The state diagram of SDF-1α-stimulated tethering, rolling, and arrest of naïve $CD4^+$ T lymphocytes

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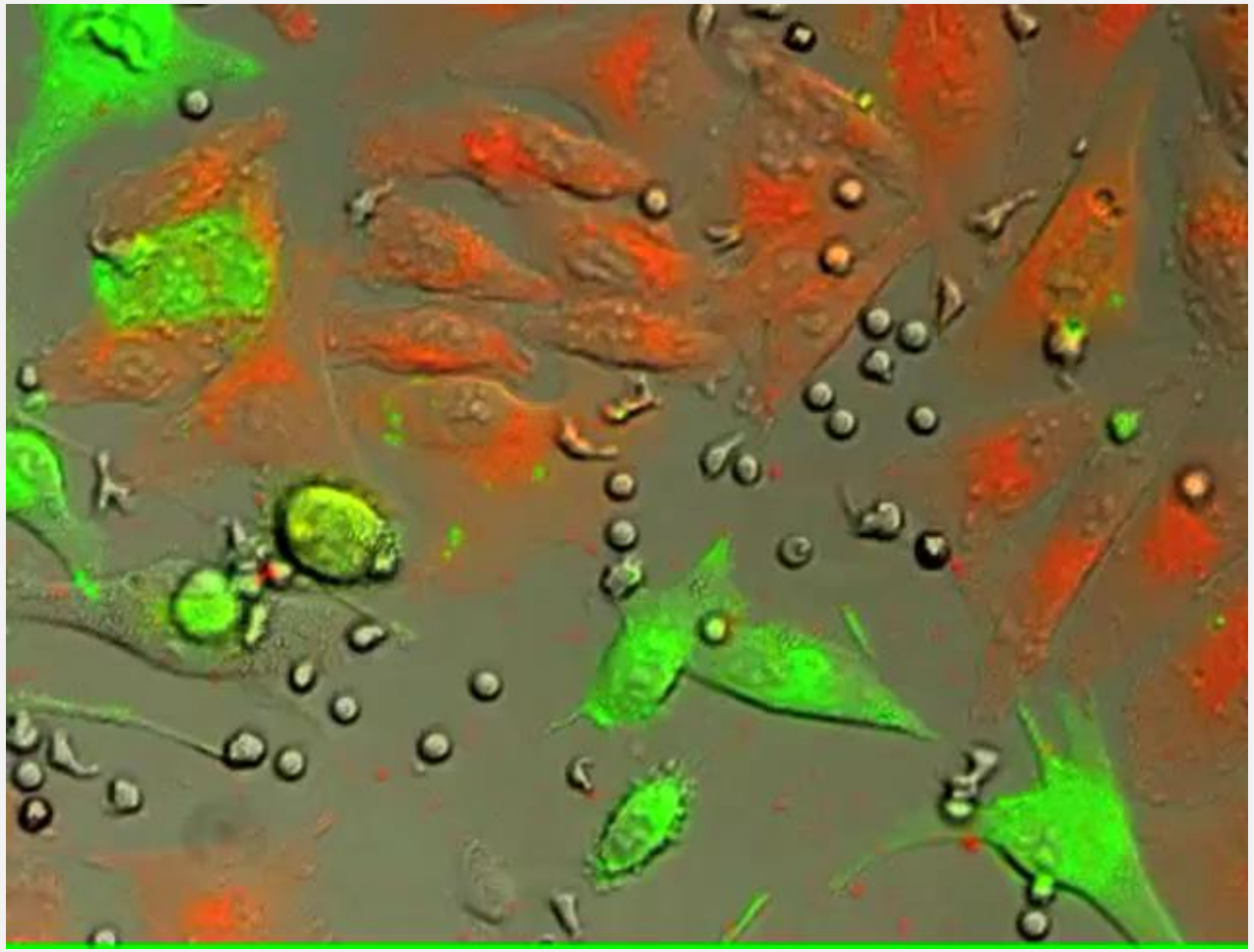
T cells at the forefront of cancer treatments



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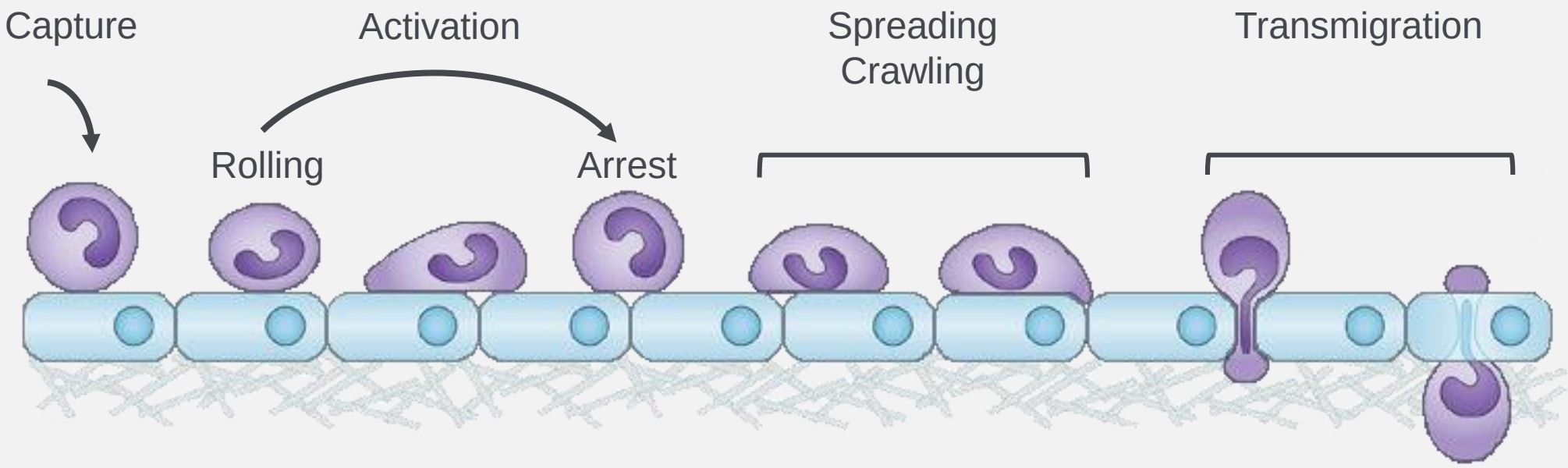
Liddy, *et al*., *Nat Med*, **2012**.

