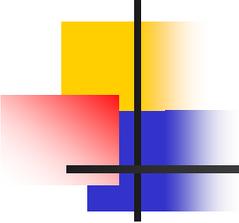


新生儿常见脑损伤 磁共振成像

中国医科大学附属盛京医院

薛辛东

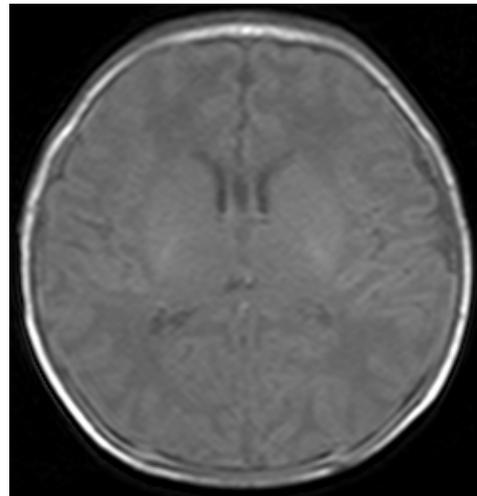


讨论内容

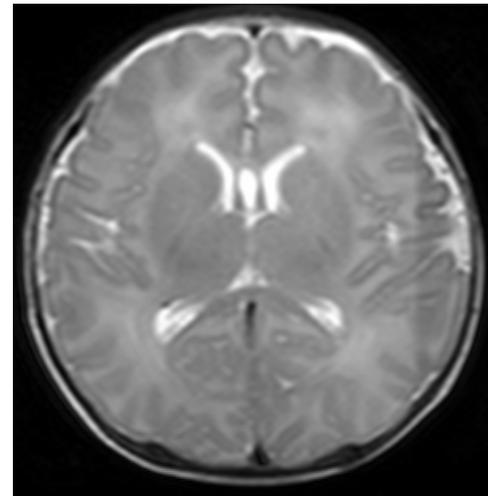
- 新生儿脑正常结构及常见病变信号
- 正常足月儿与早产儿常规**MRI**比较
- 新生儿常见脑损伤**MRI**表现及特点

正常脑内结构MRI信号

	皮层	白质	髓鞘化	脑脊液	颅骨	脂肪
T1WI	高	低	高	低	低	高
T2WI	低	高	低	高	低	高



T1WI

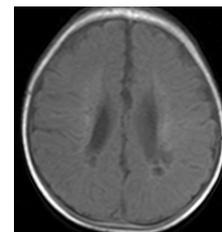
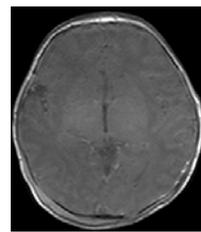
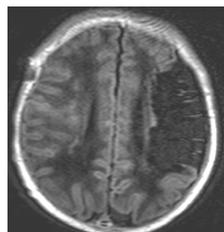
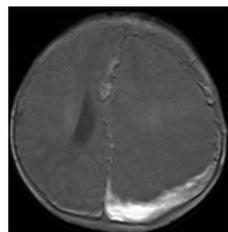


T2WI

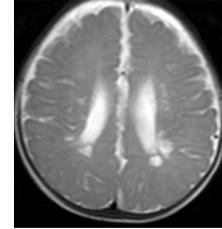
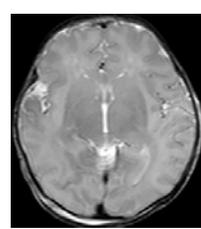
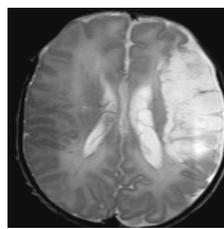
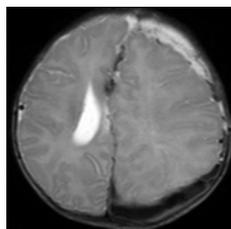
常见病变MRI信号

