1. **Title of research project:** Development & optimization of antimalarial nanosuspension- an approach to improve bioavailability

2. **Name of PI:** Ms. Vividha V. Dhapte

3. **Funding Agency:** University Grants Commission

4. **Project Reference number/ File number:** 47-1518/10 (WRO) dated 7th October 2010

5. **Executive summary of the project along with output:**

EXECUTIVE SUMMARY OF THE PROJECT

Project has been completed successfully and summary of findings are as follows:

1. Pyrimethamine nanosuspension with submicron particle size was prepared employing nanoprecipitation and high pressure homogenization techniques.
2. Nanosizing and stabilizers modified the surface characteristics of drug particles resulting in considerable increase in the dissolution rate.
3. Combination of polyelectrolyte stabilizers (non-ionic and ionic) played a key role in the preparation of a stable pyrimethamine nanosuspension as assessed from the factorial design approach.
4. Higher and negative zeta potential of pyrimethamine nanosuspension (> -30 mV) indicated formation of a stable colloidal system.
5. Scanning electron microscopy, differential scanning calorimetry and powder X-ray diffraction analysis of nanosized pyrimethamine indicated partial amorphization of the drug.
6. Thus, the optimized pyrimethamine nanosuspension demonstrated 1.7 fold improvement in the saturation solubility.
7. Stability studies as per ICH guidelines showed that the pyrimethamine nanosuspension containing polyelectrolyte stabilizers was stable up to 6 months.
8. A validated, highly selective, simple, cost effective and rapid RP-HPLC method was developed for the determination of pyrimethamine from its marketed suspension and nanosuspension in rat plasma. This optimized LC method proved to be an important tool for evaluating bioavailability of the marketed pyrimethamine formulations and in determining the therapeutic levels of pyrimethamine in order to monitor the antimalarial therapy.
9. Fabrication of pyrimethamine alone into nanosuspension by means of stabilizers proved to be a better strategy for bioavailability enhancement and rapid onset of action compared to the conventional pyrimethamine–sulfonamide combination therapy.

OUTPUT OF THE PROJECT

1. Two Publications in peer reviewed international journals.
2. Presented the project work at one international symposium.
3. **Best Oral Presentation Award** for work on 'Polyelectrolyte Stabilized antimalarial nanosuspension using factorial design' at International Symposium on the Safe Use of Nanomaterials (SUN 2011), 1st – 3rd Feb, 2011, Lucknow.