Leukocyte adhesion cascade



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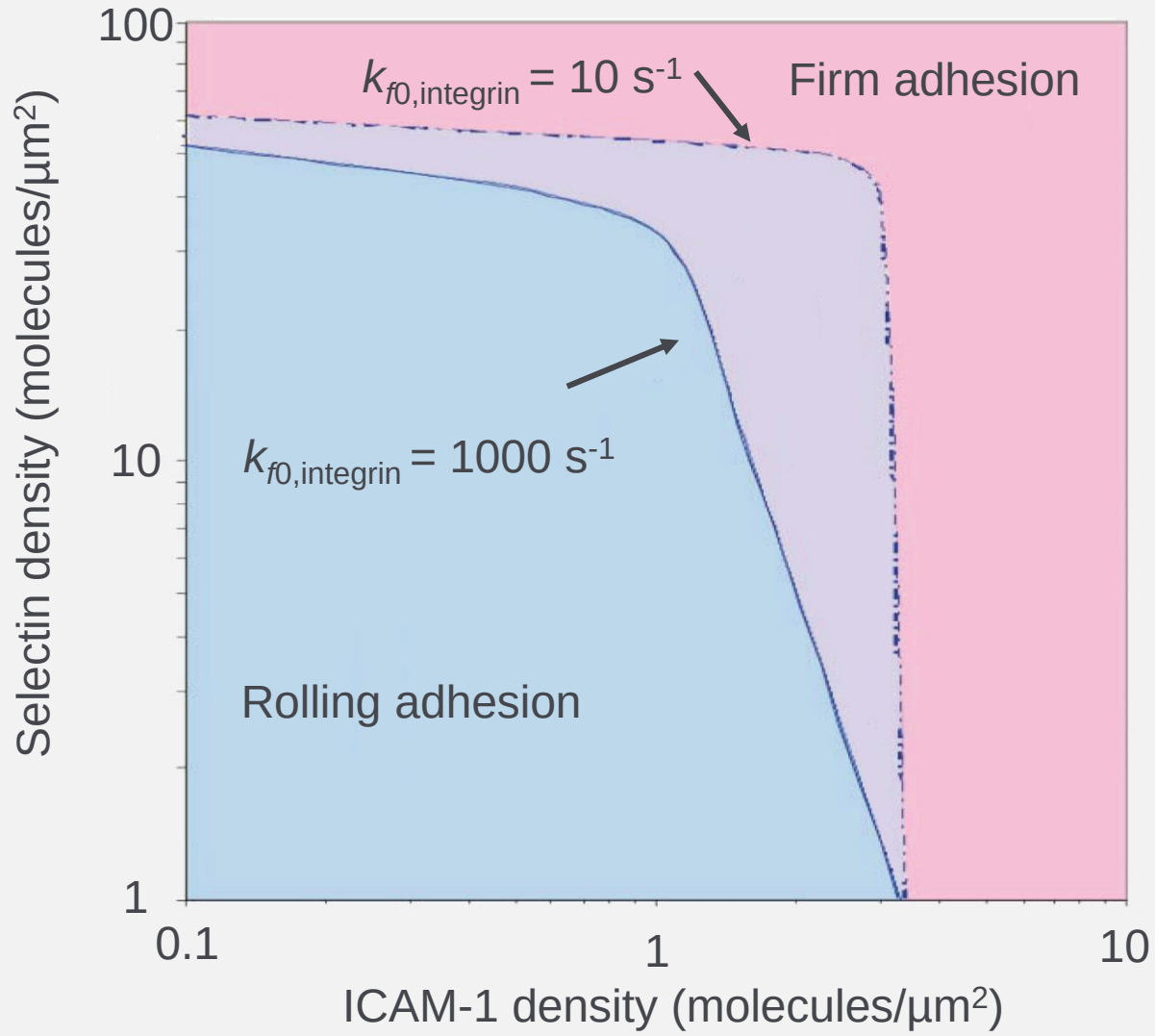
Adapted from Ley, *Nat Rev Immunol*, **2007**.

