RESULTS: A 7-year-old previously healthy male presented with 3
days of fevers up to 102.4°F, headaches, abdominal pain, and intractable
vomiting. Both parents had tested positive for SARS-CoV-2 four weeks
prior. Nasopharyngeal swab tested positive for SARS-CoV-2 RNA.
Echocardiogram was normal. CT venogram of his head was negative for
any pathology. He developed severe neck pain and persistent headache
during his hospitalization. Soon after receiving hydroxychloroquine, he
developed a facial rash and altered mental status with episodes of aphasia,
agitation, and pinpoint pupils. He then became unresponsive with left
gaze deviation. A non-contrast head CT and CT angiography were
negative. He was given levitiracetam and cefazolin and transferred to the
pediatric intensive care unit. An electroencephalogram (EEG) showed
no epileptiform activity. Over the following 7 hours, the EEG demon-
strated left frontotemporal slowing, which progressed into a loss of fast
activity over the right hemisphere with increased delta activity in the
left hemisphere, then abruptly changed to generalized voltage attenu-
ation. He rapidly lost brainstem reflexes, developing fixed and dilated
pupils. Repeat CT scan revealed diffuse cerebral edema with loss of
gray-white differentiation. Lab results then were consistent with severe
inflammation. An intracranial pressure monitor revealed pressures greater
than 76 mmHg. His exam soon became consistent with brain death.
Pathologic evaluation showed diffuse cerebral edema with perivascular
mononuclear infiltrates.

CONCLUSION: The cause of this pediatric multi-system inflam-
matory syndrome is unclear and the mechanism by which SARS-CoV-2
affects the nervous system is unknown. Pediatric patients with COVID-
19 and neurologic symptoms should be closely monitored as they can
rapidly decline due to fulminating cerebral edema.

572 Integrative Genomics Implicates Genetic Disruption of
Prenatal Neurogenesis in Congenital Hydrocephalus

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INTRODUCTION: Congenital Hydrocephalus (CH) affects
1/1,000 live births and costs the US healthcare system over $2 billion
annually. Surgical cerebrospinal fluid diversion exhibits high failure
rates and substantial morbidity. Limited understanding of pathogenesis
warrants identification of crucial genetic drivers underlying CH and
their impact on brain development.

METHODS: Exome analysis of 381 radiographically-confirmed,
neurosurgically-treated sporadic CH probands (including 232 case-
parent trios) identified genes with rare de novo or transmitted mutations
conferring disease risk. Transcriptome analyses identified mid-gestational
brain modules and cell-types enriched for cohort-determined CH risk
genes, known genes previously implicated in isolated and syndromic
forms of CH, and risk genes of Autism Spectrum Disorder (ASD) and
Developmental Disorder (DD).

RESULTS: Exome analysis reveals 9 high confidence genes and
55 probable risk genes harboring CH-linked mutations. Together,
cohort-determined and known CH genes enrich in a single network
(“yellow” module) associated with ASD and DD. Functional profiling
of the yellow module yields terms of cell and neuronal differentiation,
genetic anomalies of craniofacial development, and behavioral abnor-
malities. Cohort-determined and known CH genes together enrich in
nascent migrating excitatory neurons and cycling mitotic progenitors,
occupying earlier stages of differentiation than ASD- and DD-enriched
cell-types.

CONCLUSION: Genetic drivers of CH converge in a neurodevel-
opmental network and in early neurogenic cell-types, implicating genetic
disruption of early brain development as a primary patho-mechanism for
a significant subset of CH patients. Transcriptional overlap with ASD
and DD may explain persistence of these conditions in CH patients
despite surgical intervention, while greater potency of CH-enriched
neural precursors may account for increased frequency of structural brain
abnormalities in CH than in ASD or DD alone.

573 Duraplasty and Obex Exploration Compared with Bone
Only Decompression for Chiari I Malformation in
Children: Retrospective Review of Outcomes and
Complications

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INTRODUCTION: Some pediatric Chiari I malformation (CM-
I) patients remain asymptomatic, while others present with debilitating
symptoms necessitating surgery. Surgery aims to restore normal
cerebrosinal fluid flow, including increasing the posterior fossa volume
via bone decompression only, or bone decompression with duroplasty,
with or without obex exploration. Indications for duroplasty and obex
exploration following bone decompression remain controversial.

METHODS: A retrospective review was conducted of medical records
of 294 CM-I patients (<20 years), operated on at a single institution
between 2001–2015 by the senior author (RGE). Imaging findings
of tonsillar descent, associated syrinx (syringomyelia or syringob-
ublia), basilar invagination, clinical assessment of CM-I attributable
symptoms, and scoliosis were recorded. Clinical outcomes, including
syrinx resolution, symptom resolution, impact on scoliosis progression
and complications were compared for 3 groups: bone only/posterior fossa
decompression (PFD), with duroplasty (PF DwD), with duroplasty and
obex exploration (PFDwDO).