activated. The host cell may also remain dormant and the viral particles latent for an extended period of time. The enzyme protease is required for final protein synthesis and maturation of the newly formed viral cells within the host cell.[9] As newly formed HIV viral cells are released into the blood stream, invasion of CD4+ T-helper cells by the HIV virus continues and results in altered immune system response. The immune system becomes overwhelmed and unable to protect itself from the HIV virus and invasion from other opportunistic micoorganisms.[4] The time from HIV infection to development of clinical symptoms is variable and is reported to be as long as 10 years in some individuals.[10]

The first antiretroviral drug, zidovudine, was introduced in 1987.[11] Initial treatment response to antiretroviral medication in patients infected with HIV was encouraging. However, viral resistance developed and zidovudine as a single agent became less effective against HIV infection. A new antiretroviral drug class, protease inhibitors (PIs), was first introduced in the 1990s.[11] Additional new drugs classes introduced during this time targeted different steps in the HIV infection process. The new antiretroviral drugs, known as highly active ART, were more effective in controlling HIV viral replication and progression.[9]

At present, there are 6 classes of antiretroviral drugs available that target different steps in the HIV viral infection and replication process. Reverse transcriptase