UTTARAKHAND STATE COUNCIL FOR SCIENCE & TECHNOLOGY
(GOVT. OF UTTARAKHAND)
DEHRADUN- 248007

PROFORMA FOR SUBMISSION OF R&D AND DEMONSTRATION PROJECTS IN THE IDENTIFIED AREAS
(Only the Online Mode of Application Will Be Accepted on Call Basis)

PART I : GENERAL INFORMATION

1. **Project Title**: Development of nano-loaded Quinazoline derivative matrix system by using different Millet's starch found in Uttarakhand as binding agent for treatment of Nonmelanoma skin cancer (NMSC)
2. **Name of the Institute/University/Organization**: School of Pharmaceutical Sciences, Swami Rama Himalayan University, Jolly grant, Dehradun, Uttarakhand 248016
3. **Status of the Institute**: Private University
4. **Name and designation of the Executive Authority of the Institute / University forwarding the application**:
5. **Category of the Project**: R&D
   (R&D ;Demonstration; Other)
6. **Specific Area**: Development of Novel Polymer based Drug delivery system
7. **Duration**: Two Years
8. **Total Cost (Rs.)**: 10,00,000/-
9. **Is the project Single Institutional or Multiple-Institutional**: Single Institutional
10. If the project is multi-institutional, please furnish the following: NA

Name of Project Coordinator: NA

Affiliation: NA

Address: NA

11. **Project Summary:**

Skin cancer is one of the most prevalent and rapidly increasing cancers globally, particularly in light of increased ultraviolet (UV) exposure and other environmental risk factors. Skin cancers primarily include basal cell carcinoma (BCC), squamous cell carcinoma (SCC), and melanoma, with melanoma being the most aggressive and deadly form. Although skin cancer is often treatable when detected early, advanced cases of melanoma or non-melanoma skin cancers can be challenging to treat, requiring more sophisticated therapeutic strategies.

The approach proposed in this project combines nano-Quinazoline loaded matrix, creating a mechanism of drug delivery that can provide sustained release action by using the different millet's starch found in Uttarakhand. The nanoparticles matrix provides a formulation that can improve drug retention at the site of action. The nano-loaded matrix aims to deliver quinazoline molecules directly to skin cancer cell's receptor for anti-proliferation, potentially increasing their bioavailability and therapeutic effects while reducing systemic exposure and side effects. The formulation's advantages include anti-proliferation of cancerous cell, prolonged drug release, and enhanced therapeutic efficacy against skin cancer. In this study, quinazoline loaded nanoparticle-based matrix will be prepared by using natural millet's-based polymer, such formulation like nano particle-based tablet/capsule, and will be intake orally. The formulation will be characterized by assessing parameters like particle size, zeta potential, FTIR, DSC, SEM, XRD, Polymer's toxicity study, drug encapsulation efficiency etc. In vitro studies will focus on evaluating the drug release kinetics, cell line study, cytotoxicity against skin cancer cell and normal cells. The expected outcomes include enhanced therapeutic efficacy of quinazoline against skin cancer, improved systemic drug delivery, encourage the health benefit of millet's-based polymers and reduced side effects compared to traditional treatment methods. This novel nano loaded tablet/capsule matrix drug delivery system holds the potential to offer a more targeted, effective, and patient-friendly treatment for skin cancer, potentially will improving patient outcomes and compliance.

PART II: PARTICULARS OF INVESTIGATORS

12. **Name:** Dr. Raghav Dixit

Indicate whether Principal Investigator/Co-Investigator: Principal Investigator

Date of Birth: 10-08-1985 **Sex:** Male

Designation: Assistant Professor

Department: School of Pharmaceutical Sciences (SPS)

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No. of Projects being handled at present: 01

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13. *Co-Principal Investigators*

A. Name: Dr. Ganesh Kumar

Date of Birth: 13-12-1978 **Sex:** Male

Indicate whether Principal Investigator/Co-Investigator: Co-*Principal* Investigator

Designation: Professor

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B. Name: Dr. Ujjawal Nautiyal

Date of Birth: 15-11-1982 **Sex:** Female

Indicate whether Principal Investigator/Co-Investigator: Co-*Principal* Investigator

Designation: Associate Professor

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No. of Projects being handled at present: 03

PART III: TECHNICAL DETAILS OF PROJECT

14. Introduction

14.1 Origin of the proposal

Non-melanoma skin cancer (NMSC) is one of the most common cancers in the world. It mostly consists of basal cell carcinoma (BCC) and squamous cell carcinoma (SCC), with BCC being the most common because of environmental factors and sun exposure (Rogers et al., 2015). Present-day therapeutic approaches, including radiotherapy, chemotherapy, and surgical excision, frequently have drawbacks such low local efficacy, systemic adverse effects, and poor specificity (Workman et al., 2016). Although polymers are frequently utilized in drug delivery systems to regulate the release of pharmaceuticals, they also pose a number of difficulties. These include problems with attaining the intended release kinetics, repeatability, scalability, and biocompatibility (Suri et al., 2007). Additionally, the long-term consequences of certain polymers on the body are not always entirely understood, and they can break down into potentially hazardous byproducts (Danhier et al., 2012, Moravkar et al. 2020, Malik et al. 2023). Thus, Promoting Uttarakhand's millets on a global scale is a timely and powerful initiative, especially as the world is recognizing the importance of sustainable agriculture, nutrition, and climate-resilient crops (Devi et al., 2014, Falsafi et al. 2019; Bhatt et al. 2023). In comparison to conventional treatment approaches, the anticipated results include decreased side effects, improved systemic drug distribution, increased therapeutic efficacy of quinazoline against skin cancer, and encouragement of the health benefits of millet-based polymers. A more individualized, efficient, and patient-friendly treatment for skin cancer may be possible with this innovative nanoloaded tablet/capsule matrix drug delivery method, which could also improve patient outcomes and compliance.