Investigating vesicular cargo transport driven by multiple motors

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Vesicular cargo transport inside a cell is carried out by multiple molecular motors such as kinesins and dyneins walking along a microtubule network. Various cargos have to be delivered to specific locations at specific times during the cell cycle. This is regulated by many factors such as number of motors carrying a cargo, vesicle fluidity etc. How an ensemble of motors co-ordinate to transport vesicular cargo is not very well understood. In this study, we aimed to understand the influence of motor density on cargo transport. Thereby, we developed *in vitro* liposomal stepping motility assay using kinesin-3 motor, KIF16B, which can bind directly to liposomes via its C-terminal tail and walk along microtubules with its N-terminal motor heads. Using TIRF microscopy and single particle tracking, we found that the velocity of the liposomes decreases with increasing motor concentrations. However, at low motor concentration the liposomes pause more frequently compared to high motor concentration where the transport was slower but more robust. In contrast, previous studies have reported that velocity of a rigid cargo such as a bead doesn't vary with change in motor concentration [1]. Our results demonstrate that mechanical coupling of multiple motors via a diffusive lipid bilayer influences the transport properties of a vesicular cargo.

[1] Beeg et. al. Transport of beads by several kinesin motors. Biophysical journal, 94(2):532–541, 2008