Simulated state diagram



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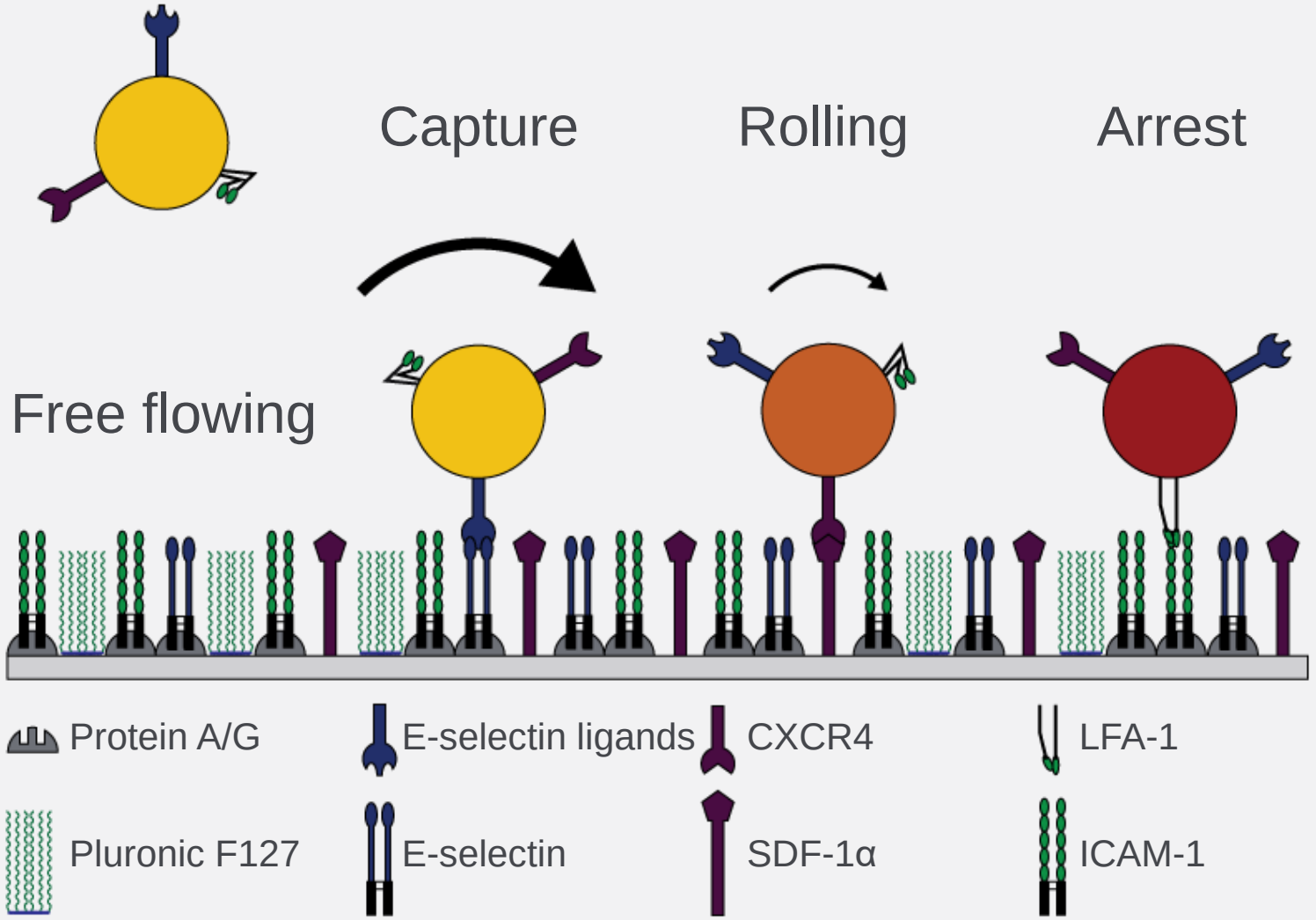
Adapted from Bhatia, *et al*, *Biophys J*, **2003**.

Experimental System



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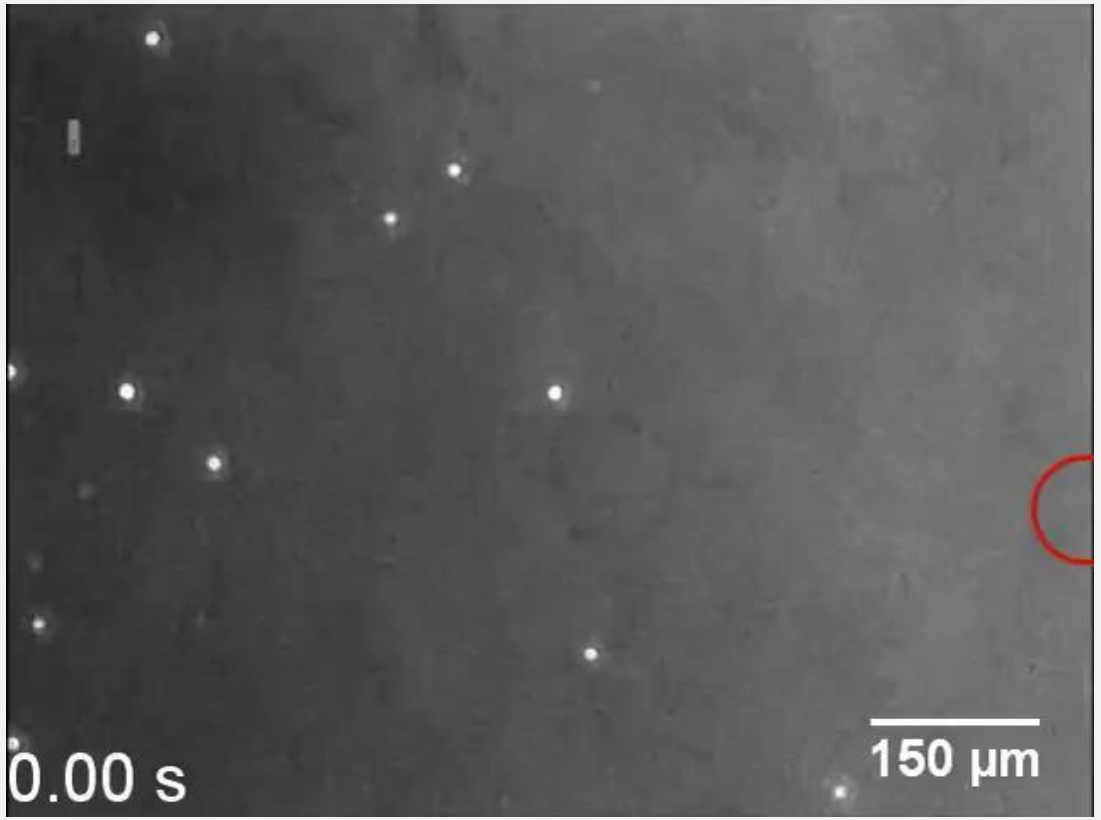
Cellular motion

