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Prof. G. Mugesh

Dean
Division of Chemical Sciences

August 28, 2023

Research Awards -2023 Committee
Sun Pharma Science Foundation

Justification letter for the nomination of Prof. Aravind Penmatsa

It is with great pleasure I nominate Prof. Aravind Penmatsa for the Sun Pharma Research Award for 2023 in the category of Pharmaceutical Sciences. Prof. Aravind Penmatsa had his undergraduate training in pharmaceutical sciences and his doctoral and postdoctoral training in structural biology and biophysics and runs a successful research group studying vital pharmacological targets involved in neurophysiology and multi-drug efflux.

A major part of Aravind's work is focused on understanding the role of integral membrane transporters and their pharmacology in neurons. Neurotransmitter transporters in the neural synapses control the levels of diverse neurotransmitters like noradrenaline, dopamine, serotonin and GABA and thereby their activation of postsynaptic receptors. An improper control of levels leads to neurological disorders like, depression, anxiety, pain, schizophrenia and seizures. These transporters have therefore been the prime targets of antidepressants, psychostimulants, antiepileptics and chronic pain medication. Aravind's group has done extensive studies on the noradrenaline block by chronic pain medications like duloxetine, milnacipran and tramadol using a neurotransmitter transporter from fruitflies (*Pidathala et al., 2021, Nat. Commun*). His group has also delved into the pharmacology and mechanism of GABA uptake and inhibition that is a vital factor in the development of epilepsy and is a target of some antiepileptics like tiagabine used for partial seizures (*Joseph et al., 2022, EMBO J; Nayak et al., 2023, Nat. Struct. Mol. Biol*).

His group has also studied the transporters in superbug membranes that have a surprising structural and mechanistic similarity to vesicular neurotransmitter transporters. These molecules are proton-coupled antiporters that are involved in multi-drug efflux of numerous antibacterial compounds in the drug-resistant strains of Staphylococcus aureus. His group studied the promiscuity of antibacterial interactions and subsequently determined the structure of a major efflux pump QacA (*Majumder et al., 2019, J. Mol. Biol.; Majumder et al., 2023, EMBO J*). These insights would be vital for developing efflux pump inhibitors to block these transporters.

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He has further pioneered the use of single domain Indian camelid antibodies as tools against these efflux pumps and used them as chaperones to successfully resolve the structures of multiple transporters like NorC and QacA. (*Kumar et al., 2020, J. Biol. Chem; Kumar et al., 2021, Commun. Biol.*)

It is therefore well justified for me to nominate Prof. Aravind Penmatsa for the prestigious Sun Pharma Research Award for 2023 and I strongly believe that his application is well suited for the award category of Pharmaceutical sciences. I full support his application. Please do not hesitate to contact me with any further queries.

Thanks, and best regrds,

G. Mugesh
Convener, Deans of Divisions