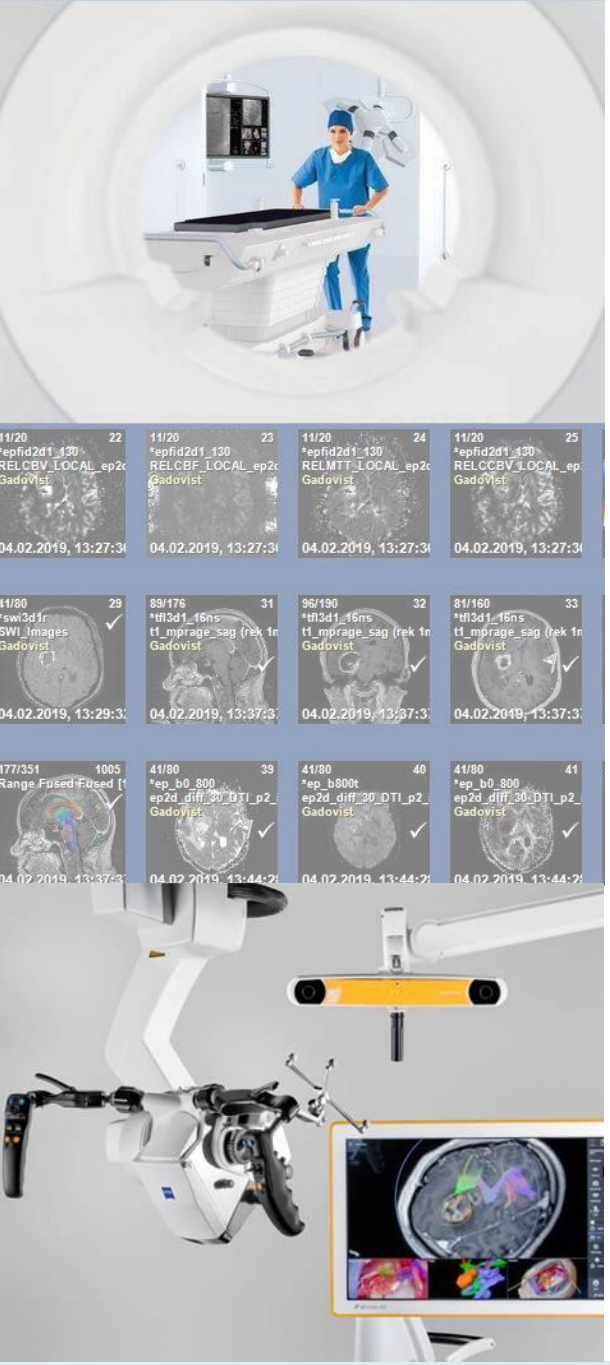


Vannlige MR-funn og pitfalls ved mitokondriesykdom

Anna Latysheva
Section of Neuroradiology
Department of Radiology
Oslo University Hospital – Rikshospitalet

Oslo University Hospital

- *Klassifikasjon*
- *MR protokoll for metabolske sykdommer*
- *MR funn ved vanligste syndrommer*
- *Pittfall/Differencialle diagnoser*
- *Konklusjoner*

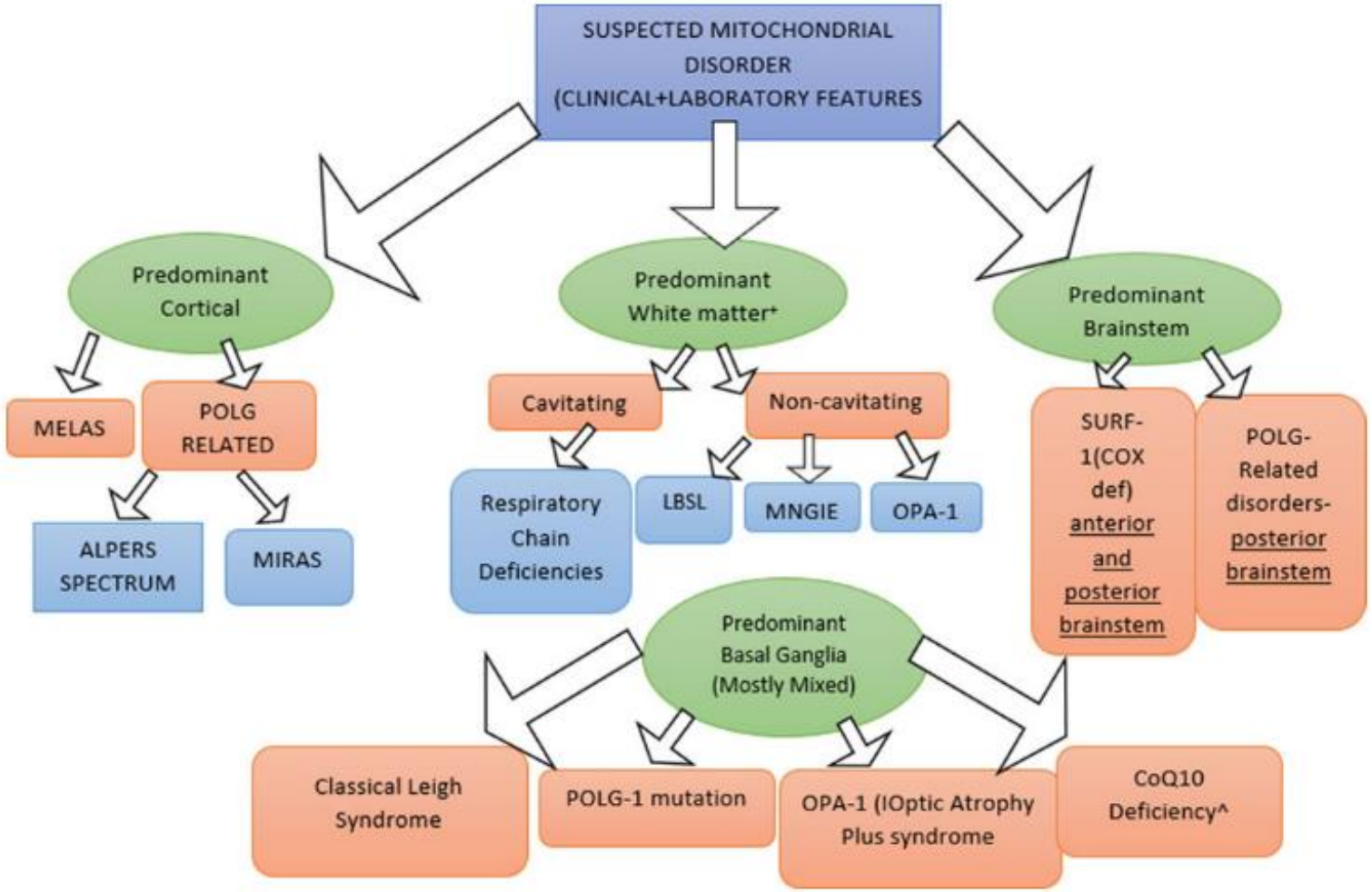
Four major encephalopatic syndoms:

- *Leigh disease*
- *Kearns-Sayre syndome*
- *MELAS (**M**itochondrial **e**ncephalomyopathy with **l**actic **a**cidosis and **s**troke-like episodes)*
- *MERRF (**M**yoclonus **e**pilepsi with **r**agged **r**ed **f**ibers)*

Rare encephalopatic syndoms:

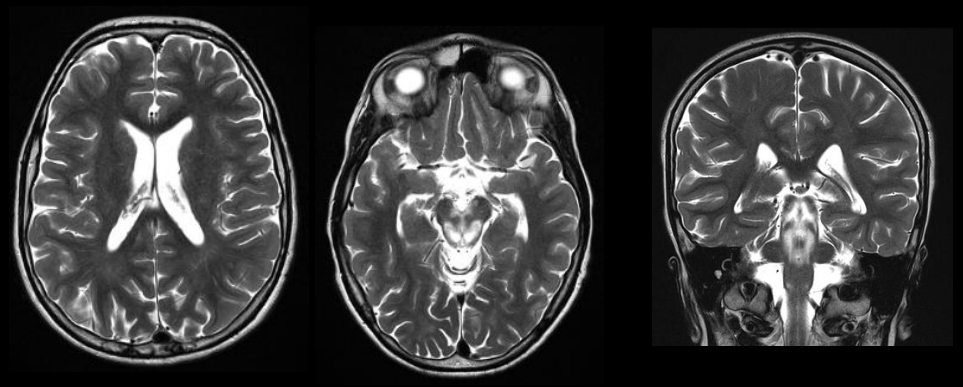
- *Alpers syndrome*
- *Infantile mitochondrial myopathy*
- *Leber hereditary optic neuropathy (LHON)*

Possible genetic etiology of neurological mitochondrial cytopathy from the MR imaging