Tethering



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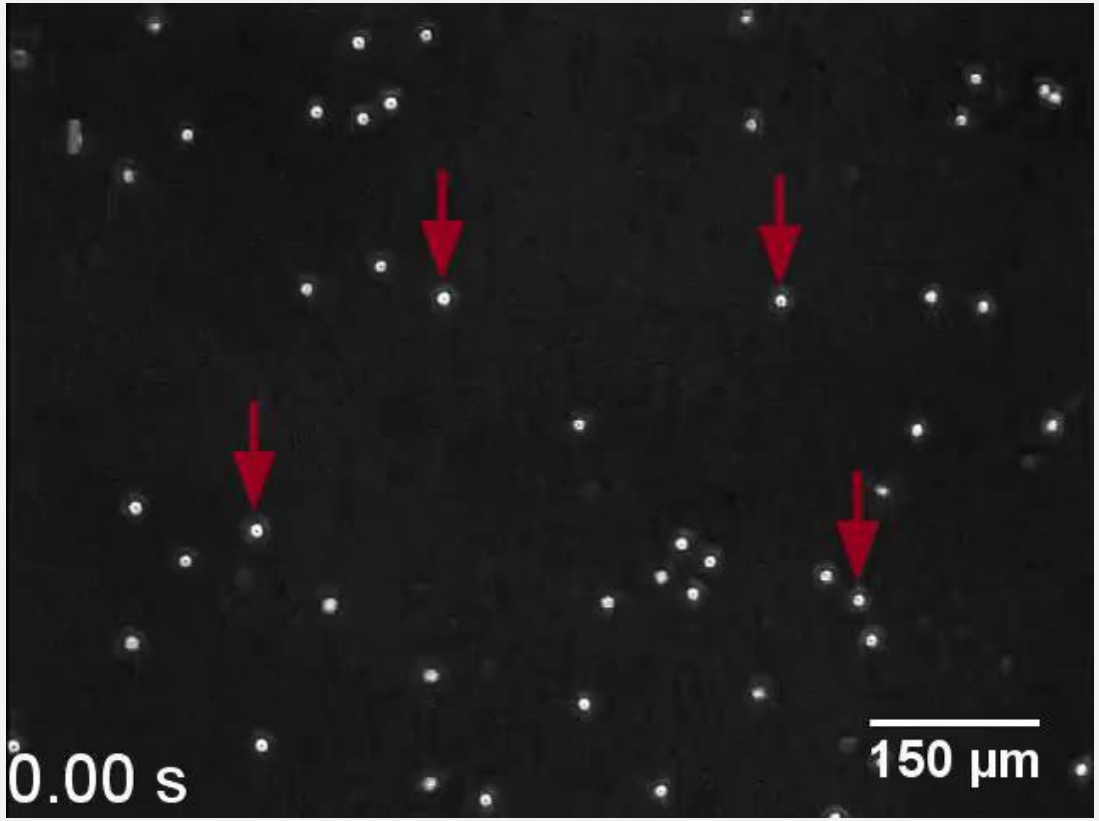
Cellular motion

Tethering

Rolling



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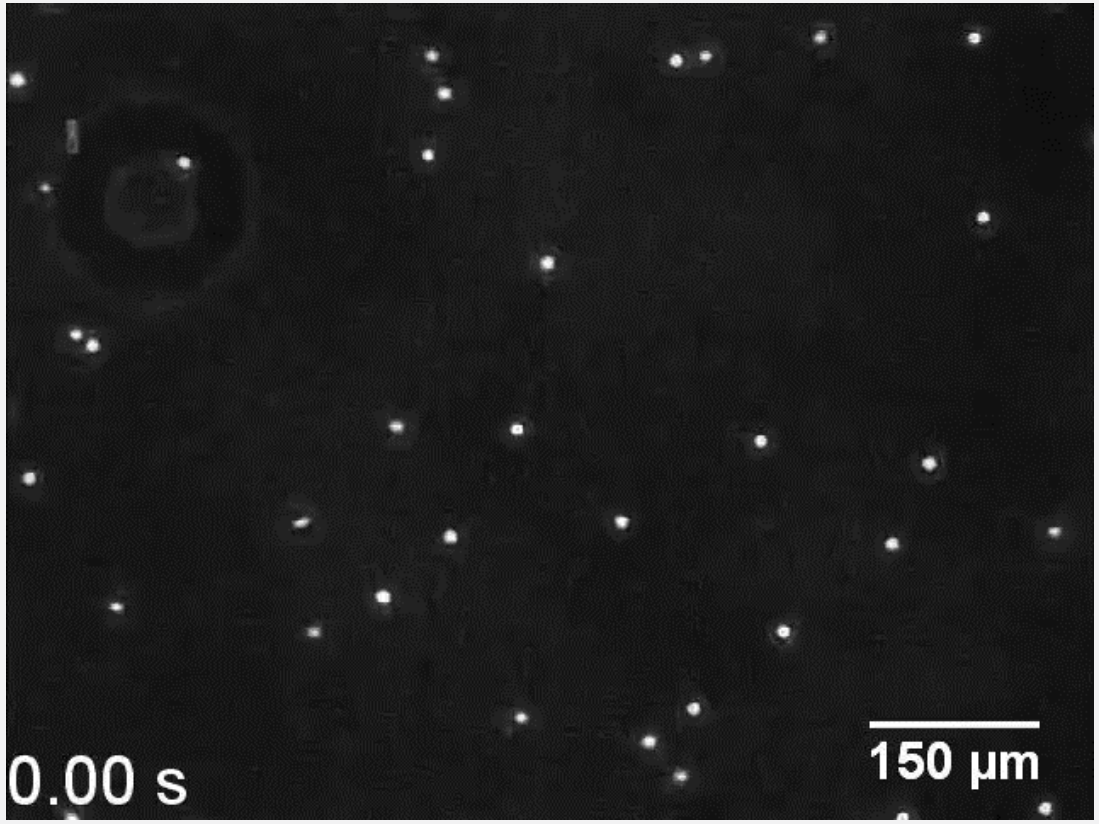
Cellular motion

