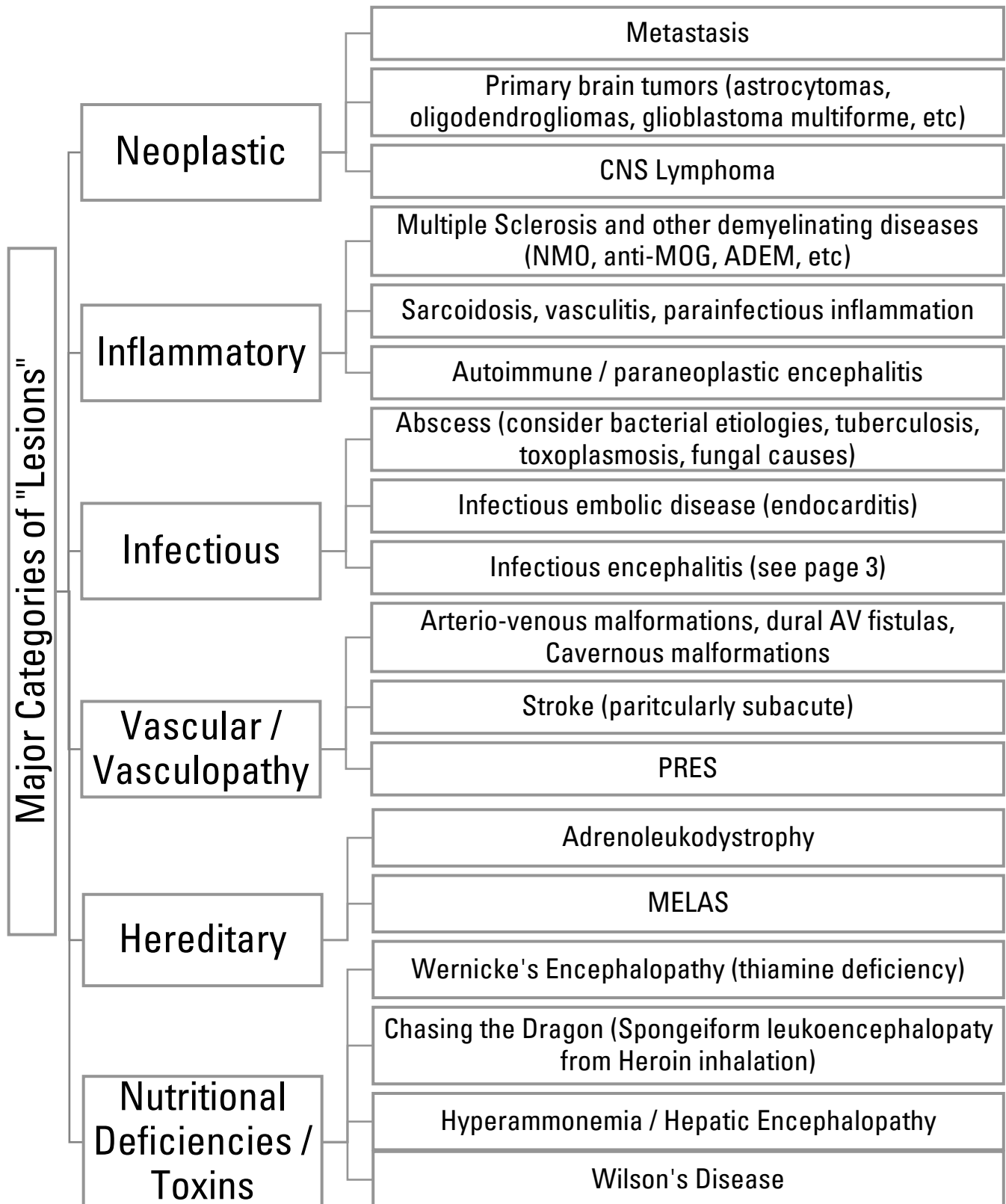


# ***EMORY & GRADY – APPROACH TO A NEW BRAIN LESION / ENCEPHALITIS***



# ***STEPS***

## **Establish a Syndrome**

- Detailed neurologic exam for evidence of optic nerve involvement and C/T spine involvement

## **Neuroimaging:**

- MRI Brain w/ and w/o gadolinium. MRI C/T spine should be considered based on physical exam.
- Dedicated MR orbits should be considered based on exam
- Consider MR spectroscopy for tumor vs demyelination

## ***Major Categories of Encephalitis:***

<b>Type</b>	<b>Example(s)</b>
<b>Infectious (Note those listed here are not all inclusive!)</b>	<ul style="list-style-type: none"><li>• <b>Viral:</b> HSV, MNV, enterovirus, EBV</li><li>• <b>Bacterial/spirochete/mycobacterial:</b> Neisseria, Strep pneumo, Listeria, syphilis, Tuberculosis</li><li>• <b>Fungal:</b> Aspergillosis, cryptococcal, histoplasmosis</li><li>• <b>Parasitic:</b> neurocysticercosis</li></ul>
	<ul style="list-style-type: none"><li>• <b>Suggested Workup:</b> LP with CSF Cx, Biofire, Chest/Ab/Pelvis and Viral Respiratory panel may be helpful</li><li>• <b>See below for extended guide by location of inflammation.</b></li></ul>
<b>Primary Autoimmune</b>	STREAT/Hashimoto's, Bickerstaff Encephalitis, NMO-Spectrum Disorders, Multiple Sclerosis, Anti-Myelin Oligodendrocyte Glycoprotein (anti-MOG)
	<ul style="list-style-type: none"><li>• <b>LP:</b> LP with encephalopathy panel, CSF OCB</li><li>• <b>Serum:</b> anti-TPO, anti-GQ1b/GM, anti-MOG, anti-AQP4</li></ul>