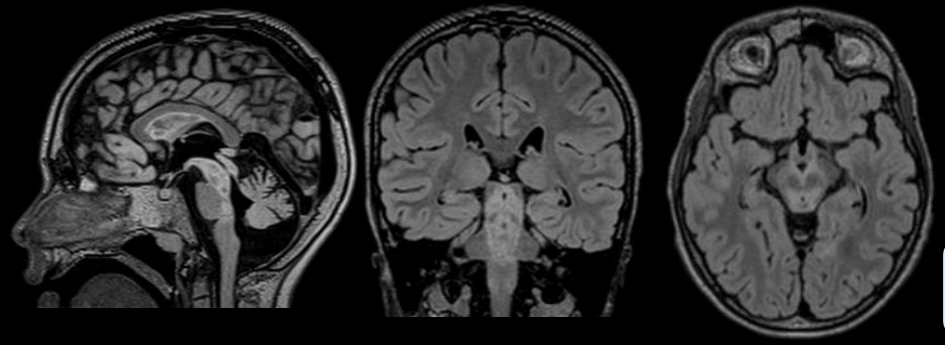


Senthilvelan et al. Clin Neuroradiol 2021

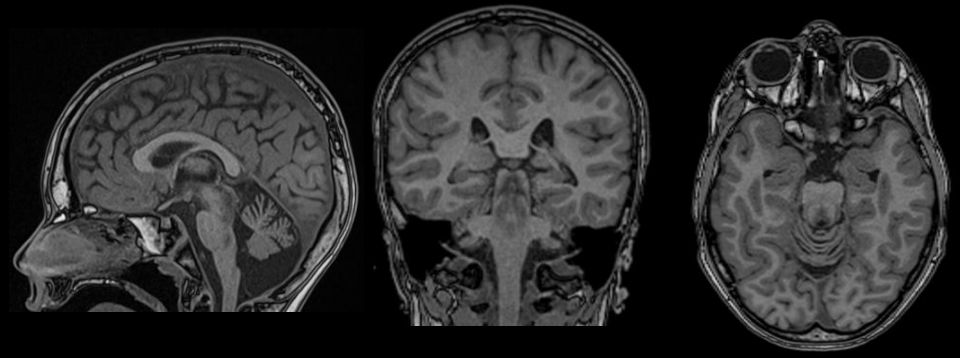
Axial T2 TSE
Coronal T2 TSE



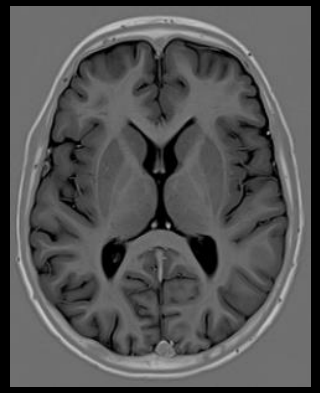
FLAIR 3D



T1 MPRAGE
uten kontrast

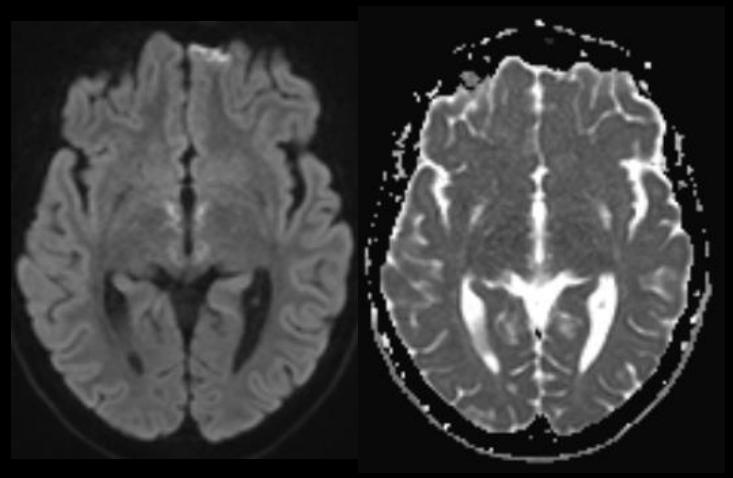


T1 IR

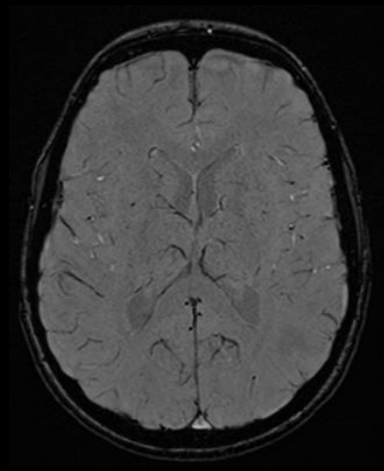


- *utbredelse*
- *struktur (nekroser, kaviteter)*
- *avgrensning fra nærliggende vev*
- *myelinisering*
- *encefalomalasia, gliosis, substans tap*

Diffusjon (DWI)

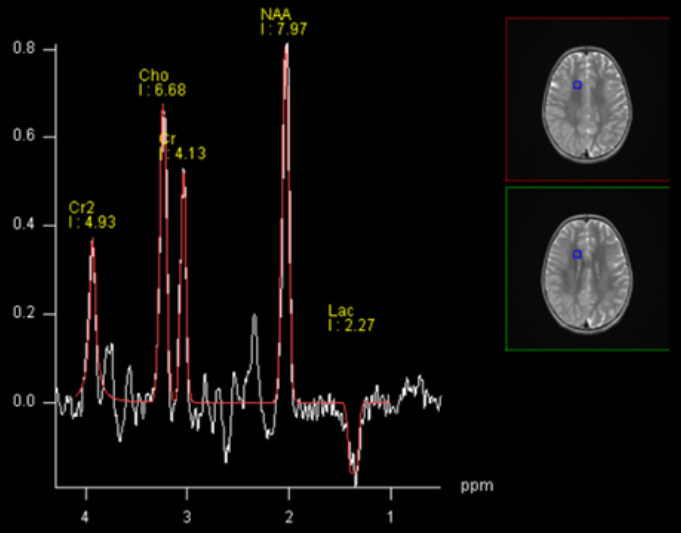


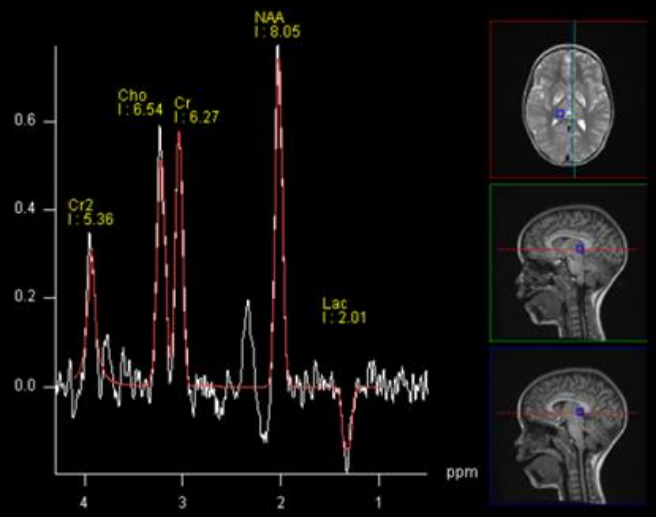
SWI



- *blod, kalk*
- *venner*

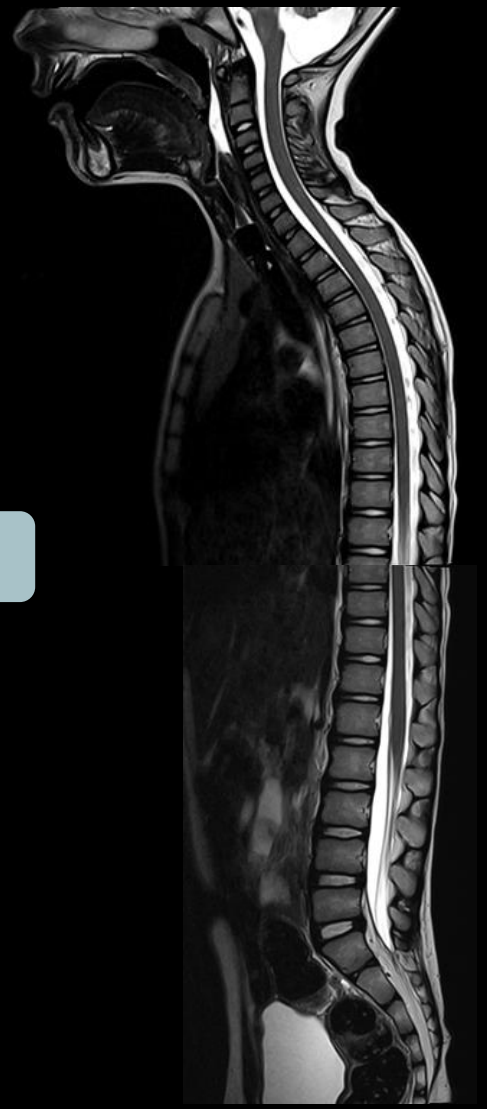
Spektroskopi



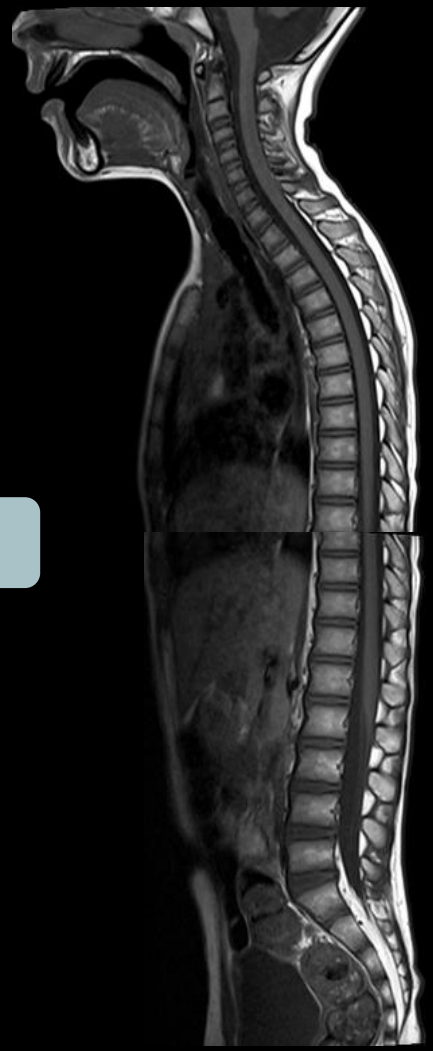


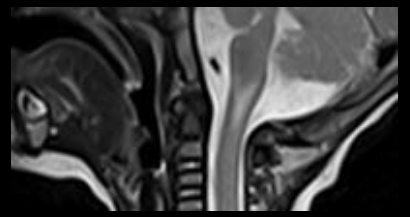
- *laktat topp*

Sag T2

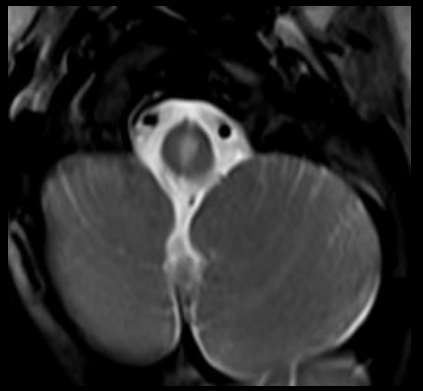


Sag T1





Axial T2

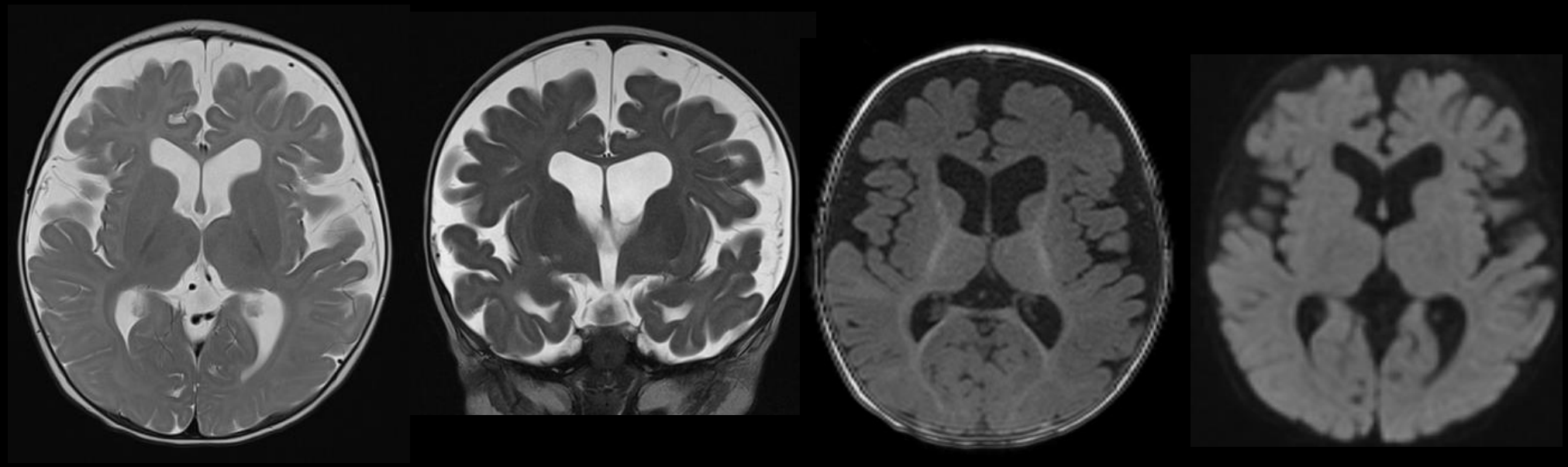


Nevroradiologic finding

- ***Findings are variable and dependent on which organs and tissues are affected and how severe they are affected***
- ***Large variation from patient to patient***
- ***Specific for the disease or non-specific***
- ***Bilateral symmetric deep grey matter involvement and peripheral white matter delayed myelination + elevated lactate level on MR spectroscopi***

MR kan være negative!