Tethering

Rolling

Arrest



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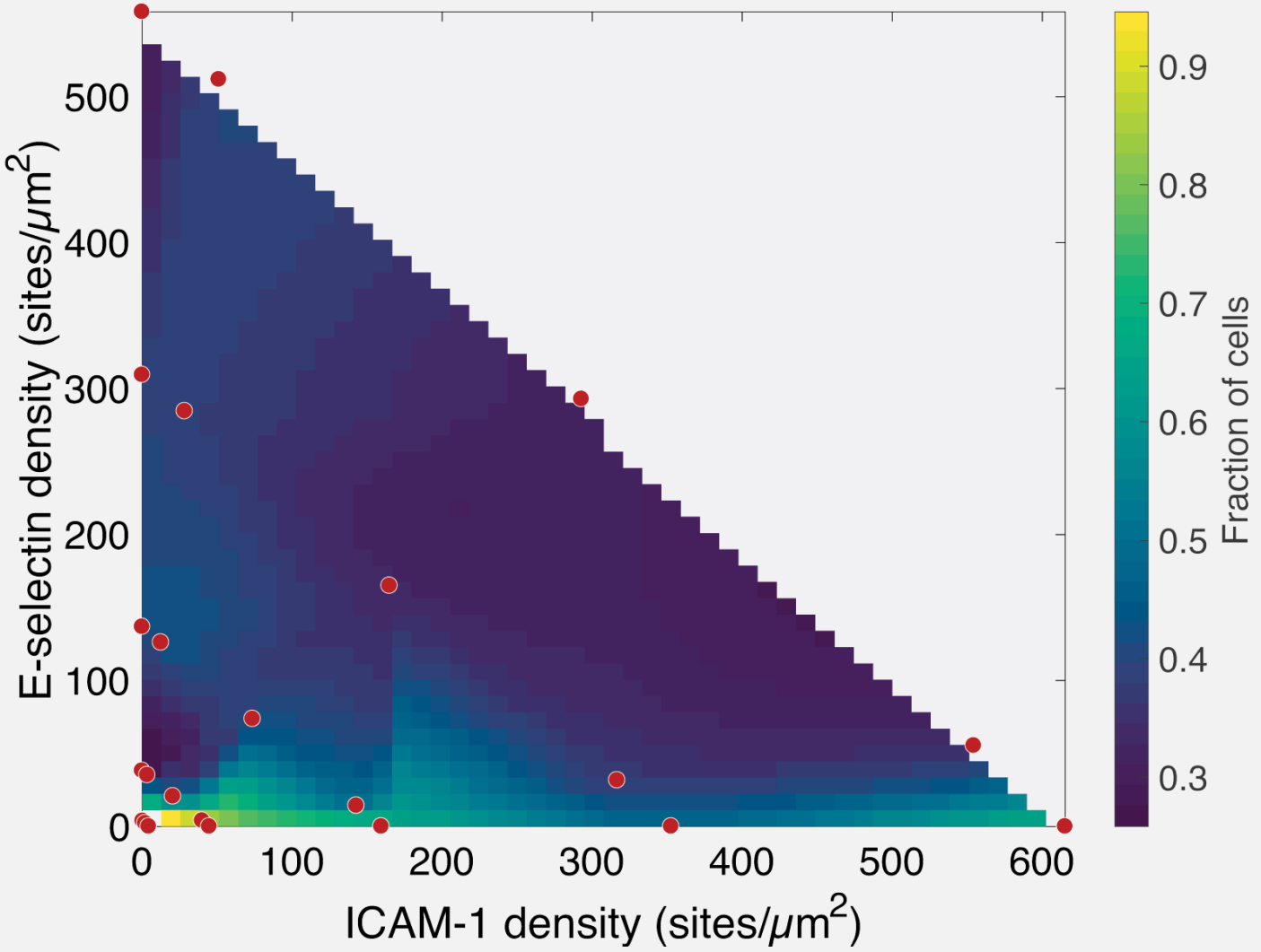
ICAM-1 only surfaces have high levels of tethering



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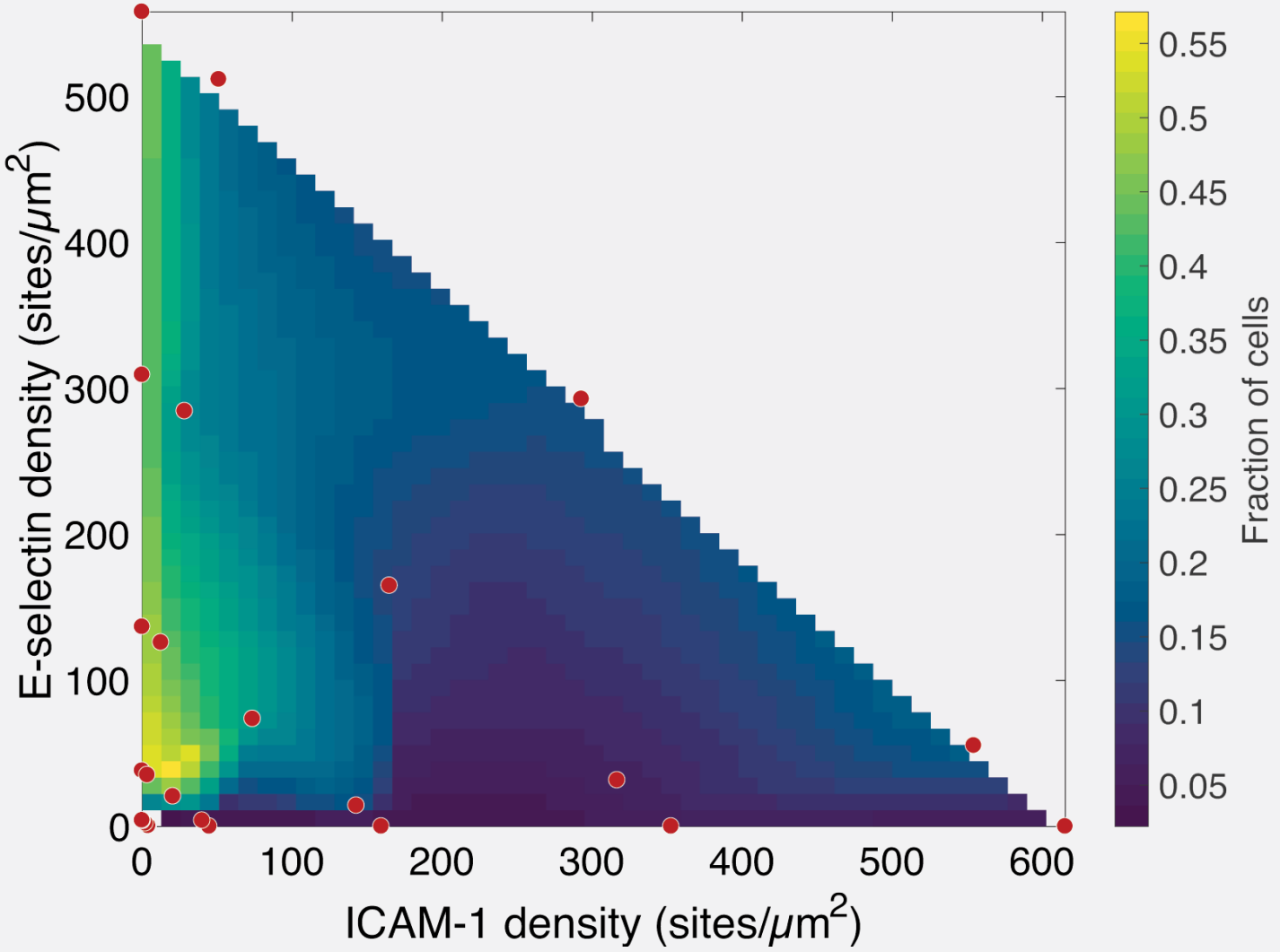
E-selectin enhances rolling



