

# Enterovirus and parechovirus infections in children

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*Viruses in May, Katoomba 2014*

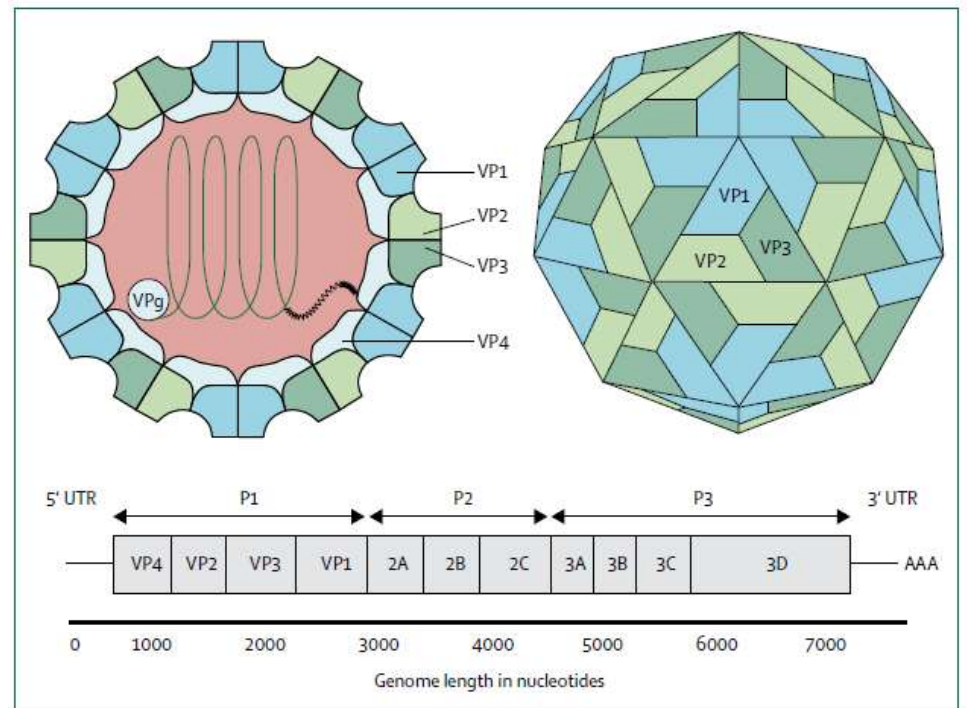


# OUTLINE

- Introduction – Enteroviruses and Parechoviruses
- Epidemiology in Australia
  - Recent parechovirus outbreak and example case
- Clinical features
- Diagnosis
- Management
- Outcomes

# Enteroviruses

- *Picornaviridae* family
- No envelope
  - Resistant to gastric acid
  - Survives for days on surfaces
  - Resistant to some disinfectants



# Classification of Enteroviruses

- 4 species
- > 90 subtypes
- *Parechoviruses previously EV22-23, now separate*

Serotype	
A	CV-A2-8, CV-A10, CV-A12, CV-A14, CV-A16, EV71, EV76, EV89-92
B	CV-A9, CV-B1-6, E1-7, E9, E11-21, E24-27, E29-33, EV69, EV73, EV74-75, EV77-88, EV93, EV97, EV98, EV100, EV101, EV106, EV107
C	CV-A1, CV-A11, CV-A13, CV-A17, CV-A19-A22, CV-A24, EV95, EV96, EV99, EV102, EV104, EV105, EV109, PV1-3
D	EV68, EV70, EV94

The Picornaviridae Study Group and the International Committee on Taxonomy of Viruses classified the Enterovirus genus into ten species, which include four human enterovirus species (A–D), three human rhinovirus species (A–C), bovine enterovirus, simian enterovirus A, and porcine enteroviruses (<http://www.ncbi.nlm.nih.gov/ICTVdb/ICTVdB/>). CV-A=coxsackievirus A. CV-B=coxsackievirus B. EV=enterovirus. E=echovirus. PV=poliovirus.

