Membrane order marks NK cell states with different function

Erdinc Sezgin's lab (SciLifeLab, Karolinska Institutet) sorted NK cells by plasma membrane order, a measure of how tightly packed the membrane lipids are. They then compared function, transcriptome and cell surface architecture.

	High membrane order (NK-H)	Low membrane order (NK-L)
Tumor killing	About 10% more tumor cells killed, 28% more degranulating cells	Lower
Migration	Slower	About 25% faster
Phenotype (PNA)	More mature: CD16, CD57, KIRs	Less mature: CD56, NKG2A, CD27
Network (PNA)	ADAM10 less close to CD37, CD53, CD81	ADAM10 closer to CD37, CD53, CD81

WHAT THE STUDY FOUND

1. **Function follows membrane order.** High-order NK cells killed about 10% more tumor cells and degranulated more. Low-order cells migrated about 25% faster.
2. **Different maturation states.** PNA showed mature CD16+ CD57+ KIR+ cells enriched in high-order cells, and CD56+ NKG2A+ CD27+ cells in low-order cells.
3. **Same abundance, different network.** In CD56dim CD16bright cells, ADAM10 sat less close to CD37, CD53 and CD81 in high-order cells, with no change in tetraspanin levels except CD53.

WHY IT MATTERS

Membrane lipid composition affects immune cell function, including NK cell migration and tumor killing. PNA shows that these functional discrepancies are associated with alterations in protein expression and organization.

Connect cell state to surface organization

Pixelgen Proxiome kits (PNA) measure abundance, clustering and colocalization of +150 proteins per cell, also in sorted cell populations.

Andronico LA, et al. Plasma membrane order maps functional diversity in immune cells. Nat Chem Biol 2026. doi: 10.1038/s41589-026-02322-x.

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