

# Nanotherapeutics for colon cancer

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## 13.1 Introduction

The term colorectal express the physiology of both the colon and rectal. Cancer of the colon and rectum are together called colorectal cancers (CRC) occurs when abnormal cells grow in this region. This broad term is used due to the fact of the difficulties in distinguishing cancers emerging in the region of the colon ends or the rectum begins. CRC is the third-highest rigorous health problem among the tumor causing conditions in developed and developing countries. It is the third most commonly found cancer and the fourth most cause of death related to cancer. Colon cancer is the prime reason for morbidity and death in the population of western countries (Ryan-Harshman and Aldoori, 2007; Favoriti et al., 2016). Lifestyle and diet being the most apparent risk factors, it is most prevalent in developed countries than the developing countries. It is predicted that by the year 2035 the overall cases of CRC may be increased to 2 to 3 million as a result of changing lifestyles in developing countries (Bray et al., 2018).

After assessing the anatomy and pathophysiology of CRC, we will look forward to the various perspective of CRC such as origination, genesis, initiation and progression. Several factors are responsible for the initiation and progression of CRC including genes, lifestyle, age, personal and family history, smoking being, etc. Environmental factors like chemicals, infectious agents, radiations and genetic factors like mutations, immune system, and hormonal dysfunction can interact in various ways to exaggerate the carcinogenesis (Giovannucci, 2001; Nakaji et al., 2003).

CRC mostly starts in the bowel lining and can grow into muscle layers and then eventually through the bowel wall. The reported etiology is hyperplasia due to activated oncogenes that can save the cancerous cell against apoptosis. Moreover, dysfunction of cellular processes owing to the inactivation of tumor suppressor genes in cancer cells has also been reported. The major intention of cancer therapy is to destroy the cancer cells without making any harm to the normal cells and hence it is very much empirical to search for the selective or targeted drug delivery system as a cancer therapy (Dujovny et al., 2004; Standing, 2019).

### 13.1.1 Anatomy

The colon and the rectum form the large intestine, which is a part of the gastrointestinal tract (GIT). Anatomically, the large intestine is divided into seven parts (Fig. 13.1) such as the cecum; the ascending, transverse, descending, and sigmoid colon; the rectum; and the anus. The rectum is an eight-inch section of the large intestine at the end of the colon. The anus is the final three inches part of the colon through which fecal matter is expelled. The ring of muscle located at the anus is called the sphincter which helps for controlled removal of feces from GIT (Granados-Romero et al., 2017; Kim, 2020). The wall of the large intestine comprises four structural layers:

- A. The innermost layer is the mucosa, which is composed of three separate sublayers: Epithelium, connective tissue, and muscle. The epithelium, which contains crypts (pits or depressions) and encompasses immediate contact with the contents of the colon. The cells deep inside the crypts have a high proliferative index and are the originating site of most CRC.
- B. The submucosa is the second layer of the large intestine and contains more connective tissue, blood vessels, lymphatic glands, and nerves.