MR 4mnd gammel gutt med laktacidose fra fødsel, hypoton



Sykdomsgivende variant i COX16-genet, som kan gir kompleks IV mitokondriapati

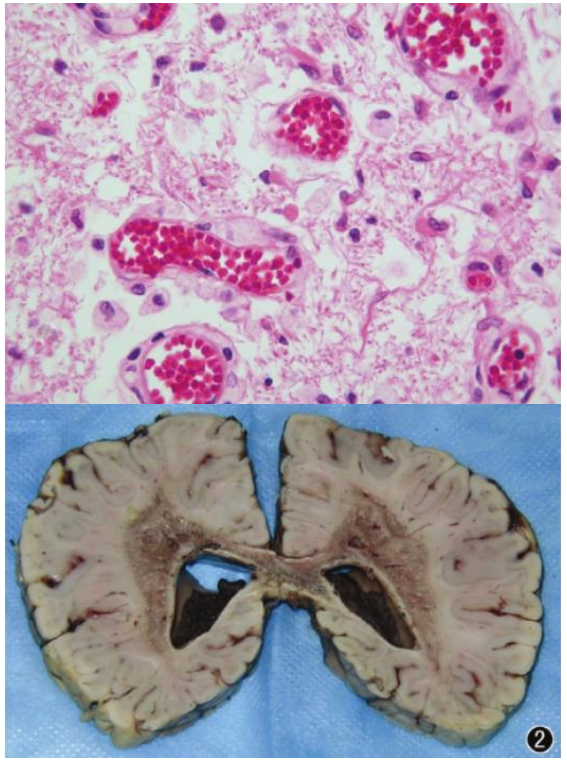
Leigh syndrome (LD)
Subacute necrotizing encephalopathy

Klinikk:

- *debut av symptommene oftest under 2 år*
- *psykomatorisk forsinkelse*
- *ataxia*
- *oftalmoplegia*
- *dystonia*
- *pareser av kranielle nerver*

Patologi:

- *spongiform degenerasjon*
- *kapillær proliferasjon*
- *demyelinisering,*
- *nevronal tapp, gliose*

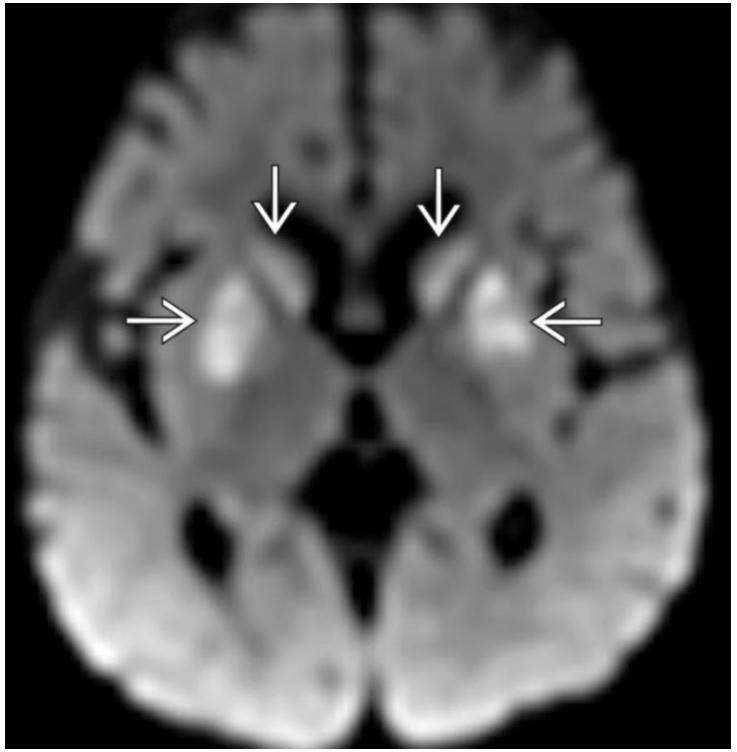


Jiang-xi Xiao et al, 2006 Chinese Madical Journal

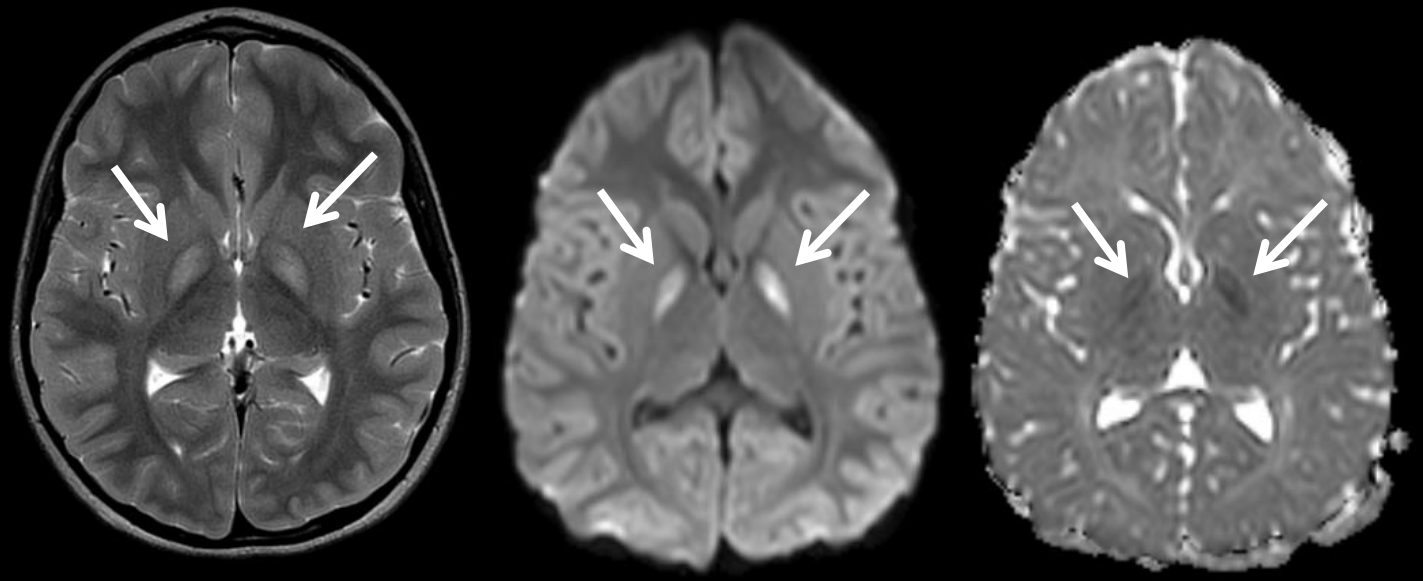
Leigh syndrome

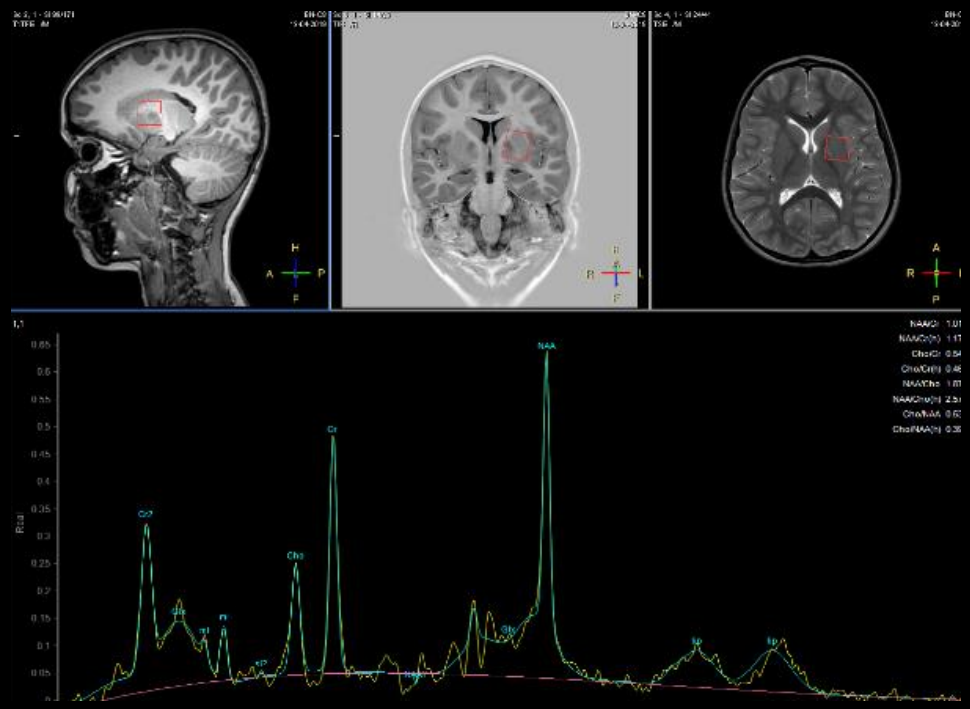
- *Bilaterale symmetriske områder med T2/ FLAIR hyperintensitet og restriktiv diffusjon i basale ganglier :*
  - *posteriore segment av putamen og nucleus caudatus*
  - *globus pallidus er mindre affisert*

- *Medial talamus bilateralt*
- *Kan forekomme lesjoner i pons, cerebellare pedunkler og medulla*



5 år gammel jenta med utvikling av dystony/dyskinesi
Flere episoder med gastroenteritt, metabolsk asidose





Mitochondrial short-chain enoyl-CoA hydratase 1 deficiency (ECHS1D), kan gi sene manifestasjon av Leigh symptommer

MELAS
Mitochondrial encephalomyopathy with lactic acidosis and stroke-like episodes

