Methods. IDLV were produced by co-transfection of transfer, packaging, and envelope plasmids in 293T cells and purification on sucrose gradients. IDLV were normalized using a colorimetric reverse-transcriptase assay. Plasmid expressing mAb VN04-2 was provided by B. Hanson. mAb in the supernatant of transfected cells were detected by western blot and quantified by the Easy-Titer Human IgG Assay Kit. For in vivo study, groups of 6–8 weeks old mice were injected with IDLV either by intranasal (i.n) or intramuscular (im) route. mAb production was detected by western blot and ELISA. Mice were challenged using the recombinant IAV VN5H51-PR8/CDC-DRG derived from IAV A/Vietnam/1203/2004.

Results. We engineered IDLV producing the humanized mAb VN04-2 (IDLV-VN4-2), which is broadly neutralizing against H5 IAV. We found that after transduction of 293T cell with different dosages IDLV-VN4-2, the production of mAb was time and dose dependent. mAb were also functional, and bind specifically H5 HA but not other IAV proteins. We also measured VN04-2 production in the serum of mice, 6, 9, 14, 21 and 30 days after in or im administration of IDLV-VN4-2. We found that levels of mAb were sustained. In separate experiments 5/5 mice receiving IDLV-VN4-2 by the im route and 2/5 mice receiving it by the im route were protected from lethal IAV challenge.

Conclusion. Our data suggest that IDLV may represent an attractive candidate for vector-mediated immunization against infectious disease.

Disclosures. All authors: No reported disclosures.

1660. Antiviral Activity of Peptide Nucleic Acid against Human Parechovirus Type 3

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Background. Human parechovirus (HPeV) type 3 (HPeV3) is an emerging pathogen that plays an important role in respiratory pathogens in young infants. However, specific treatment for HPeV3 infection is currently unavailable. The application of anti-sense technology, such as peptide nucleic acids (PNAs), to viral infection has opened a new era of therapeutics. The aim of this study is to develop PNAs inhibiting HPeV3 gene expression as an in vitro model.

Methods. We designed four PNAs that target domains I, J (base and head of domain I structure), and K of an internal ribosomal entry site (IRES) region within the 5’ untranslated region of HPeV3. The IRES region is needed for the cap-independent translation of virus RNA. As conjugated to the penetrating peptide LIRX, PNA-XB (X = L-arginine, X = a-aminohexanoic acid, B = β-alanine), LLC-MK2 cells were treated with 0.1–10 µM of each PNA or water-containing growth medium for 4 h. The cells were then infected with HPeV3 at the multiplicity of infection (MOI) of 10 for 1 h. The infected cells were incubated for 7 days at 37°C in 5% CO2. Extracellular levels of HPeV3 RNA were measured by real-time PCR on days 0 and 7.

Results. Without any treatment, an extracellular level of HPeV3 RNA increased to 8.2 × 10^6 copies/mL on day 7. When the cells were treated with 10 µM of PNA targeting the domain I of IRES, an extracellular level of HPeV3 RNA was suppressed to 4.7 × 10^6 copies/mL (−99%) on day 7. Using the same PNA with lower concentrations, 1 µM and 0.1 µM of the PNA suppressed 24% and 0% of extracellular levels of HPeV3 RNA, respectively, which demonstrated the effect is dose-dependent. In contrast, 10 µM of PNAs targeting domain J (base), J (head), and K suppressed 94%, 92%, and 30% extracellular levels of HPeV3 RNA, respectively, compared with control. Conclusion. The PNA (RRR)-XB targeting the domain I of IRES suppressed extracellular levels of HPeV3 RNA in an in vitro model in a dose-dependent manner. Thus, PNA treatment may be a therapeutic candidate for HPeV3-infected patients. This novel therapy could target other HPeV genotypes given that the target sequence was identical to those of other clinically significant HPeVs.

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1661. Preventing Respiratory Viruses in the Neonatal ICU

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1661. Preventing Respiratory Viruses in the Neonatal ICU

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Background. Infants in the neonatal ICU can acquire respiratory viruses from ill healthcare personnel (HCP), visitors, or other infants. We describe the epidemiology of respiratory viruses and infection prevention and control interventions aimed to reduce acquisition and transmission of respiratory viruses in our NICU.

