Tables

Table 1: Therapy[1]

Name	Mechanism	Case report	Tested in vitro	Animal model
Ribavirin	• Disruption viral purine metabolism • Inhibition RNA polymerase • Inhibition of IMP dehydrogenase • Induction of mutation during transcriptase	Kamble, 2007[2] Raza, 2007[3] Safdar, 2008[4] Bonney, 2009[5] Child: Shachor-Meyouhas, 2011[6]	Wyde, 2003	Hamelin, 2006
NMSO3	Modulation of the binding force between protein G and GAGs		Wyde, 2004[7]	Spetch, 2008[8]
Heparin	Competitive inhibition of G protein with regards to cellular GAGs			
Polyclonal antibodies			Wyde, 2003[9]	
Humanized monoclonal antibodies	Neutralization			
• Anti hRSV Palivizumab Motavizumab			[10] [11][12]	
• Anti hMPV Human Fab DS7			Williams, 2007[13] Ulbrandt, 2006[14] Hamelin, 2010[15]	Ulbrandt, 2006 [14] Williams, 2007[13] Hamelin, 2008[16]
Peptide-derived fusion inhibitors	Inhibition of the fusion proteins		Deffrasnes, 2008[17]	
RNA interference (siRNA)	Cleavage of mRNA before translation		Darniot, 2012[18] Deffrasnes, 2008[19]	

Table 2: Vaccination strategies tested against hMPV infection[1]

Name	Tested in animals
Inactivated vaccines	Mice: Hamelin, 2007[20]
	Macaques: de Swart 2007[21]
	Rats: Yim, 2007[22]
Live-attenuated chimeric vaccines	Tang, 2003 and 2005[23-24]
	Pham, 2005[25]
Live gene-deleted attenuated vaccines	Biacchesi, 2004 and 2005[26-27]
	Buchholz, 2005 and 2006[28-29]
Sub-unit vaccines	Cseke, 2007
	Herfst, 2007 and 2008
DNA vaccines	Cseke, 2007

Table 3: hMPV vaccination studies [1]

Name	Method	Results	
Herd[30]	hMPV cytotoxic T-lymphocyte (CTL) epitope vaccine	Reduced viral load Reduced immunopathology in the lungs Enhanced expression of Th1-type cytokines (gamma interferon and interleukin-12) in lungs and regional lymph nodes Levels of Th2-type cytokines (interleukine-10 and interleukine-4) were significantly lower in hMPV CTL epitope-vaccinated mice challenged with hMPV.	Mice
Cseke[31]	Sequence-optimized hMPV F protein delivered as either a DNA or a protein vaccine	- Modest reduction of nasal virus shedding - No Th2-type response - No increased lung pathology	Cotton rats
Yim[22]	formalin-inactivated preparation of hMPV (strain C-85473)	almost complete protection from viral replication in the lungs dramatic increase in the lung pathology, particularly the interstitial pneumonitis and alveolitis.	Cotton rats
Mok[32]	Venezuelan equine encephalitis virus replicon particles (VRPs) encoding hMPV fusion (F) or attachment (G) glycoproteins administered intranasally	VRPs encoding hMPV F protein induced F-specific virus-neutralizing antibodies in serum and immunoglobulin A antibodies in secretions at the respiratory mucosa Challenge virus replication was reduced significantly in both the upper and lower respiratory tracts. No enhancement of inflammation or mucus production. Vaccination with hMPV G protein VRPs did not induce neutralizing antibodies or protect animals from hMPV challenge.	mice and cotton rats
Biacchesi[33]	topical administration of recombinant hMPV lacking the SH, G, or M2-2 protein	Each gene-deletion virus was highly immunogenic and protective against wild-type HMPV challenge.	African green monkeys

		The replication of the deltaSH virus was only marginally less efficient than that of wild-type HMPV, but deltaG and deltaM2-2 viruses were reduced sixfold and 160-fold in the upper respiratory tract and 3,200-fold and 4,000-fold in the lower respiratory tract.	
Herfst[34]	- iscom matrix-adjuvanted HMPV fusion protein subunit vaccine (Fsol) - A live-attenuated vaccine (HMPVM11)	Both induced HMPV-specific immune responses, but the induced humoral immune response waned rapidly over time.	cynomolgus macaques
[35]	two candidate live-attenuated HMPV vaccines cold-passage (cp) temperature-sensitive (ts) HMPV strains	Replication of these ts-viruses containing either the cp-HMPV or cp-HRSV mutations was respectively reduced and undetectable in the upper and lower respiratory tract High titres of HMPV-specific antibodies were induced by both ts-viruses. Upon immunization with the ts-viruses, the LRT of hamsters were completely protected against challenge infection with a heterologous HMPV strain, and URT viral titres were reduced by 10 000-fold.	

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