<b>Parainfectious</b>	<p>Post-viral cerebellitis, Acute Demyelinating Encephalomyelitis (ADEM)</p> <hr/> <p><b>Consider patients exposure.</b></p> <ul style="list-style-type: none"> <li>• <b>LP:</b> CSF Cx + CSF HSV, EBV, VZV, mycoplasma</li> <li>• <b>Consider Serum:</b> COVID IgG, Mycoplasma IgG/IgM, VZV IgG/IgM, Enterovirus IgG/IgM, HIV antibodies, EBV PCR, CMV PCR.</li> <li>• <b>See below for extended guide by location of inflammation.</b></li> </ul>
<b>Antibody Mediated / Paraneoplastic</b>	<p>Anti-NDMA, anti-LGI1, others in the “Autoimmune Encephalopathies Panel”</p> <hr/> <ul style="list-style-type: none"> <li>• LP with autoimmune encephalopathy panel and flow cytometry/cytology</li> <li>• <b>Further dx:</b> Consider CT Chest/Ab/Pelvis, eye exam, testicular or ovarian ultrasound, skin exam, whole body PET/CT</li> </ul>
<b>Drug Induced</b>	<p>Encephalitis associated with interferon-alpha, tumor necrosis factor-alpha, checkpoint inhibitors and CAR T cells</p>

# ***INFECTIOUS WORKUP BY AREA OF INFLAMMATION***

	<b>Limbic</b>	<b>Basal Ganglia/ Thalamus</b>	<b>Cerebellitis</b>	<b>Rhomb- encephalitis</b>	<b>Encephalo- myelitis</b>	<b>Other</b>
<b>General</b>	HSV-1 (CSF PCR)  Syphilis (CSF VDRL)	WNV* (CSF IgG/IgM)  Influenza (Nasopharyngeal, Influenza A/B & RSV PCR)	VZV^^ (CSF PCR)  Listeria (CSF culture)	Listeria (CSF culture)  WNV* (CSF IgG/IgM)  EEE* (CSF IgG/IgM)  TB^^^ (T spot, CSF mycobacterial culture)	WNV* (CSF IgG/IgM)  VZV^^ (CSF PCR)  Lyme (CSF IgG/IgM)	Enterovirus#(CSF PCR) – may also be accompanied by flaccid paralysis  Mycoplasma (CSF PCR and IgG/IgM)
<b>Rare</b>		EEE* (CSF IgG/IgM)  JEV^  SLEV^  Powassan^	Whipple (CSF PCR)  SLEV^  Mumps^  Powassa^  EBV (CSF PCR, serum IgG/IgM)	EV71 (CSF PCR)  JEV^  Brucella (serum IgG/IgM)	JEV^  EV71 (CSF PCR)  Tick-Borne Encephalitis Virus^ (CSF IgM)  Polio  Rabies	Anaplasmosis & Ehrlichiosis (serum PCR and smear)  Histoplasmosis# (CSF antigen and IgG/IgM, urinary antigen) – meningitis  Coccidioides# (CSF fungal culture, antigen and IgG/IgM, urinary antigen)
<b>Immuno- compromised</b>	HHV-6 (CSF PCR)		EBV (CSF PCR, serum IgG/IgM)  JC virus / PML (CSF PCR)		CMV (CSF PCR) – often causes a radiculitis	Cryptococcal# (CSF cryptococcal antigen)-meningitis  JC virus / PML (CSF PCR) – white matter disease

ADEM = acute disseminated encephalomyelitis AHL = acute hemorrhagic leukoencephalitis; EBV = Epstein-Barr virus; EEE = eastern equine encephalitis EV71 = enterovirus 7; HHV = human herpes virus; HSV = herpes simplex virus; JC virus / PML = John Cunningham virus / progressive multifocal leukoencephalopathy; JEV = Japanese encephalitis virus; LGI-1 =

leucine-rich glioma-inactivated 1; NMDA-R = N-methyl-D-aspartate receptor; NMO = neuromyelitis optica; SLEV = St Louis encephalitis virus; TB = tuberculosis; VZV = varicella zoster virus WNV = West Nile virus

\* Arbovirus Antibody Panel. Usually performed by a state's viral serology lab. Routinely includes WNV/EEE IgG/IgM with the possibility of adding further studies through the CDC. You will need to fill out the appropriate form with relevant history. Note that WNV PCR is not sensitive.

^ Rare viral encephalitis studies can be ordered through the State Viral Serology Lab (and will then be sent to the CDC). You will need to talk with the State Lab to organize ordering.

^^ VZV PCR is highly specific but not as sensitive as VZV IgG (compared between serum / CSF). Note that VZV cerebellitis is more common in children than adults.

^^^ TB CSF PCR, if high index of suspicion

# Usually cause meningitis, but can cause meningoencephalitis