	出血	梗塞	水肿	软化
T1WI	高	低	低	低
T2WI	低	高	高	高

T1WI

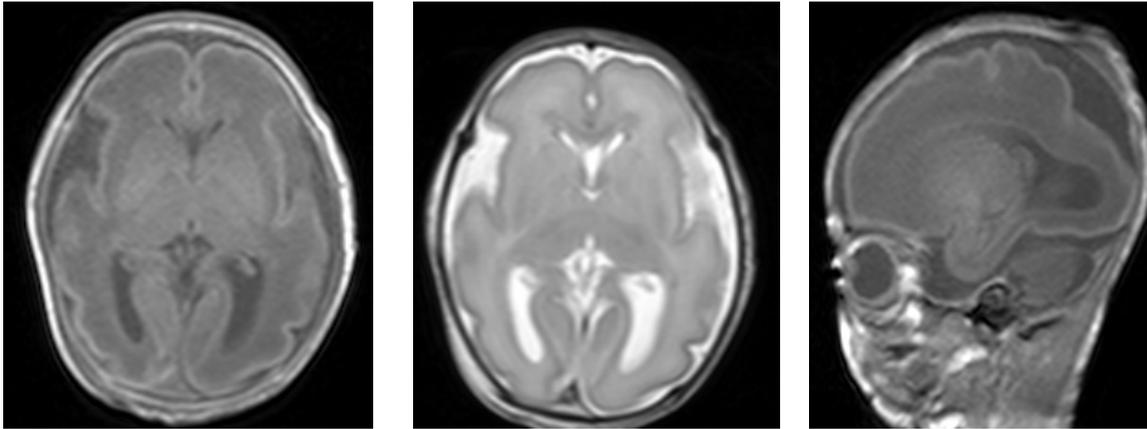


T2WI

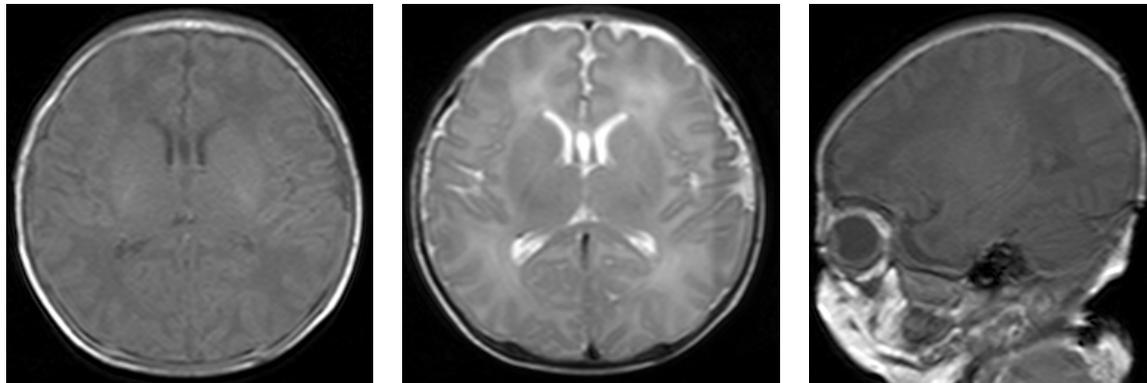


正常早产儿与足月儿MRI比较

28w



38w



早产儿脑MRI特点

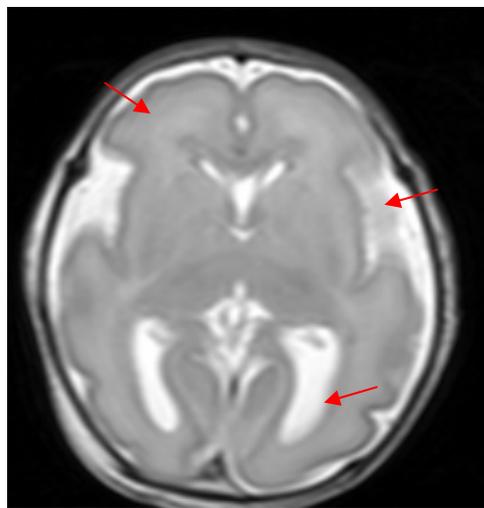
- 皮层薄, 脑回少
- 弥漫性T2高信号
- 脑室大, 脑外间隙宽

早产儿脑MRI

早产儿脑常被误诊为：

- 脑积水（脑室系统大）
- 脑萎缩（脑外间隙宽）
- 弥漫性脑水肿（脑白质含水量多）

脑白质



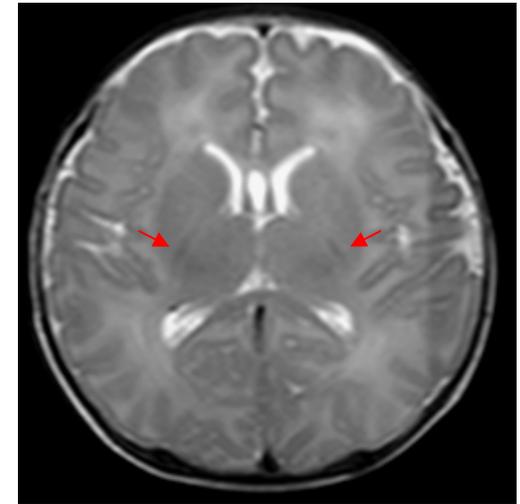
脑外间隙

侧脑室

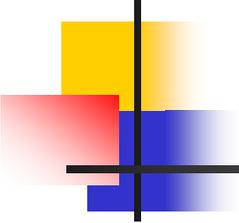
足月儿脑MRI

内囊后肢（PLIC）髓鞘化

- 时间 ---- $GA \geq 38w$
