Panchakshri Shivacharya Trust's Est :- 1973
**Channabasweshwar Pharmacy College (Degree)**
Kava Road, Basweshwar Chowk, Latur-413512 (Maharashtra)
Phone No. (02382) 240192, Fax-(02382) 243855
Email- channabasweshwar@gmail.com Website- www.cdphl.org
Approved by:- Govt. Of Maharashtra, AICTE & PCI New Delhi, Affiliated to :- S.R.T.M.University Nanded.
DTE Code :- 2253, University Code :- 947

## Report of the Collaborative Events with Professor, Hyun Tae Jungs Lab, Dept. of Chemical engineering, Hanseo University, Seaosan-Si, South Korea

Channabasweshwar Pharmacy College (Degree), Latur and Professor, Hyun Tae Jungs Lab, Dept. of Chemical engineering, Hanseo University, Seaosan-Si, South Korea entered into collaboration for mutually beneficial research programs which serve to enhance the intellectual life and cultural development on both institutes as well as to promote and encourage students for research activities. The list of these events is as follows;

| Sr. No. | Activity | Date of Activity | Venue | Total No. of Participants |
|---|---|---|---|---|
| 1 | Research Paper Publication | 10/06/2021 | Dept. of Chemical engineering, Hanseo University, Seaosan-Si, South Korea and Channabasweshwar Pharmacy College (Degree), Latur. | 07 |

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College (Degree), Latur

## 1. Rsearch Paper Publication

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Research paper

# Novel 5-flurouracil-Embedded non-woven PVA - PVP electrospun nanofibers with enhanced anti-cancer efficacy: Formulation, evaluation and in vitro anti-cancer activity

Omprakash Gadgeppa Bhusnure [a,*], Sachin Bhagwat Gholve [a], Padmaja Sidram Giram [b], Abhimanu Vilas Gaikwad [c], Ubaidulla Udumansha [d], Ganesh Mani [e], Jang Hyun Tae [e,**]

[a] Department of Quality Assurance, Channabasweshwar Pharmacy College (Degree), Latur, Maharashtra, 413512, India
[b] Department of Pharmacology, Channabasweshwar Pharmacy College (Degree), Latur, Maharashtra, 413512, India
[c] Department of Pharmaceutics, Channabasweshwar Pharmacy College (Degree), Latur, Maharashtra, 413512, India
[d] Department of Pharmaceutics, C.L. Baid Metha College of Pharmacy,Chennai,India
[e] Dept of Chemical Engineering, Hanseo University, 46 Hanseo 1-ro, Haemi-myeon, Seosan-si, Chungcheongnam-do, South Korea

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ABSTRACT

In this study we describe the development of an effective nanofiber (NF) formulation that uses two low-cost and easily available polymers, PVA and PVP, to embed and release a well-known anticancer drug, 5-flurouracil (5FU), which is intended to treat colon cancer. PVA:PVP polymers in a variety of ratios (10:2, 8:4, 6:6, 4:8, 2:10) were used for NF fabrication to find the optimum composition. The selected NF composition (10:2 PVA: PVP) was then characterized by UV–Visible spectroscopy, Fourier-Transform InfraRed spectroscopy (FTIR), Scanning Electron Microscopy (SEM), and Powder X-Ray Diffraction (PXRD). The FTIR results demonstrate effective loading of the drug into the polymer matrices, this is further supported by a decrease in the intensity of the 5-FU crystallinity peak shown in the PXRD results. Drug loading experiments showed that approximately 95.97, 94.48 and 93.22% of 5–FU was successfully loaded to the selected NFs when 10, 20 and 30% initial proportions of the drug, respectively, were added. Entrapment efficiencies of 91.2, 93.85 and 96.06% by the PVA-PVP NF were achieved from initial 5-FU proportions of 10, 20 and 30%, respectively. Drug release experiments show that all of the drug-loaded NFs exhibit an initial burst of elevated drug release followed by slow sustained release over a period of more than 20 h that follows a Fickian diffusion mechanism ($n > 0.5$), we believe this mechanism controls release of the drug by a combination of diffusion and erosion. An in vitro cytotoxicity evaluation of the nanofibers against a human colorectal adenocarcinoma cell line (HT29) showed enhanced anti-cancer performance, suggesting additional advantages of these fluorouracil nanofibers.

## 1. Introduction

Colon cancer is a fatal disease that is a major cause of death worldwide. The expected growth of the global colorectal cancer (CRC) population is estimated at 60%, this means that more than 2.2 million new cases and 1.1 million deaths are expected to occur by 2030. A rapid increase in CRC incidence and mortality rates is now being seen in many developed countries, particularly in Europe, Asia and South America, these increases are thought to be caused by changes in lifestyle and eating habits. Currently, the primary choice of treatment is surgical removal, but early detection and resection is crucial for successful treatment of colorectal cancer. However, recently, the chemotherapeutic drugs that are widely used to treat CRC have been shown to lead to various types of toxicity due to their low efficacy and high required doses [1–3]. Most conventional oral dosages designed for CRC treatment are ineffective at delivering drugs to the colon due to absorption and/or degradation of the active ingredient in the upper gastrointestinal tract (GIT). Therefore, colon-specific drug delivery systems that can deliver drugs directly to the lower gastrointestinal tract without being affected by the environment of the upper GI tract, are expected to lead to a decreased incidence of side effects and give improvements to the quality of life of patients suffering from colon-specific diseases [4].

* Corresponding author.
** Corresponding author.
*E-mail addresses:* omprakashbhusnure@gmail.com (O.G. Bhusnure), sbgholve@gmail.com (S.B. Gholve), htjang@hanseo.ac.kr (J.H. Tae).

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**Prof. Dr. Bhusnure O.G.**
M. Pharm., Ph.D.
Professor & Head, Dept. of Quality Assurance
Channabasweshwar Pharmacy College
Latur (MS.), India

Channabasweshwar Pharmacy College (Degree) LATUR

**Principal**
Channabasweshwar Pharmacy
College (Degree), Latur