



SIKSHA 'O' ANUSANDHAN

(A Deemed to be University declared u/s 3 of UGC Act, 1956)

Accredited (3rd Cycle) by NAAC with A++ Grade

To

The Committee

Sun Pharma Science Foundation, Science Scholar Award 2023

OFFICE OF SUN PHARMA SCIENCE FOUNDATION

New Delhi: 110 001 (India)

sunpharma.sciencefoundation@sunpharma.com

Subject: Certification of Research work for Sun Pharma Science Scholar Award.

Dear Sir,

With immense pleasure I am submitting herewith the nomination in favour of Sri Rakesh Swain, working as Ph D research scholar under my supervision in **Siksha 'O' Anusandhan** (Deemed to be University), under INSPIRE fellowship (Department of Science and Technology, Govt of India) since 2019 for the Sun Pharma Science Foundation Science Scholar Award 2023.

Mr. Rakesh Swain has already made remarkable contributions in the field of formulation design and development specifically ocular drug delivery systems.

I am writing this letter to confirm that the research work submitted by Rakesh Swain for the Sun Pharma Science Scholar Award has actually been conducted by him under my supervision at **Siksha 'O' Anusandhan** (Deemed to be University) as described below. He is a sincere, dedicated and highly motivated in discharging his research activities.

Project accomplishment:

- In one survey report published from our laboratory we have understood that polymer-clay nanocomposites have a high drug-loading capacity and have the potential to be used in controlled drug delivery system with improved mechanical properties. [R. Swain. et al., **Curr, Drug Deliv. 2023**].
- Montmorillonite, a multifunctional clay mineral of bentonite due to its remarkable swelling and adsorption may be utilized in delivery systems for promising results.
- Na-bentonite incorporated trimetazidine ocular *in situ* gel has been developed successfully for the management of antiinflammatory effect prophylactically. [R. Swain. et al., **Int. J. Biol. Macromol. 2023**]
- Presence of bentonite revealed more sustained release and corneal permeation compared to its absence in the formulation.
- Bentonite incorporated film indicated a significant improvement in ocular bioavailability with a controlled intra ocular pressure. [R. Swain et al., **J Drug Deliv Sci Technol. 2022**]
- The matrix formulation containing bentonite has shown higher negative binding energy values compared to the formulation without bentonite indicating stable interaction.
- Pseudoplastic shear thinning behavior without any yield value and high viscosity at low shear rate were the positive attribute of the tolerability of the sol formulation after ocular instillation.
- In situ gel with bentonite revealed the extended drug release over 6 h in a controlled manner exhibiting more effectiveness than regular eye drops.
- DMSO plasticized felodipine film could be used for the better management of intra ocular pressure and associated inflammation [R. Swain. et al., **Int. J. Pharm., 2023**].
- Aerosil incorporated hydrogel forming buccal film could be used for improved and sustained delivery of valsartan to overcome low oral bioavailability and short biological half-life [R. Swain. et al., **Chem. Biochem. Eng. Q., 2023**].

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Work in progress and suggested outcomes

- Effect of bentonite clay on the swelling of the polymeric ocular film will be studied. Hydration could better explained using some modified kinetic models.
- In a report trimetazidine decreased the production of free radicals and protected smoking induced left ventricular damage (Zhou et al., 2012). That report encouraged us to study the cytoprotective role of trimetazidine in the rat eye model applying hydrogel based film formulation.
- Thiobarbituric acid reactive substance assay (TBARS) (using rat eye homogenate) and histology study of the ocular tissue will be performed to assess the cytoprotective effect.
- Increased reactive oxygen species and antioxidant deficiency are the vital causes of the pathogenesis of cataract formation in chronic diabetic condition (Sharma et al., 2020). Anti-cataract activity will also be performed *in vitro* using isolated goat eye lens collected from local butcher shop. And further *in vivo* study will be accomplished in selenite induced suckling rats.
- Protein content of the induced isolated rat eye lens will be carried out as per Lowry et al., (1951).

Thank you for your consideration.

Sincerely,

Subrata Mallick 17.8.2023

Professor (Dr.) Subrata Mallick, M. Pharm, Ph D, FIC, PGDBM

Professor and HOD of Pharmaceutics

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