Klinisk triade *: laktaacidose*
kramper
infarkt-lignende episoder

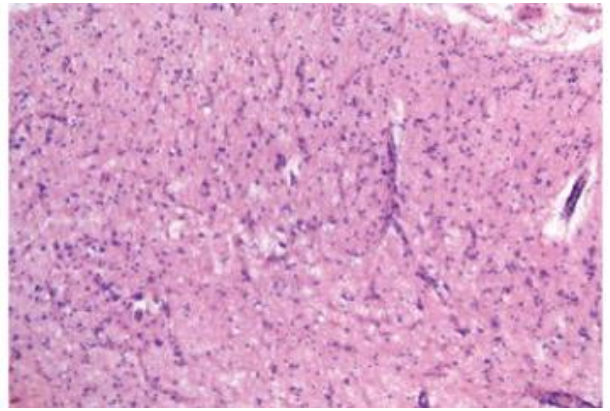
- *encefalopati*
- *demens*
- *muskelsvakhet*
- *nedsatt hørsel*

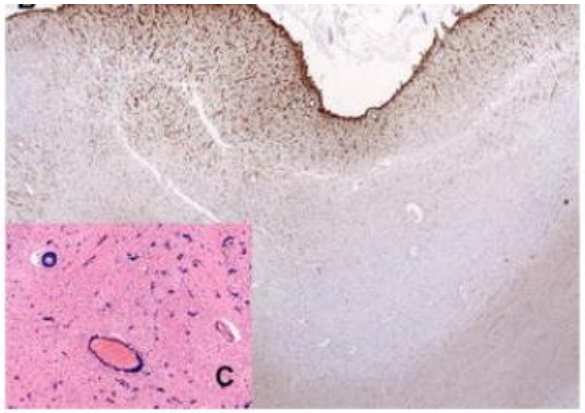
Gjennomsnitts alder ca 15 år kan også forekomme senere

Patologi

Defekt involverer respiratory chain

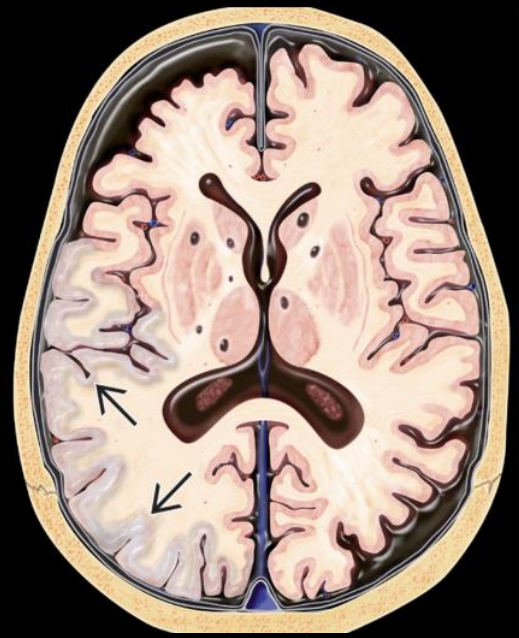
- *nevronal tapp*
- *karproliferasjon*
- *gliose*

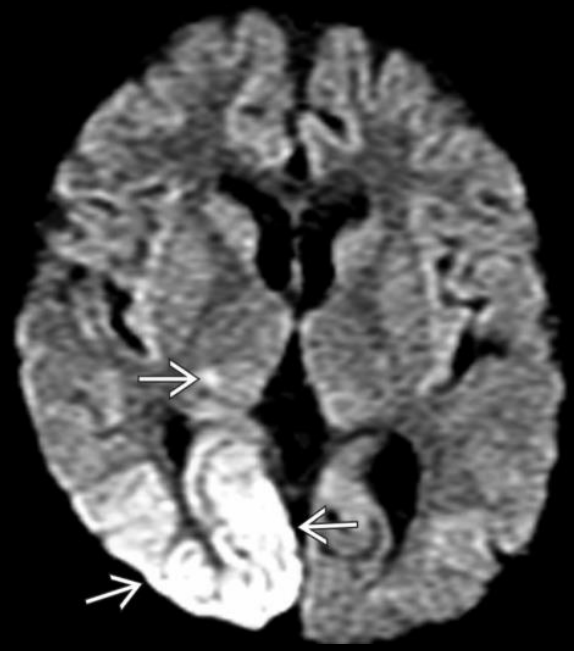




Akute MELAS

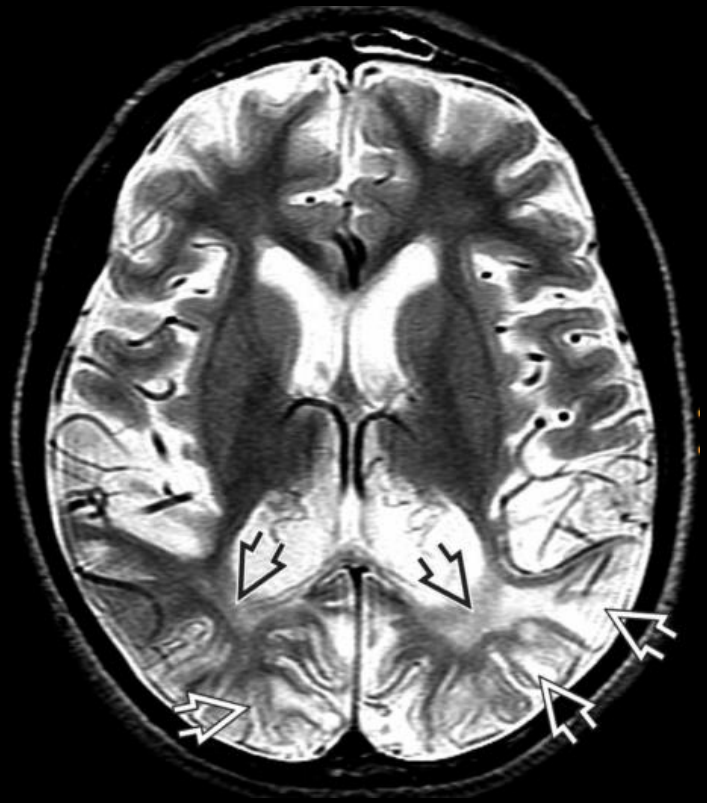
- *Gyral ødem (oftest vasogene ødem) med økt T2 / FLAIR signal uten respekt av vaskulære områder.*
- *Gyral kontrastoppladning*
- *Subkortikal hvit substans er ikke involvert*
- *MR angio viser ikke okklusjon av store kar*
- *Parietal oksipital lapp er oftest affisert*



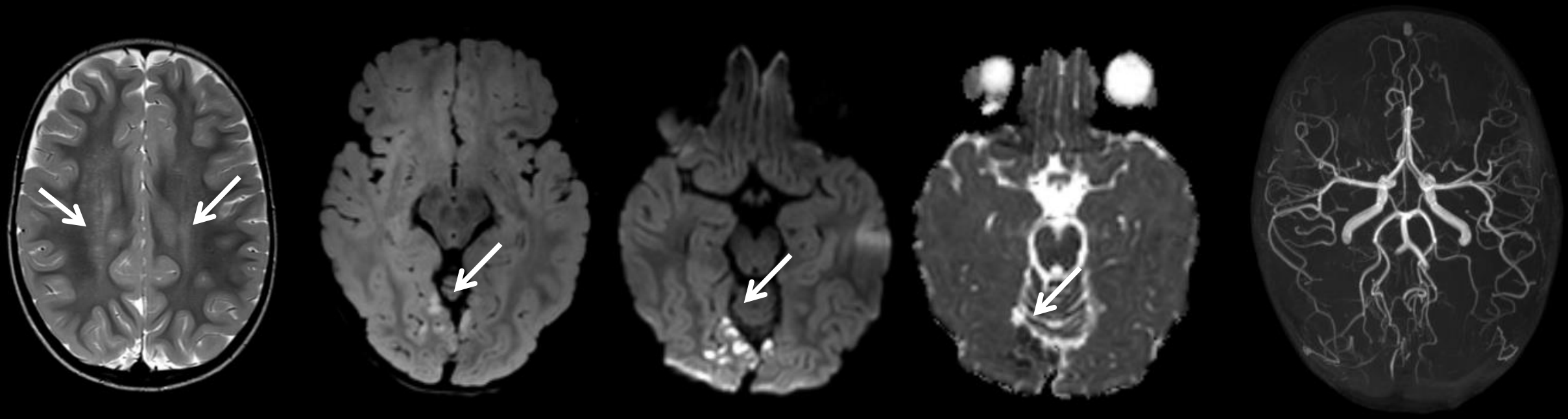


Kronisk MELAS

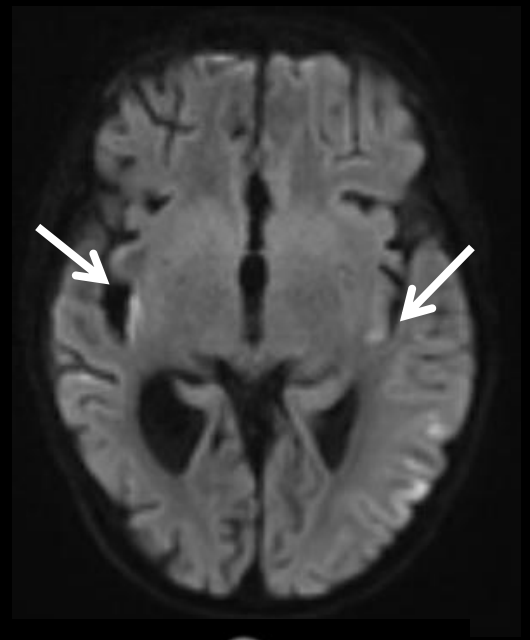
- *Multifokal lakunære infarkter*
- *Symmetriske kalsifikasjoner I basale ganglier*
- *Substanstap*
- *Progressive atrofi av parietooksipitalt cortex*

