of human red blood cells. Some of the genes were friendlier than others. For example, two α-globin
genes were about five times more likely to be near each other than were two β-globin genes.

Next, the researchers tested whether a gene’s chromatin environment affects its tendency to cluster. In
human cells, β-globin sits in a tightly packaged chromatin region, whereas α-globin’s neighborhood is looser.
But in mouse cells, α-globin resides in a condensed region. The team replaced the mouse α-globin gene with
the human version, so that the ordinarily loose human gene was now in a condensed chromatin environment.
Like the β-globin gene in human cells, the inserted α-globin gene in mouse cells was aloof, suggesting that
a gene’s surroundings do influence its position relative to other genes. However, the team found that the
inserted gene worked normally, showing that associations aren’t essential for normal transcription.

The results also indicate that genes aren’t sharing transcription factories. The average distance
between associating active genes, the researchers determined, was about 10 times the diameter of a
factory. Instead, the genes were congregating at nuclear speckles, much larger structures than factories
that harbor enzymes for splicing RNA after transcription. The team concludes that genes associate
because they sometimes happen to be drawn to the same speckle.

Brown, J.M., et al. 2008. J. Cell Biol. doi:10.1083/jcb.200803174.

Laminin reaches across the synapse
Like a plug and a socket, a nerve and a muscle fiber mesh at the neuromuscular junction. The extracellular
matrix protein laminin shapes both sides of the junction to ensure they fit together. Nishimune et al. report.

A neuromuscular junction in a newborn mouse is functional but simple, with a globular nerve terminal
meeting a flat, oval structure on the muscle fiber. As the animal matures, the nerve terminal branches into a
claw shape, and the muscle side contours into a matching conformation. But what coordinates these changes so
the two sides mirror each other? The researchers think that one molecule in the synapse sculpts both sides.

Their chief suspect was the synapse-spanning protein laminin. Made by the muscle, laminin sports
α, β, and γ chains and is part of a sheath that covers the muscle fiber. Previous work had shown that
the β2 chain of laminin spurs differentiation of the nerve terminal. The team has now found evidence
that the α chains of laminin influence post-synaptic patterning. For example, maturation of the post-
synaptic side slowed in mice lacking the α5 chain of laminin in their muscles. Moreover, post-synaptic
development faltered in myotubes, or muscle fiber precursors, from these mice.

The researchers discovered that laminin corrals molecules of its receptor, dystroglycan, on the
post-synaptic surface. Dystroglycan, in turn, gathers receptors that respond to acetylcholine released by
the nerve, though how dystroglycan rounds up these receptors is uncertain. Overall, the work suggests
that laminin influences pre-synaptic and post-synaptic development, thus providing a way to coordinate
maturation of the sending and receiving sides of the synapse.

Nishimune, H., et al. 2008. J. Cell Biol. doi:10.1083/jcb.200805095.

Pumping up caveolae
The sodium pump is branching out. As Cai et al. show, the pump not only moves ions, it controls trafficking
of a membrane protein that is crucial for intercellular communication and other functions.

The Na/K-ATPase, or sodium pump, ejects sodium ions from the cell and brings in potassium. Besides
swapping ions, the pump helps structure the cell membrane. Pump molecules are prevalent in caveolae,
pockets in the plasma membrane involved in cell–cell signaling and endocytosis. Instead of assembling
these structures at the membrane, cells build pre-fab caveolae in the Golgi apparatus and then ship them for
installation. Because pump molecules can bind to caveolin-1 (Cav1), the main structural protein of caveolae,
Cai et al. wondered whether the pump helped govern dispersal and positioning of Cav1.

To find out, the researchers used RNA interference to trim the amount of non-pumping Na/K-
ATPase. The treatment reduced the amount of Cav1 in the membrane and the number of caveolae.
Adding a non-pumping version of Na/K-ATPase restored the normal distribution of Cav1, but a version
that couldn’t attach to Cav1 had no effect.

The researchers found that in the treated cells, Cav1 emerged from the Golgi apparatus, suggesting that
the pump’s disappearance doesn’t impair caveolin construction. However, Cav1 in the plasma
membrane was prone to return to the cytoplasm. A protein called Src promotes this endocytosis of
Cav1, but the pump inactivates Src. Overall, the study suggests that by blocking Src and by latching
onto Cav1, the sodium pump helps direct Cav1 to the membrane and keep it there.

Cai, T., et al. 2008. J. Cell Biol. doi:10.1083/jcb.200712022.