Supplementary materials for:

Breaking the fibrinolytic speed limit with microwheel co-delivery of tissue plasminogen activator and plasminogen

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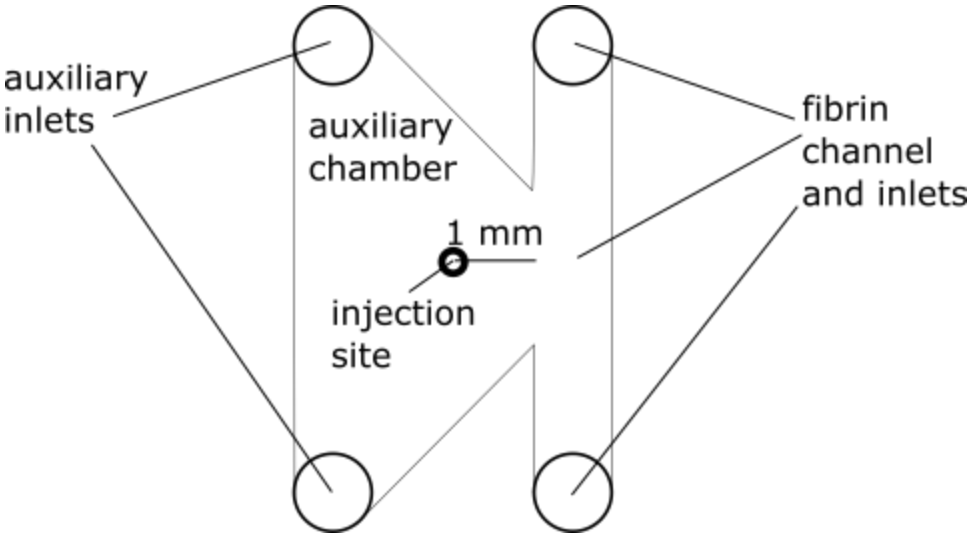

Fig. S1: Schematic of microfluidic device used for fibrinolysis experiments

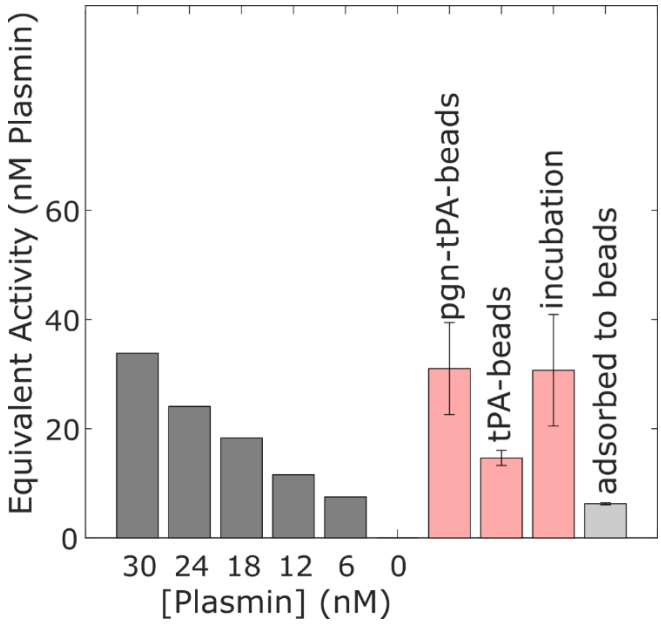

Fig. S2: Plasmin activity of particle samples measured using a fluorometric substrate. Data sets in salmon are 10x diluted. Sets in gray are not diluted. tPA-beads and pgn-tPA-beads are at a concentration of 10^5/uL, and are measured in samples of recalcified (20 mM $CaCl_2$) NPP treated with 9 nM thrombin. All other samples are in buffer. "Incubation" refers to the loading of mMSN with plasminogen, during which tPA-beads are soaked in 10 uM plasminogen for 24 hr. "Adsorbed to beads" refers to tPA-beads after the 24 hr plasminogen loading step, and after three washing cycles. We observe generation of 300 nM plasmin during incubation; however, after washing, beads have a plasmin activity of only <10 nM plasmin.