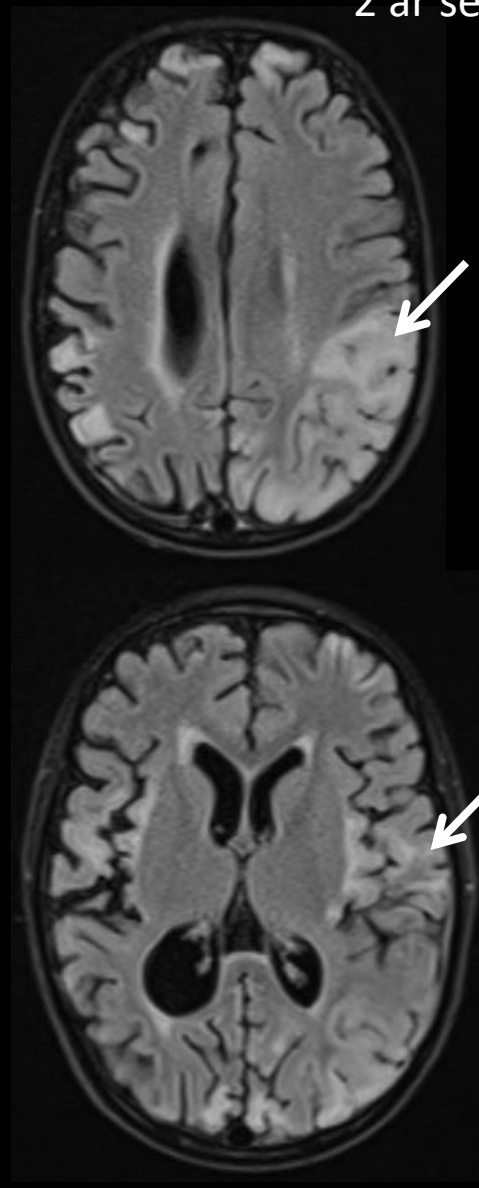


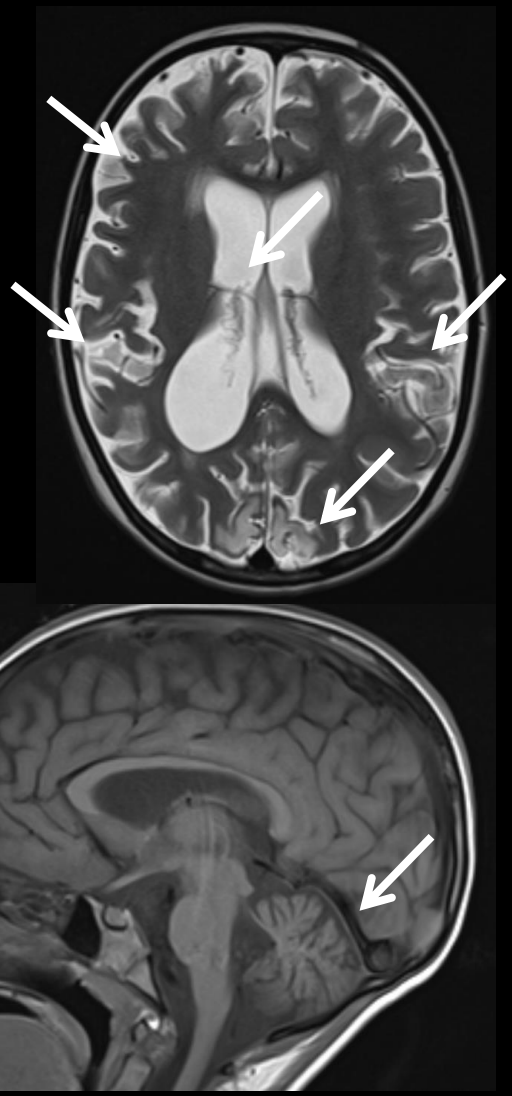
4 år gammel jenta med flere infarkt lignende episoder
Epilepsi
Problemmer med ernæring, vekttap



2 år seinere etter flere anfall



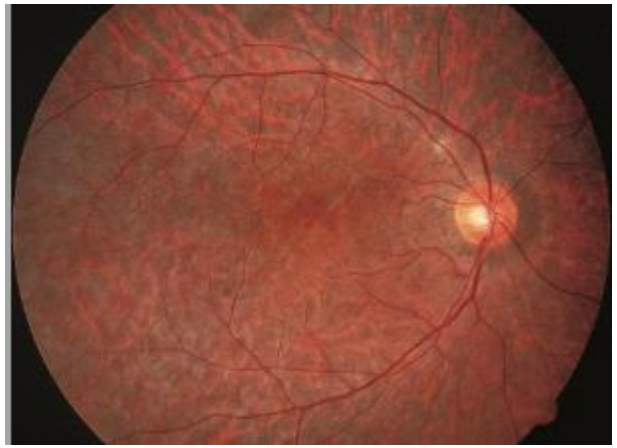




Kearns-Sayre Syndrome (KSS)
Ophthalmoplegic syndrome

***Klinisk tirade**: progressiv ofalmoplegia*
retinit pigmentosa
arytmia

- *Eldre barn eller unge voksne*
- *Kortvekst*
- *hørsel tapp*
- *ataxia*

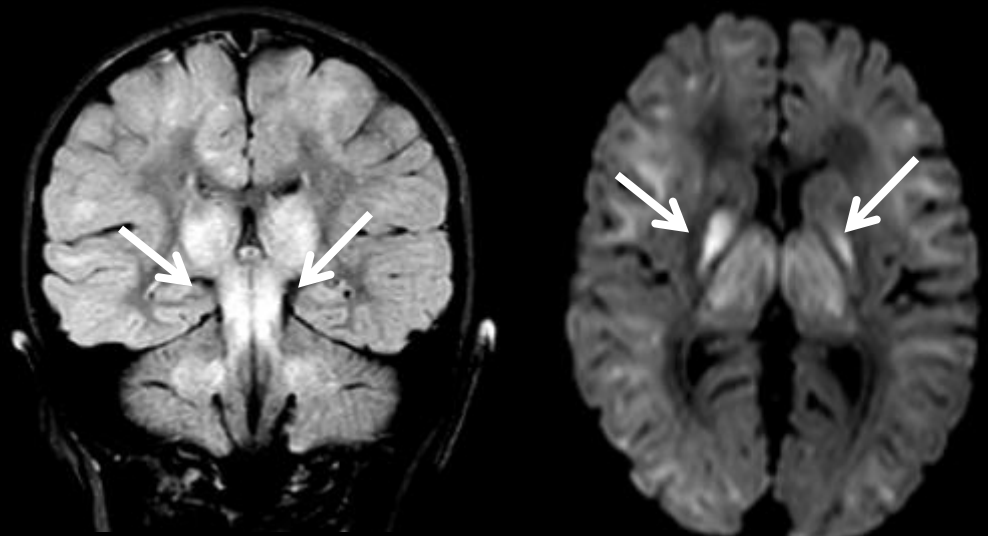


Patology:

- *Mitochondrial DNA*
- *Spongiform hvit substans, vakuolisering hvor cerebrale hemisfærer og hjernestammen er mest affisert.*

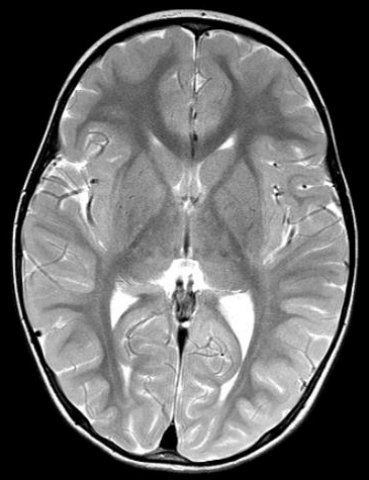
Kearns-Sayre Syndrome

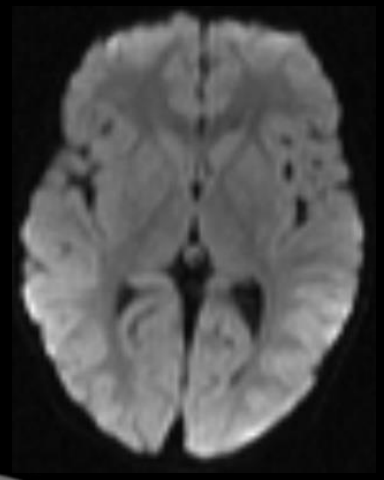
- *Hyperintense T2 / FLAIR signal i basale ganglier og hvit substans , cerebellum kortikospinale trakt*
- *Hjernestammen er tidlig involvert*
- *Periventrikulære hvit substans er relativt sparret*
- *Spektroskopi viser laktat topper*
- *Kalsifikasjoner i basale ganglier gradvis substanstap kortikal og cerebellar*

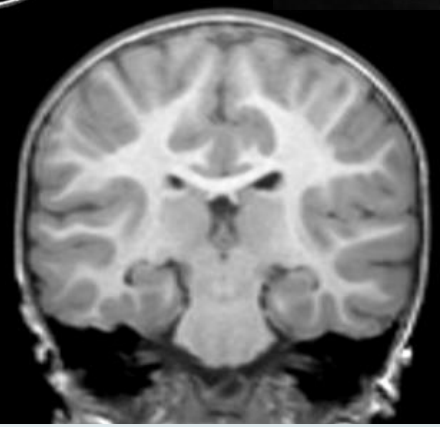


Kearns-Sayre Syndrome (KSS)

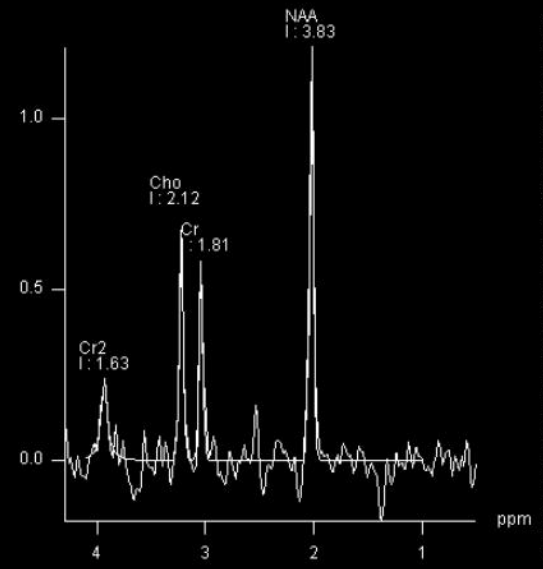
2 år gammel jenta med mye oppkast , dårlig matlyst, vekttap og lite vekst

