



# The Need for Routine Monitoring of Cardiac Function in Patients Receiving 5-Fluorouracil Infusion

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Fluorouracil (5-FU) is an antimetabolite that has become the cornerstone chemotherapeutic agent used to treat tumors of the gastrointestinal tract. Although proven to be effective, 5-FU can cause cardiotoxicity, which can be life-threatening. Adverse cardiac-related events induced by 5-FU include angina pectoris, myocardial infarction, supraventricular tachycardia, and atrial fibrillation. Nurses play a crucial role in the routine monitoring of cardiac function by identifying patients at high risk of developing 5-FU-related cardiotoxicity, monitoring patients during treatment, and then implementing specific interventions if 5-FU-related cardiotoxicity is identified or suspected. This article discusses the relevance of 5-FU-related cardiotoxicity, highlights the need for routine monitoring of cardiac function, and discusses methods of early detection and management.

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A 74-year-old man with a history of diabetes and hypertension was diagnosed with gastric cancer in 2013. The treatment plan included 5-fluorouracil (5-FU) as a continuous infusion for 48 hours administered on an outpatient basis. On day one of the third course, the patient presented to the emergency department with complaints of substernal chest pain and dyspnea. An electrocardiogram revealed supraventricular tachycardia. The 5-FU infusion was discontinued. Nonpharmacologic measures to revert the patient's heart rate to normal were employed, but were unsuccessful. The patient was given IV adenosine, which resolved the tachycardia, and he was admitted to the cardiac unit for further monitoring.

## Introduction

5-FU is an antimetabolite, which has been in use since 1957 (Deboever, Hiltrop,

Cool, & Lambrecht, 2013). To date, 5-FU is considered the cornerstone chemotherapeutic agent in gastrointestinal tumors, such as colorectal, stomach, esophageal, and pancreas. Other malignancies treated by 5-FU include those in the breast, head and neck, cervical, renal, bladder, and those of unknown primary (Sorrentino, Kim, Foderaro, & Truesdell, 2012).

Like most chemotherapeutic drugs, 5-FU has toxic effects, which include myelosuppression, mucositis, and diarrhea (Sorrentino et al., 2012). Cardiotoxicity caused by 5-FU administration is a rare, but potentially serious, side effect. The incidence of 5-FU-induced cardiotoxicity has been documented in several studies. The most common abnormalities experienced were ST elevation and ST depression. Other electrocardiogram abnormalities included increased QT intervals and inverted T waves (Ceyhan et al., 2004; Kosmas et al., 2008; Oztot et al.,

2004; Tsavaris et al., 2002). The purpose of this article is to advise nurses on the need for routine monitoring of cardiac function, and to provide information to assist with early detection, resulting in prompt management of cardiotoxicity.

## Incidence

In 1975, Roth et al. described the first case of 5-FU-related adverse cardiovascular event. Since then, several studies have described 5-FU-induced cardiotoxicity. Four large, prospective studies described the incidence of cardiotoxicity related to 5-FU administration as ranging from 1.2%–4.3% (Jensen & Sørensen, 2006; Kosmas et al., 2008; Tsavaris et al., 2002; Tsibiribi et al., 2006). In three of the four studies, the participants' past medical history was free of cardiac disease (Kosmas et al., 2008; Tsavaris et al., 2002; Tsibiribi et al., 2006). Two smaller studies demonstrated that 9%–11% of patients exposed to 5-FU developed cardiac-related complications (Sudhoff et al., 2004; Jensen, Hasbak, Mortensen, & Sørensen, 2010).

Compared to patients with no cardiac history, the incidence of cardiotoxicity is higher in patients with a history of cardiac disease. Schöber et al. (1993) described the incidence of cardiotoxicity to be 15% in people with known cardiac disease, compared to 2% in those without prior cardiac disease. The mortality rate from 5-FU-related cardiotoxicity ranged from 0%–8% (Polk, Vaage-Nilsen, Vistisen, & Nielsen, 2013). Combined, the overall incidence of 5-FU-related cardiotoxicity is 1%–11%.

## Clinical Presentation

In most patients, 5-FU-related toxicity usually occurs during the first course