

SINGLE MOLECULE INTERACTION OF RECEPTORS AND ANTIBODIES WITH HUMAN RHINOVIRUS HRV2 USING AFM

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Human rhinoviruses (HRVs) are a main cause of common cold infections. They are small (30 nm) icosahedral particles with an RNA genome enclosed within a protein shell. This capsid consists of 60 copies each of the viral proteins VP1 through VP4. As the very first event in infection, minor group HRVs, such as HRV2, bind to members of the LDL-receptor family, e.g. the very-low density lipoprotein receptor (VLDLR). Adsorption of HRV2 onto mica in the presence of divalent cations revealed a densely packed layer of viral particles, which remained stable for many hours during imaging. In topography images, we observed different polygonal surfaces of the virus capsid. The binding dynamics of single virus-receptor interactions was studied with recombinant MBP-VLDLR1-3 and MBP-VLDLR1-8 (a fusion of the maltose binding protein with the first 3 and the first 8 ligand binding repeats of VLDLR, respectively) coupled to an AFM tip in force-distance cycles. Furthermore, antibody binding epitopes on HRV2 were probed using the virus-neutralizing antibodies 8F5 and 3B10. Our results demonstrate the potential of AFM to study virus-ligand interactions on the single molecule level.

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