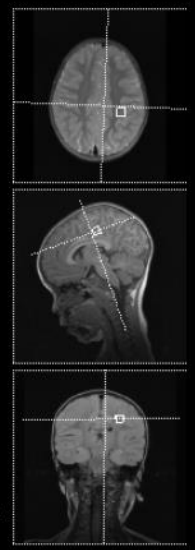


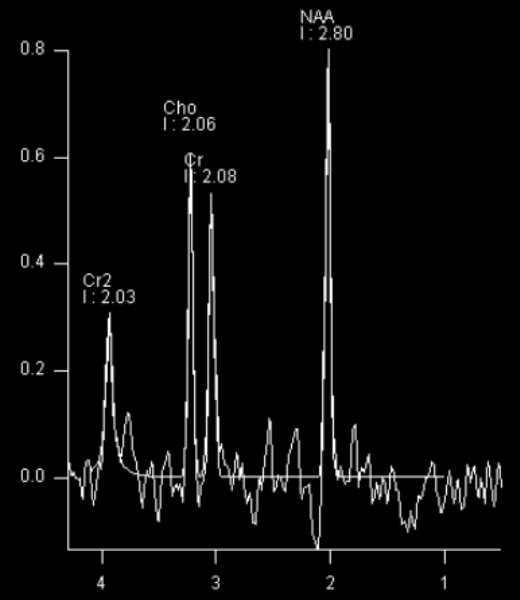


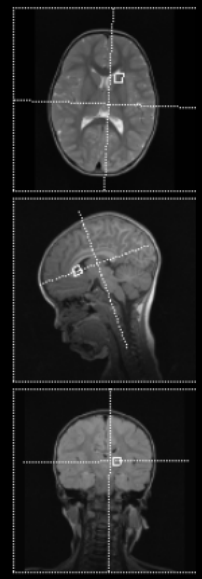


MR var normal, mulig laktat topper

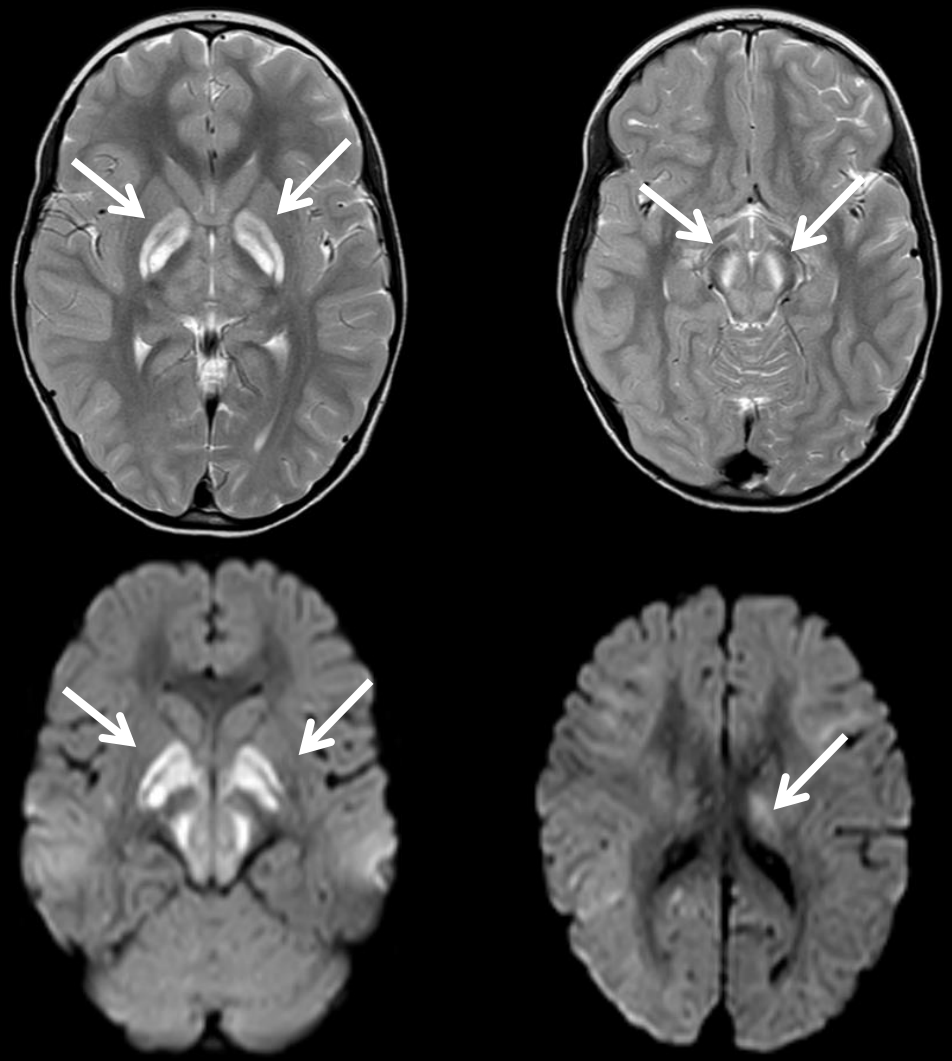


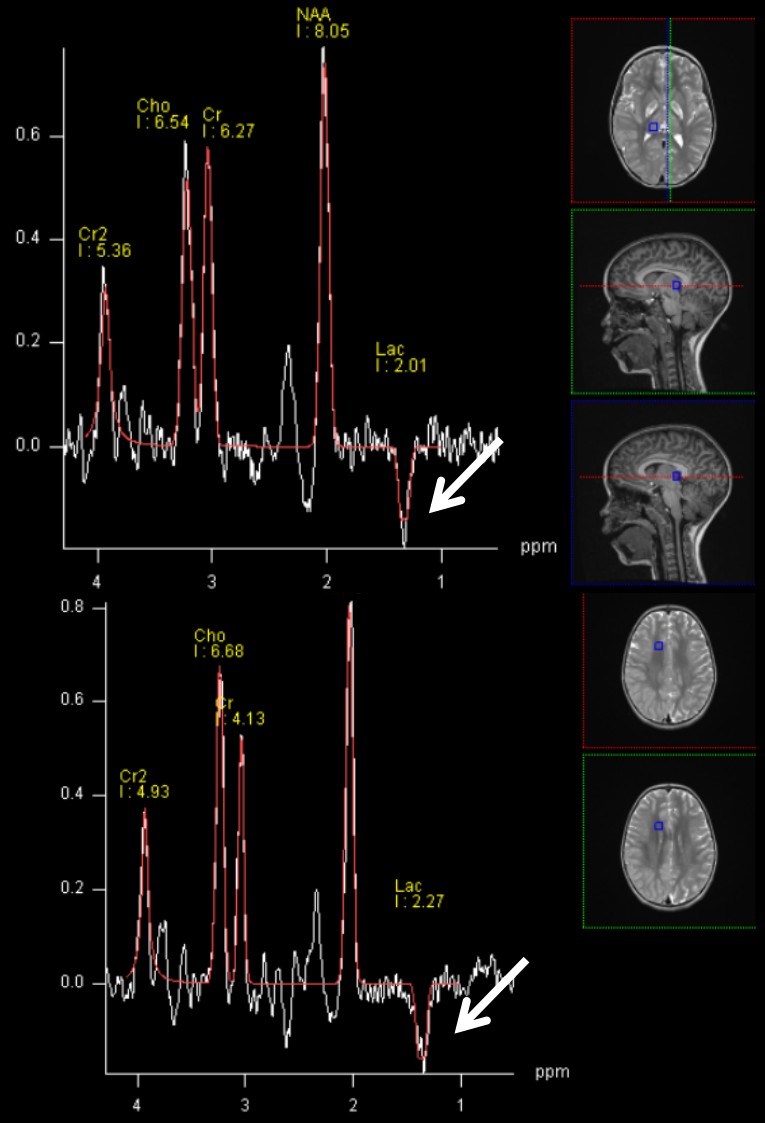




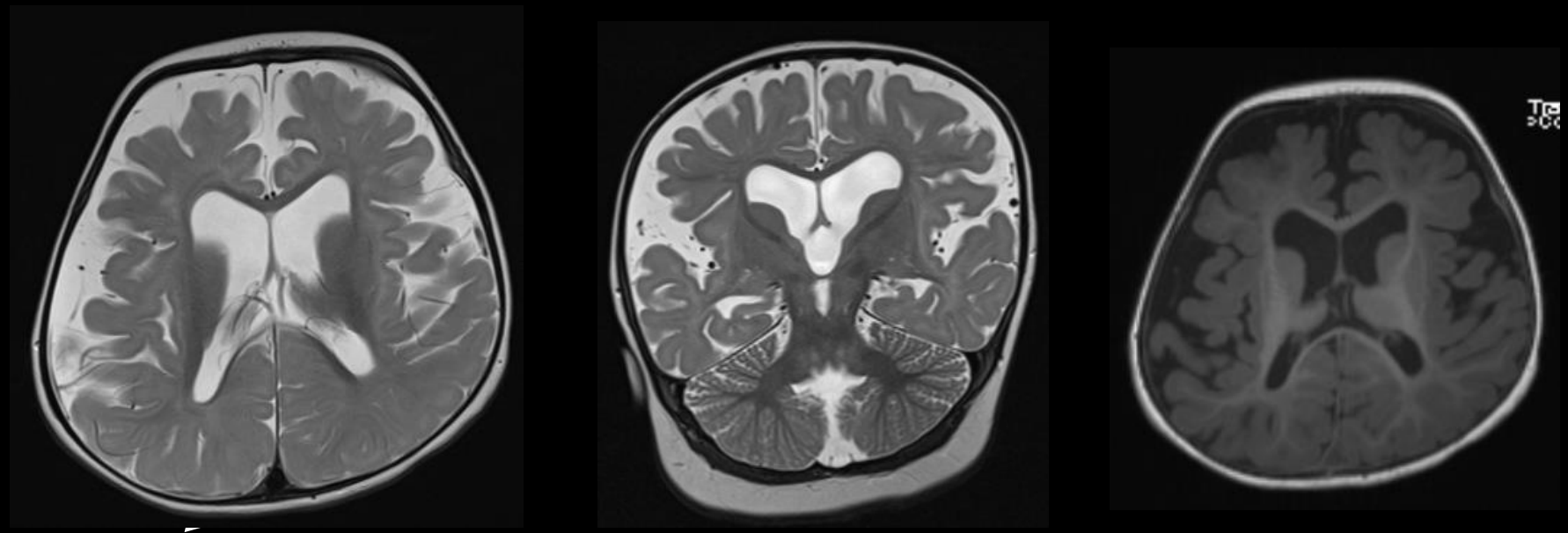


MR caput om 6 år





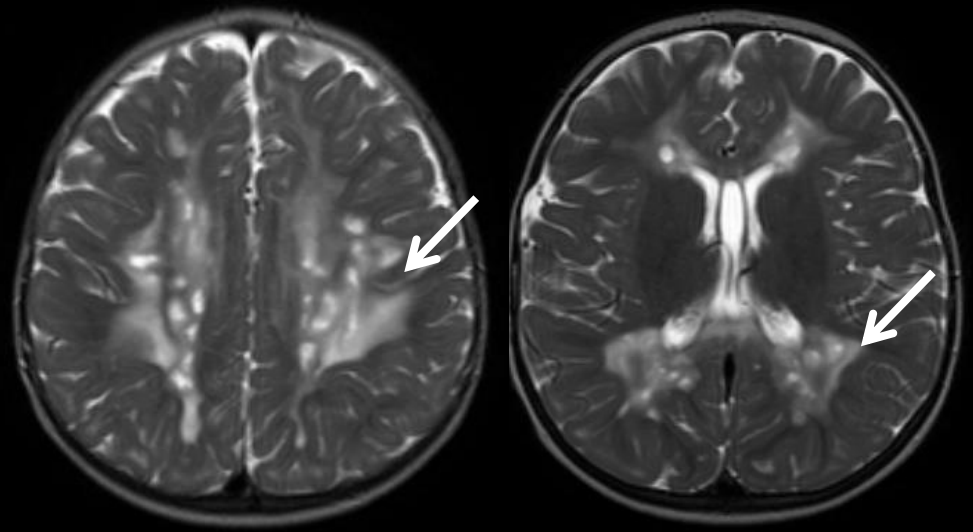
14 mnd gammel gutt er svært utviklingforsinket, hypotoni, epilepsi