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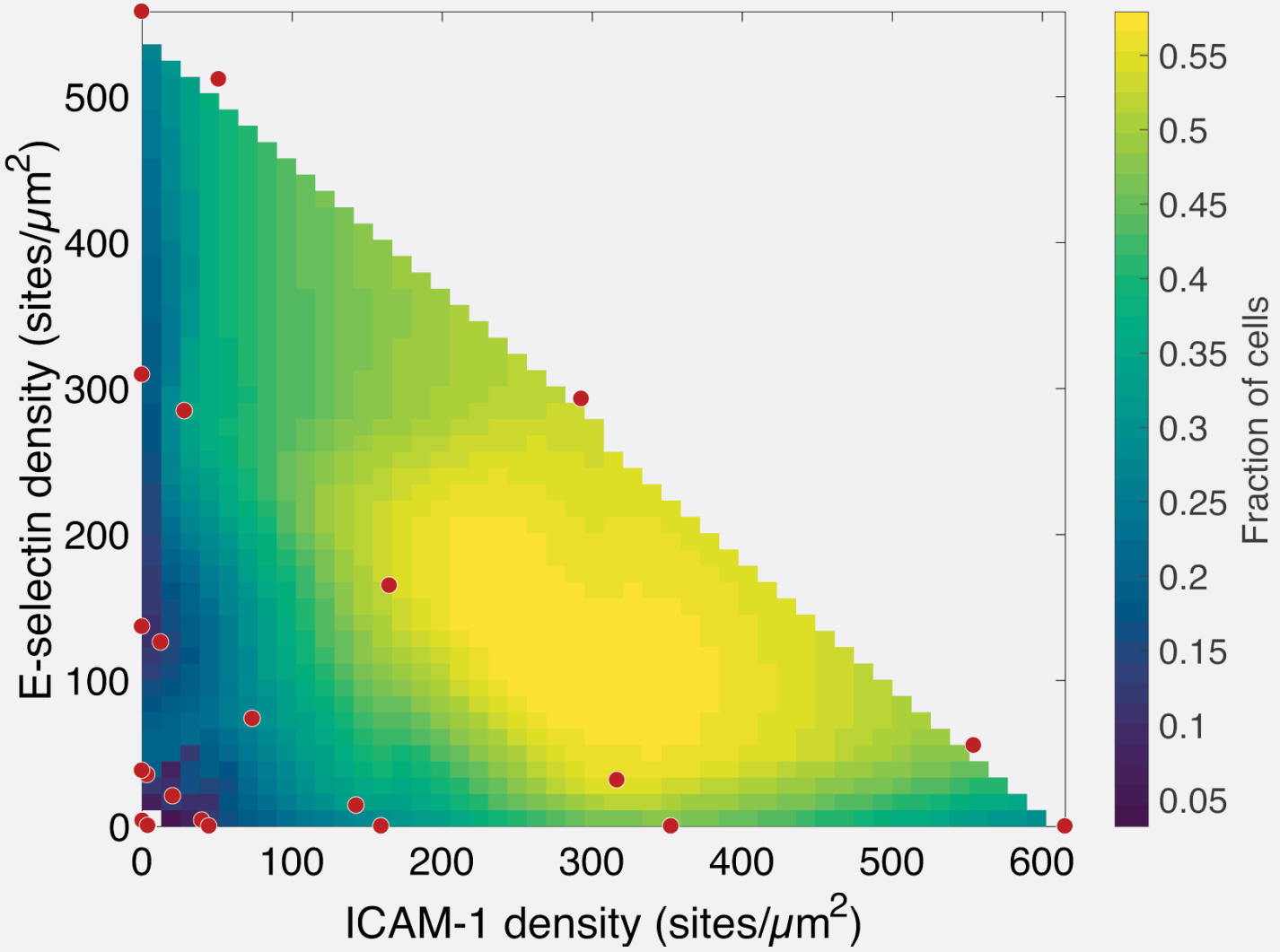
Both E-selectin and ICAM-1 are required for efficient arrest