**Table 1: Human enterovirus serotypes, by species**

# Epidemiology

- Transmission
  - Faecal- oral
  - Respiratory secretions
  - Surfaces / fomites
- Viral shedding
  - Pharynx 3-4 weeks
  - Faeces 5-6 weeks
- Seasonal periodicity
- $\frac{3}{4}$  infections < 15 yrs of age

# Clinical - Enteroviruses

- Asymptomatic 50-80%
- Non specific febrile illness
- Herpangina
- Hand, foot & mouth disease (HFMD)
- Aseptic meningitis
- Brainstem / cerebellar encephalitis, myelitis
- Acute flaccid paralysis
- Post infectious neurological syndromes



# Parechovirus

Australian babies diagnosed with 'parechovirus' for first time ...

<http://www.abc.net.au/news/2013-11-30/babies-diagnosed-wi...>



## Australian babies diagnosed with 'parechovirus' for first time

*Updated Sun 1 Dec 2013, 12:42am AEDT*

**Doctors are being urged to look out for a new virus, called parechovirus, that affects infants and has not been seen in Australia before.**

MAP: Australia

# Human parechoviruses

- Human parechovirus (HPeV) were detected in a number of neonates and young infants admitted to NSW hospitals since October 2013
- Sepsis-like presentations
- Some additional features:

- Irritability and appearing to be in pain
- Maculopapular or erythematous rash
- Diarrhoea or loose stools
- Tachycardia
- Abdominal distension

- Tachypnoea
- Encephalitis
- Myoclonic jerks
- Hepatitis



# HPEV Case

- 13-day old neonate
- 1 day of rhinorrhoea and fever plus loose stools
- Developed maculopapular rash becoming confluent with facial sparing
- Admitted to hospital:
  - Mottled, capillary return >3 seconds
  - Tachycardic and tachypnoeic
  - No improvement with fluid bolus
  - Treated as sepsis
    - IV amp/gent (later also given cefotaxime/aciclovir)
    - Transferred to SCH CICU

# HPEV Case

- pH 7.07 on arrival
- RR 70, SaO<sub>2</sub> 100% in RA
- HR 180
- CRT 4 seconds
- T 38.4 degrees Celsius
- Irritable, confluent rash, distended abdomen

# HPEV Case - Outcome

- CICU admission 7 days
- CPAP support
- Surgical review of abdomen – no surgical abdomen
- All cultures negative, HSV PCR negative
- Normal echocardiogram, unremarkable head U/S
  
- Discharged to ward, afebrile, in room air, feeding and clinically well
  
- PARECHOVIRUS PCR POSITIVE (FAECES AND NPA)

# Other features

- Sepsis-like presentation most notable
- Abdominal distension
- Hepatitis +/- coagulopathy
- Encephalitis/white matter changes on MRI
  - Small number of infants
  - Generally normal CSF cell counts
- Suspected myocarditis due to tachycardia
  - Normal echocardiogram and recovery in our cohort

# Diagnosis

- PCR
  - CSF (often normal cell count)
  - Throat swabs/NPAs
  - STOOL – best sample
  - Blood
  - **(HPEV is not picked up on standard Enterovirus PCR!)**
- Serology/Viral culture
  - Not used in this outbreak

# Treatment

- Supportive care
  - Antibiotics prescribed prior to confirmation of diagnosis
- Severe cases
  - Circulatory and ventilatory support
  - Inotropes
  - Albumin

# Prevention

- Vaccines? – the race is on
  - Poliovirus vaccines available for many years worldwide
  - Enterovirus 71 vaccines successfully trialled in China
- Education and hygiene?