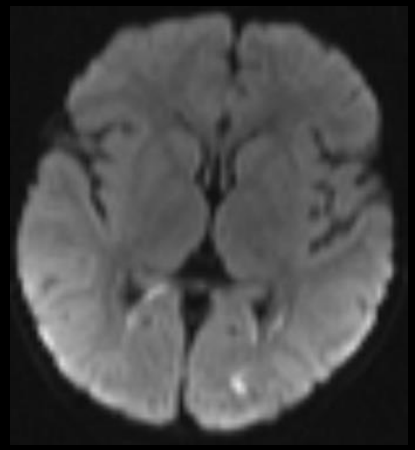


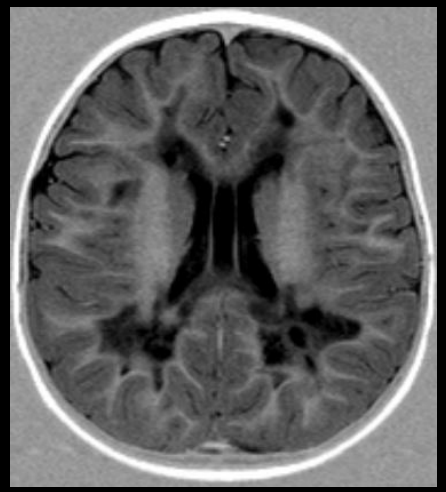
Autosomal recessive mutations in the DNA Polymerase Gamma, Catalytic Subunit (POLG) gene

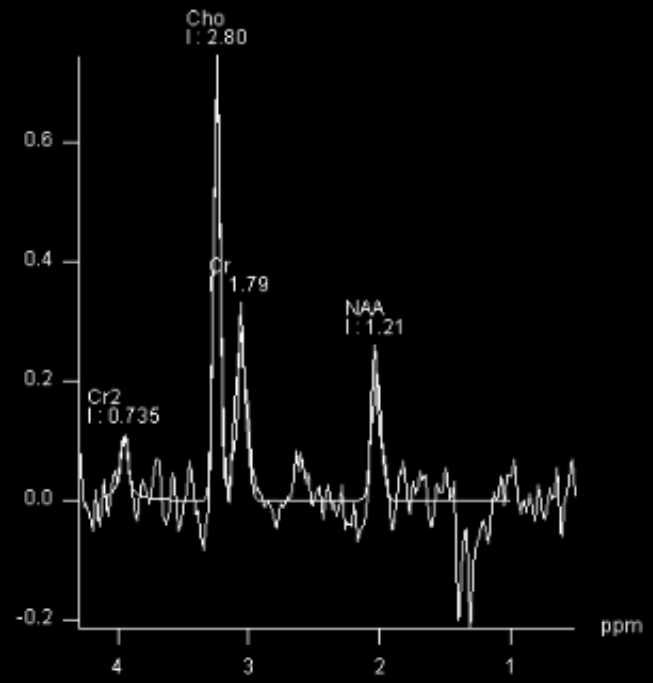
Alpers syndrom

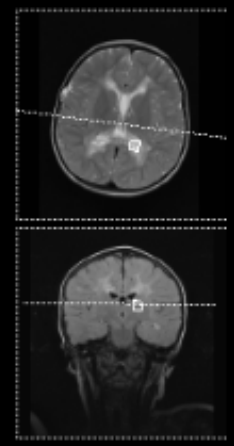
19 mnd gammel jenta med lammelser i underekstemiteter og forbigående klonus



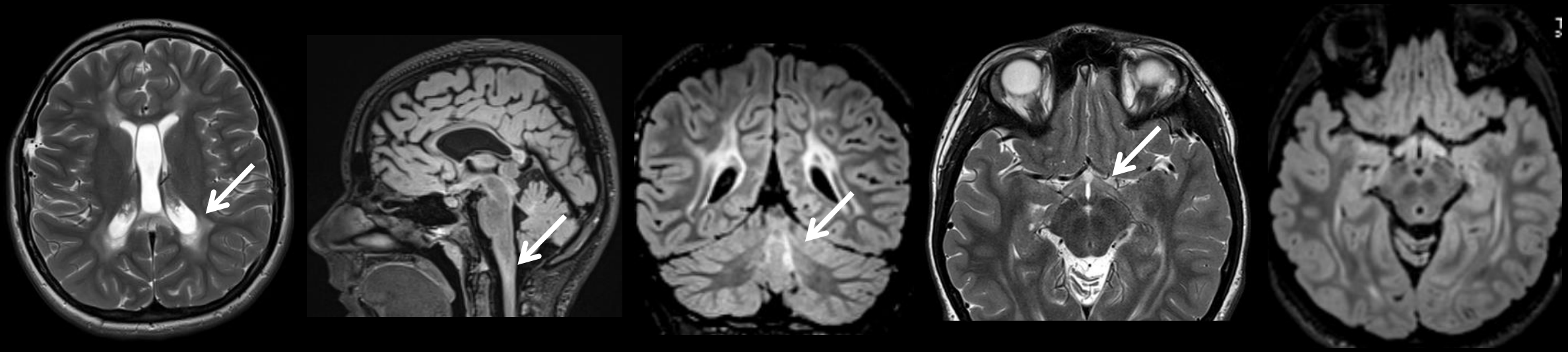








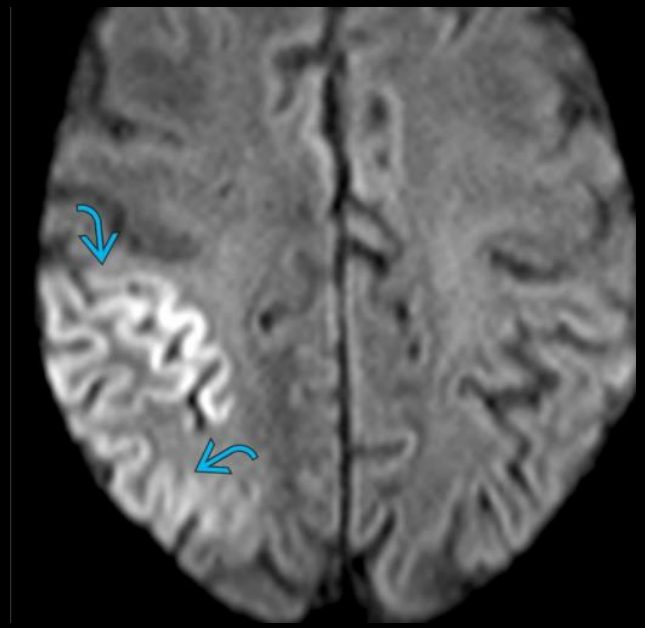
Om ca 5 år. Varierende motoriske symptomer med utstrålende smerter fra nakke.
Gradvis utvikling av redusert syn.

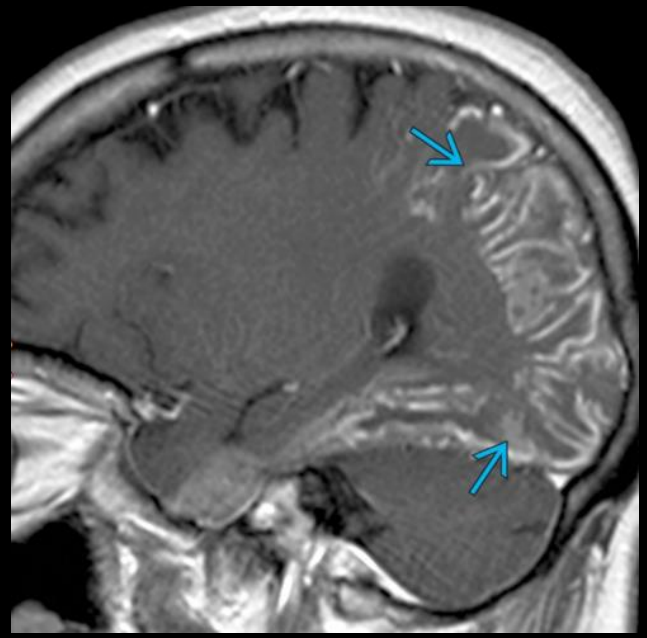


Mutasjon i NDUFV1-genet, biokjemisk defekt i den mitokondrielle respirasjonskjeden (kompleks I)

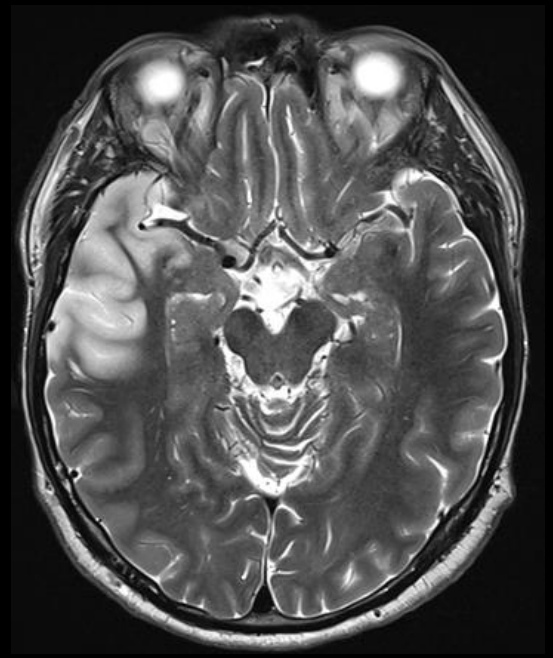
Leber Hereditære Opticusnevropati (LHON)