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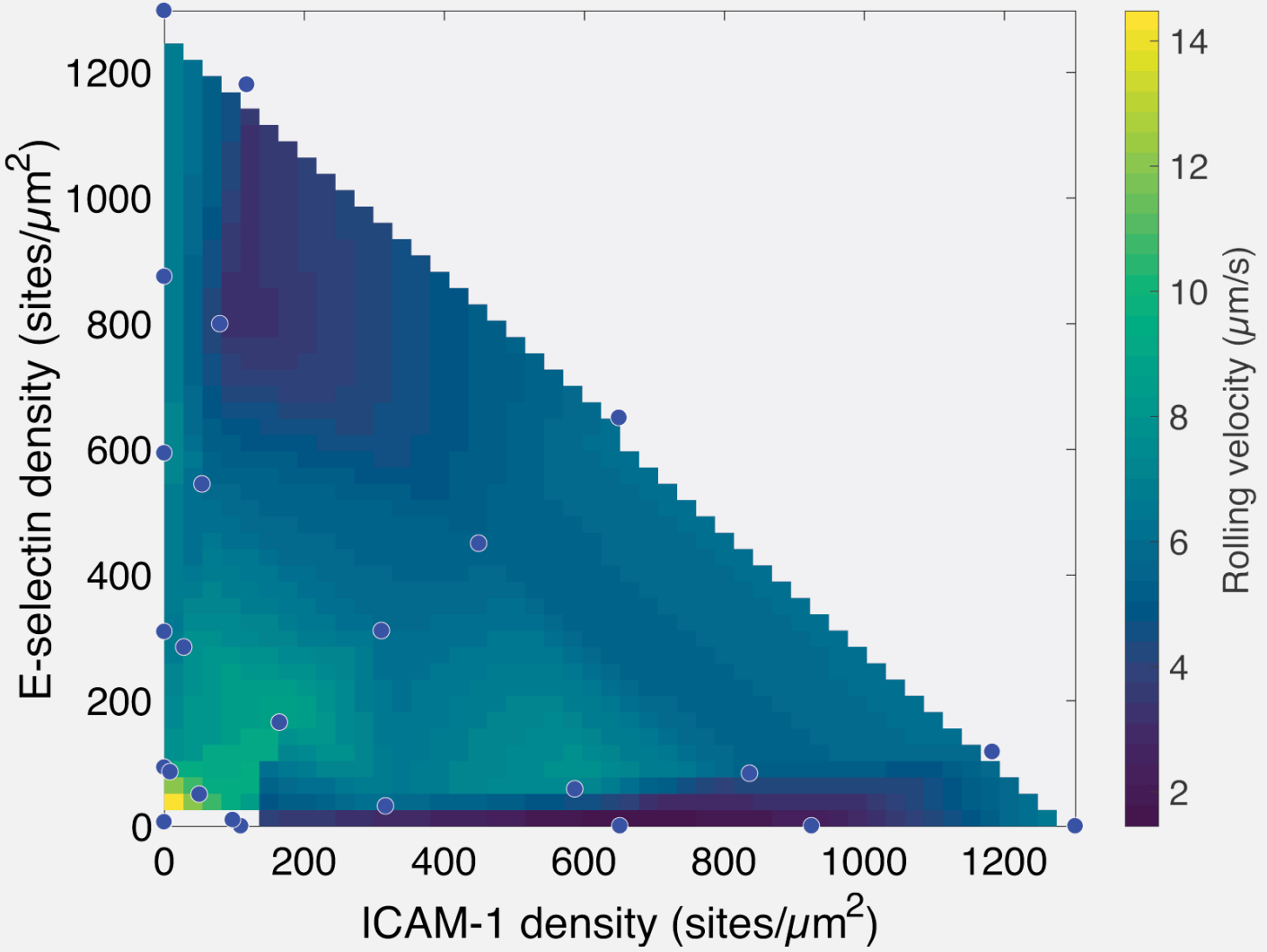
Rolling velocity is constant across many surfaces



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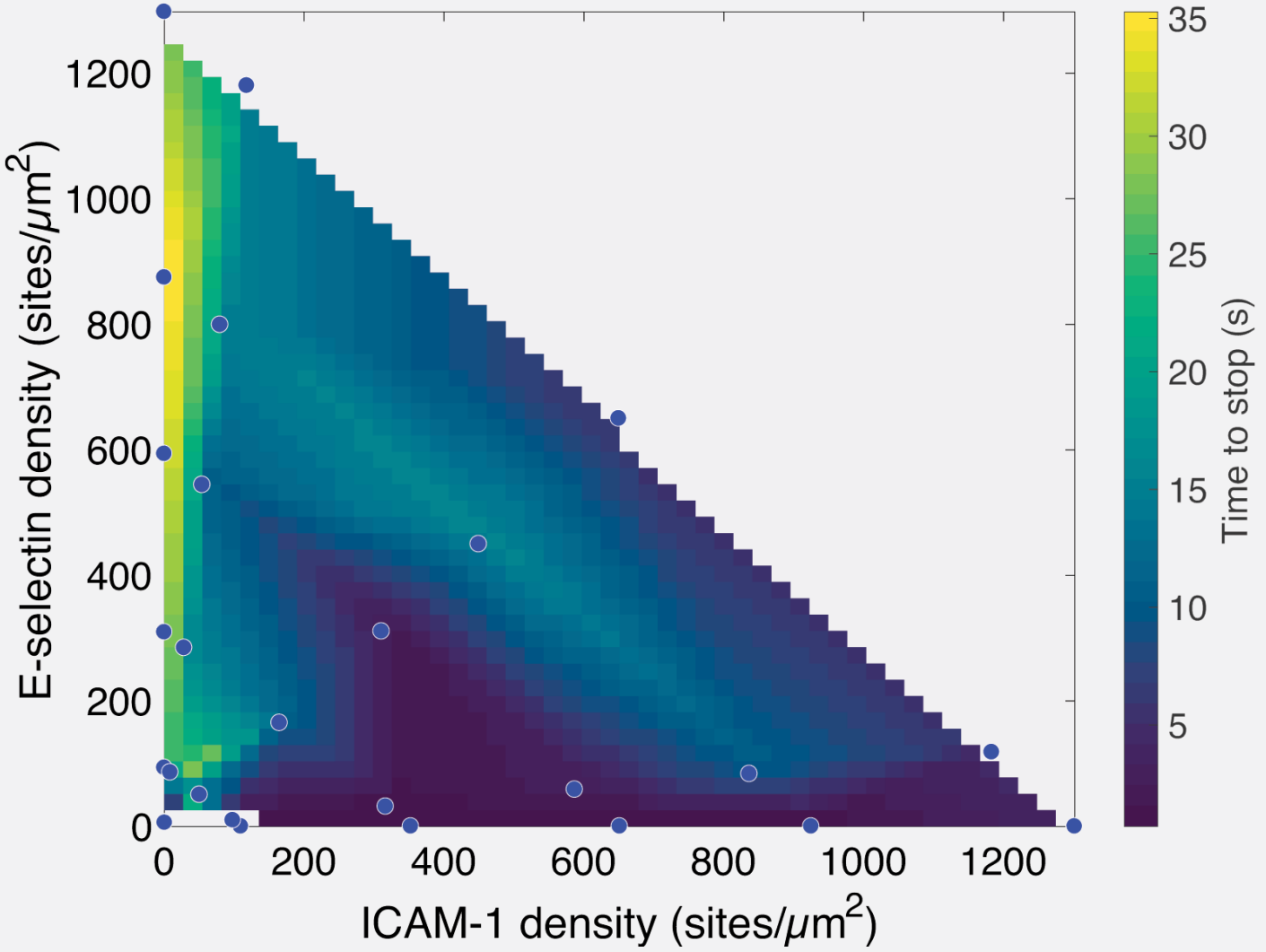
ICAM-1 is required for stopping