Methods. From May 2012 to December 2016, we tracked respiratory viruses detected by a multiplex reverse-transcriptase (RT-PCR) assay (FilmArray, Biofire, Inc.) in our 58-bed level IV NICU (~1,000 annual admissions). Testing was ordered for clinicians treating for symptomatic infants. Infants with positive RT-PCR tests generally remained on contact/ droplet precautions throughout their NICU stay. FCPR were made to the sick and report to Workforce Health and Safety if they became ill at work. Ill visitors were not permitted in the NICU, as enforced by written educational materials and signage, but formal screening was not performed. Starting in January 2015, asymptomatic infants exposed to RT-PCR-positive index cases were screened by RT-PCR, put on contact/ droplet precautions for the incubation period (IP) of the index case’s virus, and screened again at IP end. Starting in December 2015, infants born at gestational age of <32 weeks were screened at 2 weeks and 4 weeks of age. We assessed transmission events (≤2 infants), clusters (3 infants), and outbreaks (>3 infants); all were defined as detecting geographically related cases within the relevant IP. We determined screened infants who had positive RT-PCR tests.

Results. During the 5-month observation period, 79 infants had 83 viruses detected (~1.8% of admissions). Rhinovirus enterovirus (RV/ERV) were most common (n = 59) and caused 1 outbreak of 7 infants, 4 clusters, and 5 dyad transmissions. Adenovirus caused 1 outbreak of 5 infants. Two dyad transmissions occurred for parainfluenza. Apocaudicasis of RSV (n = 5), coronavirus (n = 5), and influenza (n = 2) occurred. Ill household contacts were identified for 10 infants. No HCPs were identified with respiratory infections. Since January 2015, 8 screened infants had positive RT-PCR tests. Since December 2015, only 1 transmission dyad (RV/ERV) occurred.

Conclusion. Preliminary data suggest that our interventions have reduced the burden of respiratory viruses in the NICU.

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1662. Use of Oral Ribavirin for the Treatment of RSV Infections in Hematopoietic Cell Transplant (HCT) Recipients

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Background. The benefit of aerosolized ribavirin (AR) in reducing the risk of progression of RSV infections and RSV-associated mortality in HCT recipients has been recognized, yet there is paucity of data assessing the use of oral ribavirin (OR) in this patient population. We evaluated outcomes associated with the use of OR compared with AR in HCT recipients.

Methods. Retrospective review of all HCT recipients with RSV infection treated with OR or AR during three RSV seasons (September 2014 – February 2017). An established immunodeficiency Scoring Index (ISI) was applied to identify patients at high risk for progression and death based on host risk factors. Mortality, progression to lower respiratory infection (LRI), and need for ICU admission was compared among recipients of AR and OR.

Results. A total of 107 patients were treated with OR (n = 42, 39%) or AR (n = 65, 61%). Recipients of AR and OR were equally likely to be high-risk by ISI scoring (11% vs. 10%, P = 1.00). Fifty-three patients (50%) presented with upper respiratory infection (URI) of whom 13 (25%) progressed to LRI. There was no difference in the rate of progression to LRI between recipients who received AR compared with OR (8% vs. 19%, P = 0.53). No difference was found in 30-day mortality rates based on treatment strategy (8% vs. 5% OR, P = 0.70). Interestingly, 90-day mortality was found to be significantly lower among patients who received OR vs. AR (20% vs. 5%, P = 0.04). No difference in inpatient rates of ICU admission and requirement for mechanical ventilation were found between the two groups. For the 99 inpatients at time of diagnosis, median (interquartile range) length of stay was 7 (5–19) days, and was similar for patients on either treatment modality. Eight patients were treated for RSV on an outpatient basis and all received OR.

Conclusion. HCT patients with RSV had similar outcomes when treated with AR and OR, OR may be a safe and effective alternative to AR for prevention and treatment of RSV in HCT patients with significantly reduced cost.

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1829. Pharmacokinetics (PK) of Efavirenz in Subjects with Renal or Hepatic Impairment Compared with Healthy Subjects

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Background. Efavirenz (ERV) is a nonnucleoside reverse transcriptase inhibitor that is approved for the treatment of HIV-1 infection. Although ERV is not considered restricted to any special population, drug-drug interactions, less renal clearance and apparent volume of distribution are increased in patients with impaired renal function and the risk of neuropathy may be increased in patients with creatinine clearance <50 mL/min. Therefore, the present study investigated the pharmacokinetics of ERV in subjects with end stage renal disease (ESRD) or hepatic impairment (HI) who had undergone a kidney or liver transplant.