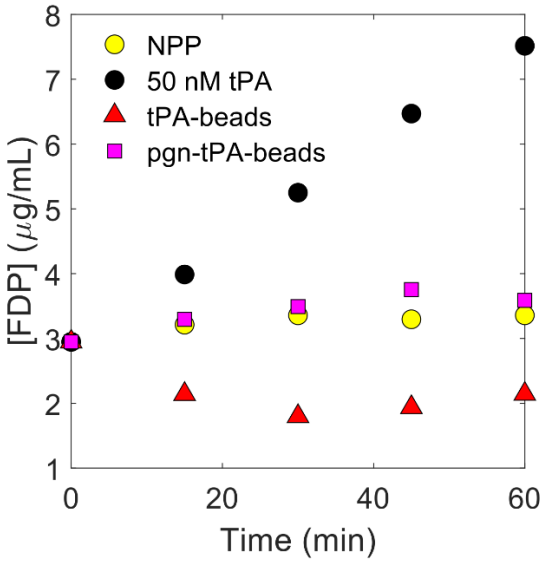

Fig. S3: FDP generation during the course of lysis experiments. NPP exhibits a slight increase in FDP concentration. tPA causes significant fibrinogenolysis throughout the hour-long experiment. tPA-beads initially decrease plasma FDP concentration as FDP adsorbs to bead surfaces, but exhibit FDP generation after t = 30 min. Pgn-tPA-beads cause insignificant fibrinogenolysis.

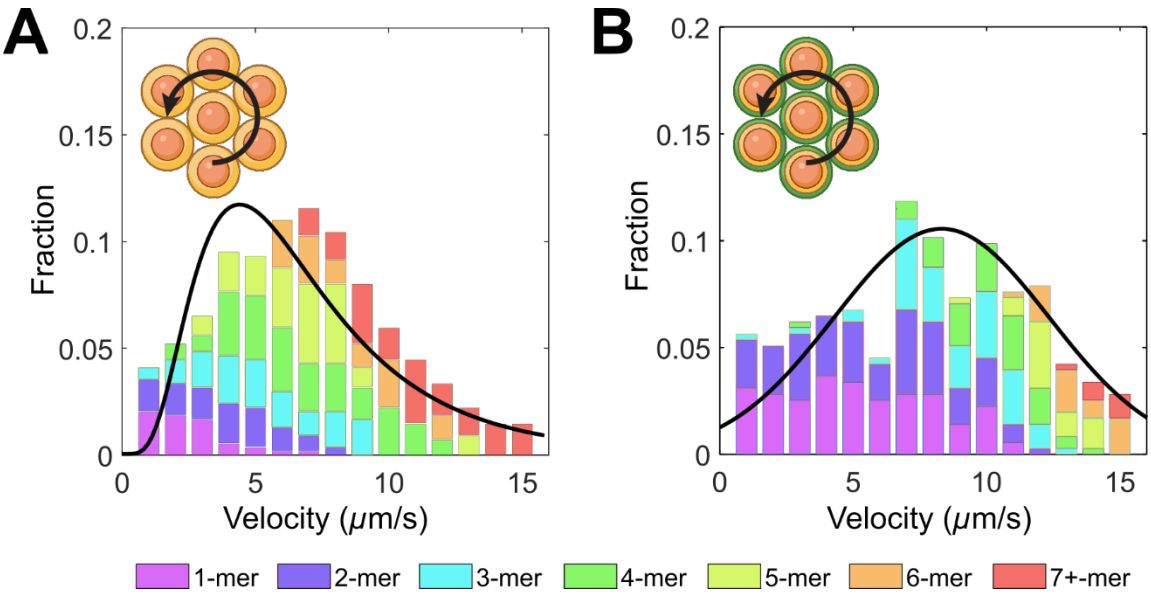

Fig. S4: Representative velocity profiles for A) tPA-beads and B) pgn-tPA-beads after 5 min under the applied magnetic field. A) tPA-beads have an average velocity of 6.8 μm/s. Beads translating as components of larger μwheels (for example, a 7-mer is a μwheel composed of 7 beads) translate faster than those in smaller ones. B) pgn-tPA-beads have an average velocity of 7.7 μm/s. pgn-tPA-μwheels tend to remain smaller than tPA-μwheels because the mMSN impede strong magnetic attraction between beads.