Human rhinoviruses (HRVs) are the main cause of the common cold. During uncoating they undergo conformational changes, first converting into the subviral A-particle and finally, on releasing the RNA genome, into the (empty) B-particle. Mimicking in vivo conditions of uncoating in the late endosome we attached the A-particle to the liposomes and demonstrated that the RNA was transferred into the liposomal lumen upon acidification; arrival of the RNA was shown with RT/PCR (1) and fluorescence correlation spectroscopy. Single particle 3D cryo-electron microscopy reconstruction (cryo-EM 3DR) of membrane bound A-particles showed that they are attached via one of the 30 two-fold icosahedral axes (2). In Enteroviruses, such as poliovirus, it has been shown that the RNA was released close to a 2-fold axis when native virus was heated to 56°C. When the RNA was crosslinked with psoralen within native HRV-A2 followed by exposure to 56°C, particles representing an intermediate stage different from the classical A- and B- subviral particles accumulated. Cryo-EM 3DR revealed a rod-like internal density, which presumably represents the condensed form of the viral RNA. One end of this 'rod' was near a viral icosahedral 2-fold axis (4). This suggests that the rhinoviral RNA was in the process of being released but got stuck because double stranded regions could not be unfolded as a consequence of the crosslinking. It remains to be seen whether such condensed RNA plays any role during uncoating under more physiologic conditions. A mechanism imparting directionality to the genome release process might be common to many icosahedral non-enveloped single stranded RNA viruses.

References:

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