

**A Fluorescence Lifetime Imaging Microscopy (FLIM) Supported
Investigation on Temperature Dependent Penetration of Dopamine in
DMPG Lipid Bilayer**

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Distribution of dopamine, an essential neurotransmitter in mammalian central and peripheral nervous system, in lipid bilayer and at the surface of DMPG vesicles has been studied herein. To track the progress of dopamine through different regions of the lipid vesicle, the vesicles were synthesized using 7-nitrobenz-2-oxa-1,3-diazol-4-yl (NBD) labeled phospholipid molecules either tagged to the head group (NBDPE) or the acyl chain (NBDPG). Dopamine induced quenching of NBD fluorescence in the lipid vesicles demonstrates that dopamine has a preference to diffuse into the lipid bilayer. A change in the excited state lifetime obtained for NBDPG clearly indicates the preference in dopamine binding. The temperature dependent release of dopamine and recovery of NBD fluorescence supports the proposition of deep penetration of dopamine inside the lipid bilayer of the GUVs. Finally, the FLIM data provide visible evidence to the spectroscopic observations and confirms our proposition about dopamine percolation inside lipid vesicles.