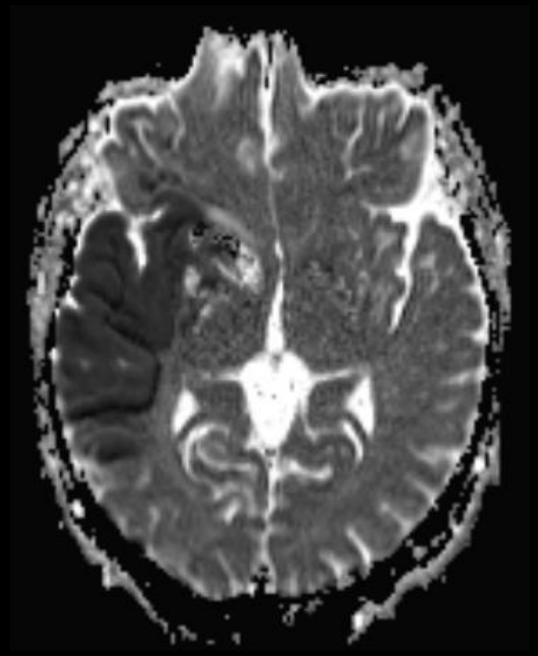
Status epilepticus

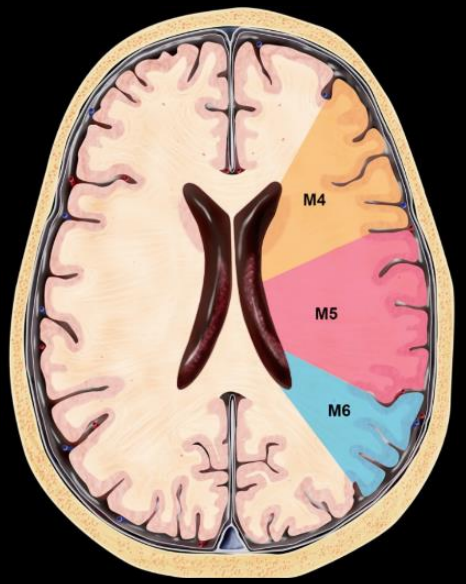


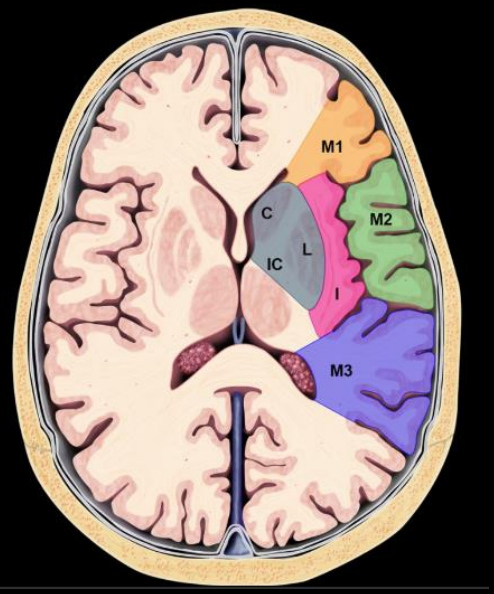


Infarkt

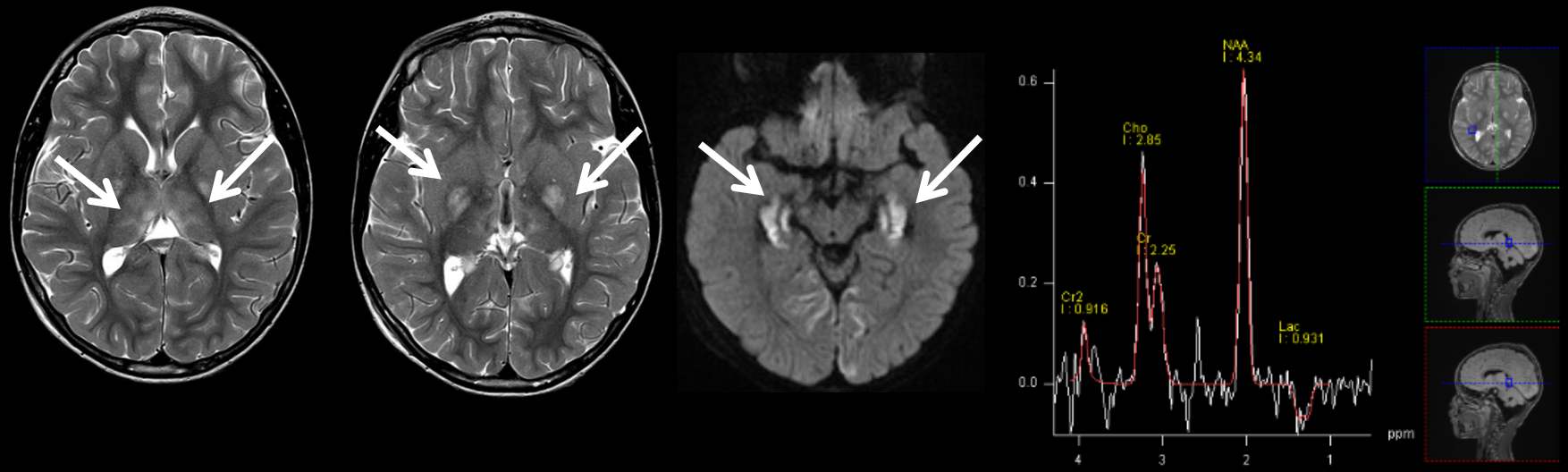




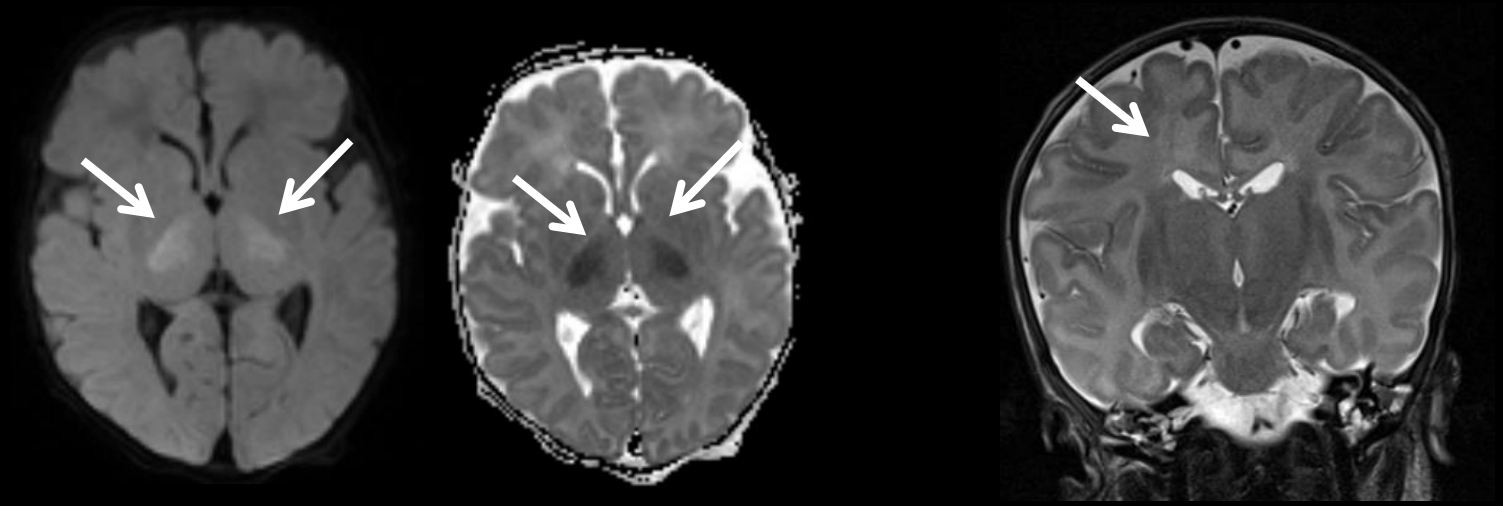




Hypoksisk – ichemisk encefalopati



Tidligere frisk gutt. Drukningsulykke .
Langvarig resuscitering.
Ecmo i 3 døgn.
Tilstedeværende dype senereflekser bilat, cornearefleks til stede.

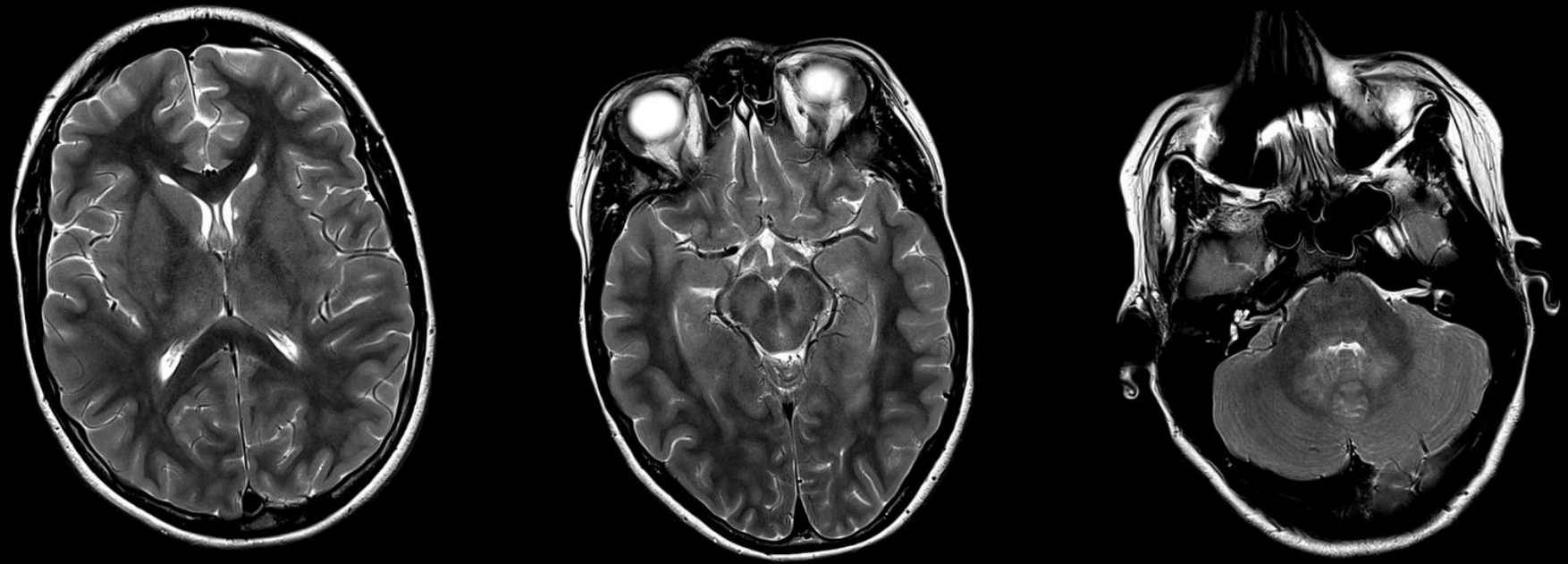


Termin barn med sirkulatorisk kollaps på bakgrunn av non-compaction cardiomyopati. Kramper

Encefalitt

13 år gammel jenta. 3 dagers sykehistorie med slapphet. Nå somnolent, svarer ikke på tiltale.
Høyt BT 140-150/100. puls 100. Mindre kontakt i dag enn i går.

Feber, nakkestiv, cpinalceller 312, spinalprotein 1,29.



Klassisk funn

- bilaterale symmetriske forandringer I sentrale strukturer (basale ganglier, talamus, mesencefalon)
- forsinket myelinisering
- laktat toppene på MR spectroscopi

MEN stor overlapp mellom syndrommer/sykdommer og mye variasjon innenfor samme syndrom

God henvisning er veldig viktig!!!

Tusen takk!

PhD dee, 10.11.2020