

(a) Summarize the most significant work of the nominee on which the recommendation is based (in 50 words)

Prof. Padma's nanocarrier-shape based splenic targetting is a remarkable finding. The On-Site Nanotechnology demonstrates affordable nanomedicine-based treatment of infectious diseases and cancer. The teat dip for mastitis in livestock and the Point-of-Care cattle pregnancy detection kit are noteworthy contributions of high social relevance. Her innovations exemplify affordable excellence.

(c) Impact of the contributions in the field concerned, basic or applied

Nanomedicine & Shape: Nanomedicine is a rapidly expanding field in medicine, exploding with new findings at a rapid pace. In this crowded discipline she has created a niche and demonstrated for the first time, the role of nanoparticle shape in enabling targeted drug delivery to the spleen. Splenic infections in humans like leishmaniasis, splenic fungal infections, HIV, and veterinary infections like brucellosis, ehrlichiosis, theileriosis are difficult to treat and often become chronic and resistant. This finding opens up a simple strategy to enable drug accumulation in the spleen and hence enhanced efficacy. Further, high efficacy in treating the veterinary infections theileriosis in cattle, and Ehrlichiosis in pet dogs with buparvaquone solid lipid nanoparticles, and doxycycline hydrochloride nanoparticles respectively is successfully demonstrated. A scientific theory based on Marangoni effect has been published, to explain the formation of the asymmetric nanoparticles by the simple modified nanoprecipitation method.

Oral nanocarriers for Lung targetting: Lung targetting in tuberculosis is being explored through direct pulmonary delivery which severely limits the dose that can be delivered to the lungs. Oral nanocarriers which could exhibit lymph mediated uptake through the Peyer's patches in the intestine were optimized and high lung accumulation demonstrated in preclinical studies in rat model. This has huge implications in improving therapy of tuberculosis. The same strategy is now being adapted by her group for lung targeted delivery of anti-COVID 19 drugs by oral route.

On-Site Nanotechnology (OSN): Major impediments in the translation of exciting findings in nanomedicine to commercialized nanotechnologies include, limited stability, scale-up challenges, need for organic solvents and high infrastructure cost. OSN, a revolutionary concept and platform technology, totally bypasses these challenges. Simple and elegant, OSN relies on preparation of drug loaded monophasic preconcentrates which could be converted to drug loaded nanodispersions of desired size and high drug entrapment by simply mixing with aqueous media. Ready to Use nanodispersions for injection/oral delivery can be instantaneously generated On-Site just prior to administration.

A success story of OSN is **BU'ANTRAP™ (Buparvaquone solid lipid nanoparticles (BPQ-SLN))** for treatment of theileriosis. Asymmetric BPQ-SLN generated on-site, ensured targeted delivery, higher efficacy and near zero downtime for milking, all at one-fifth the conventional intramuscular injection

dose of buparvaquone. **BU'ANTRAP™** is based on Patent Application no. 201621024980 and Licensed to Saife Vetmed Private Limited Technology. Launch is delayed due to the pandemic. **BU'ANTRAP™ could enable outreach of Nanomedicine to the farmer's doorstep**, thereby presenting key socio-economic benefits. Being platform technology OSN is readily adapted for other drugs. OSN of Amphotericin B already developed at lab-scale, could provide an efficacious, safe and cost-effective alternative for treating the latest **mucormycosis** infection in **Covid-19** patients.

Teat dip for cattle: Mastitis an infection of the milking teats of cattle, causes huge economic losses, making it the dairy industry's most important disease. A *Spontaneously plug forming drug free teat dip* developed for mastitis, provides additional protection at the teat canal orifice with no additional effort. After dipping the teat, plug formation is attributed to **tears of wine effect**, which provides a superior barrier, also precludes the need for addition of an antibacterial. Being drug free the teat dip circumvents the problem of antibacterial contamination in milk due to improper cleaning of the teats.

A significant development is the added application proposed due to the spontaneous plug formation, for an indication called dry cow syndrome. The plug forms a reinforced barrier at the teat canal opening to provide additional protection, and does not break or tear off when the animal sits down on any kind of surface. NOVA'dip™ designed originally for mastitis, therefore serves two very important needs in veterinary health care. **This product is patented (IN325008,2020) Licensed to Saife VETMED LTD, and launched in the Indian Market as NOVA'dip™.**

Pregnancy detection in Livestock: Pregnancy detection is very critical in livestock, particularly in case of Artificial Insemination programmes run to ensure sustained milk production. Conventional methods practiced are painful and can cause abortion and needs trained manpower. Furthermore, pregnancy detection is delayed sometimes up to 3 months. Instrumental and laboratory methods are expensive. Preg-V-Det our test kit is a urine based visual colour detection kit and needs no specially trained manpower. Moreover, the test enables early detection. Simple, innovative and affordable this kit could revolutionize pregnancy detection in cattle. Recognizing the great potential, this innovation was awarded the first prize at the POC competition by MHRD-AICTE (2019) with a grant for pre-incubation. The idea is preincubated in the ICT incubation center.