# Prevention

- Public health measures
  - Hand washing
  - Nappy disposal
  - Surface cleaning with bleach based disinfectants
  - Heightened surveillance
  - “Social distancing” measures?
  - Awareness campaigns

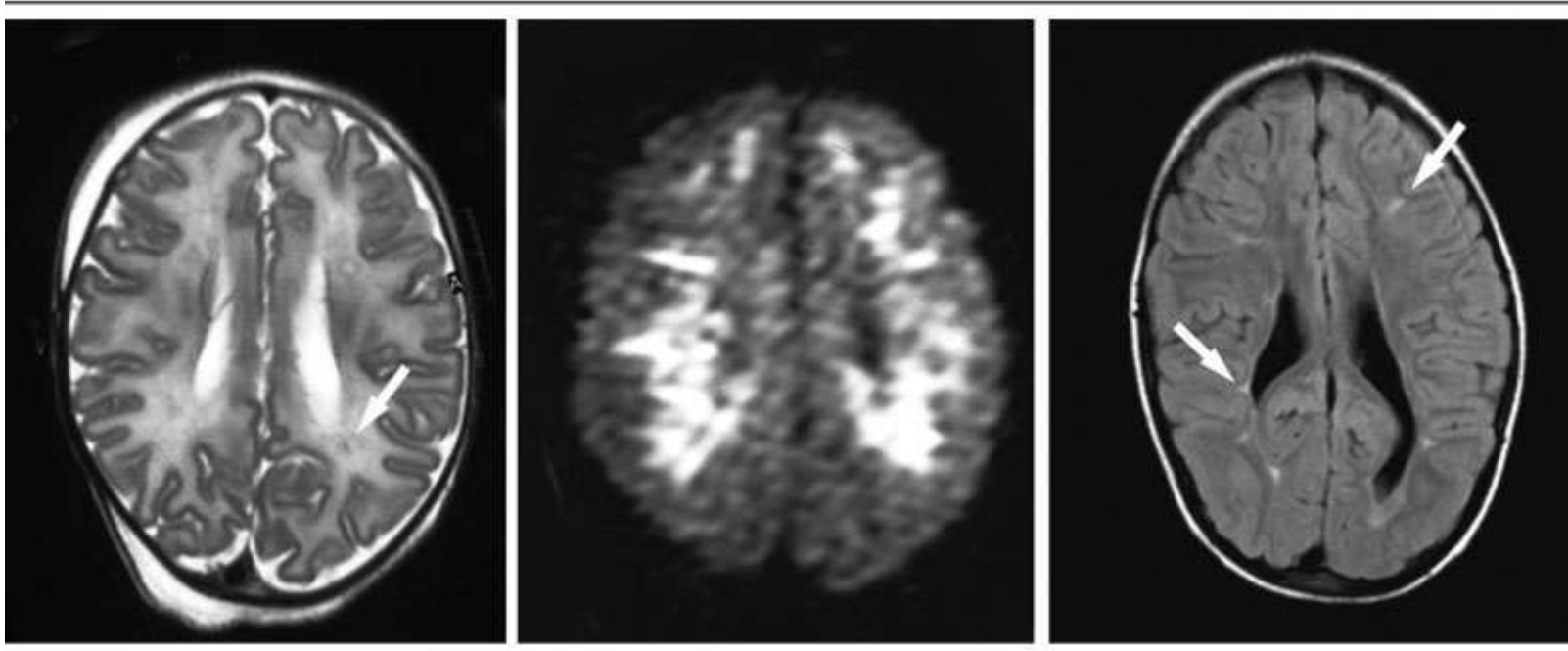




# HPEV encephalitis outcomes

- 9 neonates admitted to NICU with clinical seizures (Netherlands and Canada)
- Head Ultrasound: increased echogenicity in periventricular white matter all infants
- MRI: confirmed white matter changes – later gliosis
- Outcomes
  - Normal development 5 infants
  - Neurological impairment or epilepsy 3 infants
  - Possible mild impairment one infant

# HPEV encephalitis outcomes



# Outcomes – NSW cohort

- Variable illness severity often for 4-7 days
- Generally followed by defervescence and rapid recovery
- Generally good outcomes in these infants to date, even in infants severely ill
- Reversal of MRI changes (to normal scan) in one SCH infant, who was clinically normal at follow-up

# Acknowledgements

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