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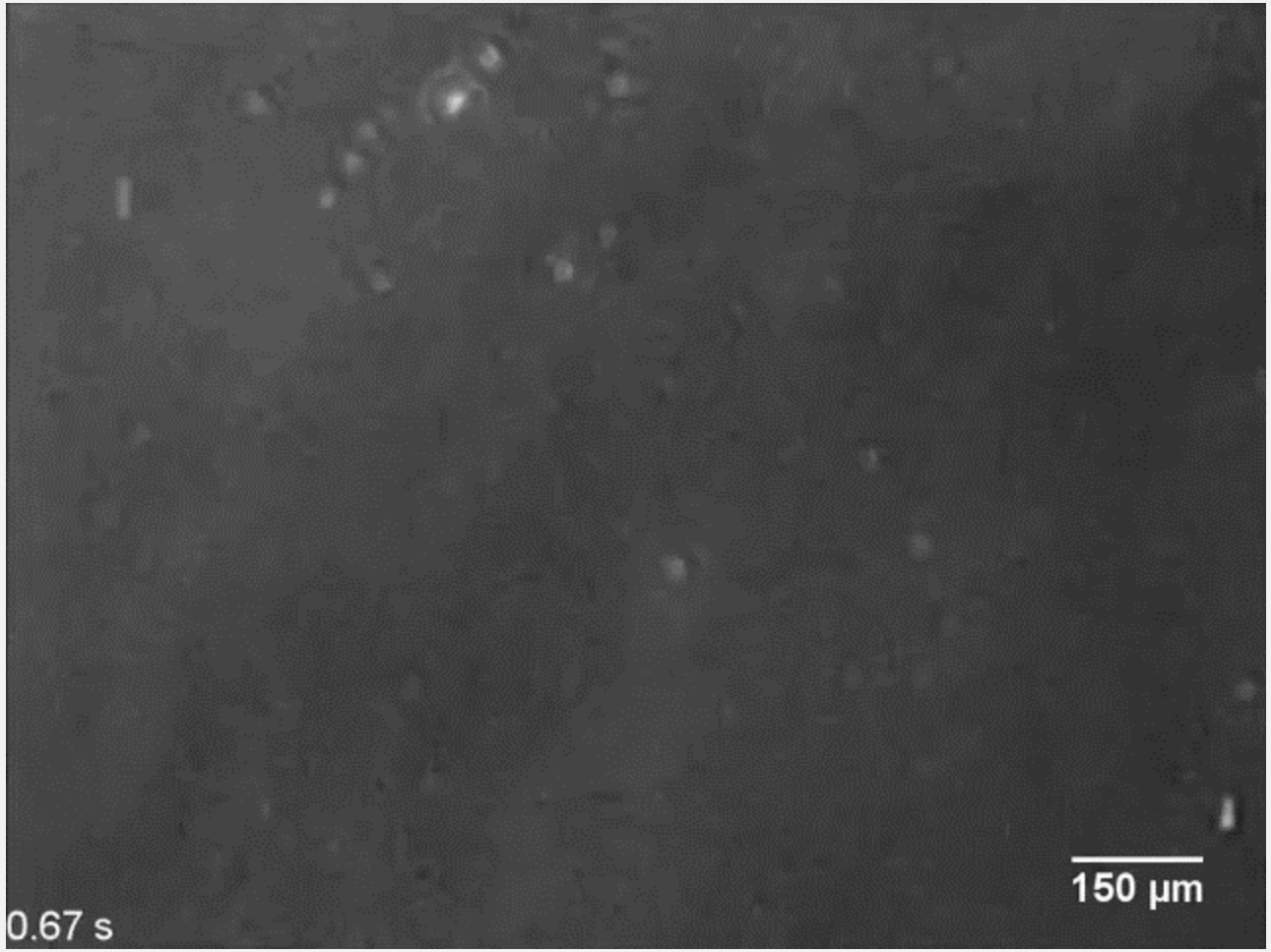
Connection to upstream migration?



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Conclusions

- System allows for study of entire leukocyte adhesion cascade
- E-selectin and ICAM-1 can act synergistically to promote arrest
- Small numbers of E-selectin or ICAM-1 can rapidly change prominent adhesion types
- Naïve $CD4^+$ T cells maintain constant rolling velocity across many surface types
- Time to stop can vary significantly depending on surface composition

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