- MRI ---- T1WI高信号； T2WI低信号
- 评价 ---- 正常（髓鞘化 $\geq 1/3$ PLIC）
可疑（髓鞘化 $\leq 1/3$ PLIC
或双侧不对称）
异常（无髓鞘化或髓鞘化消失）

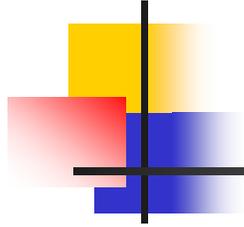


T2WI



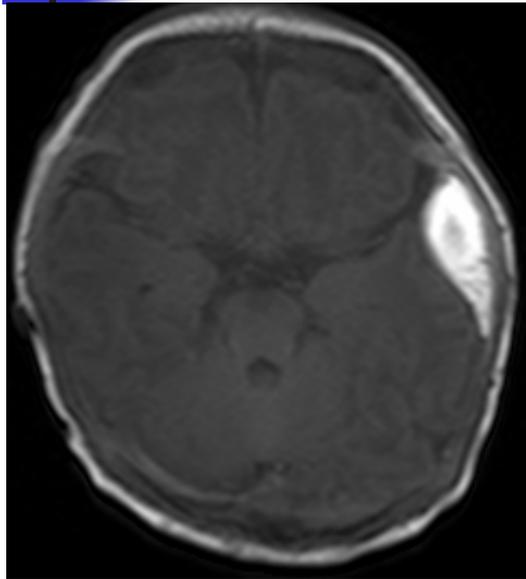
新生儿常见脑损伤

- 颅内出血 ---- **EDH; SDH; SAH; GM-IVH**
- 脑白质损伤 ---- 局灶性; 弥漫性
- 脑梗死
- 脑病 ---- **HIE; BE; HE; ME**
- 颅内感染 ---- 细菌感染; 真菌感染

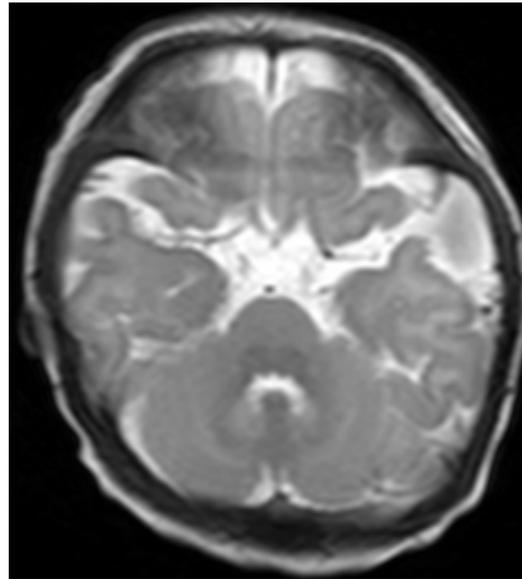


颅内出血 (Intracranial hemorrhage)

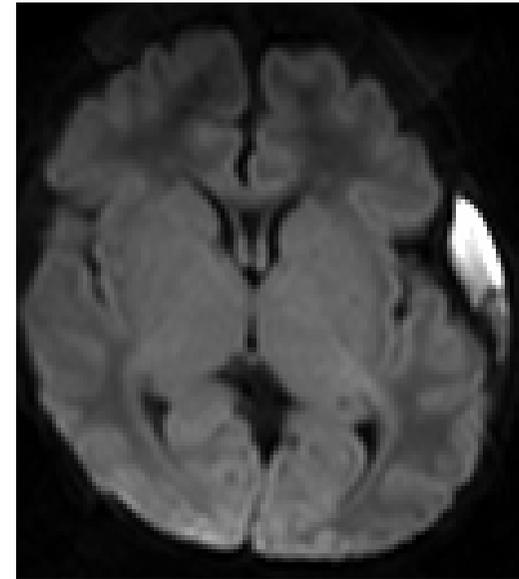
硬膜外出血 (EDH)



T1WI



T2WI



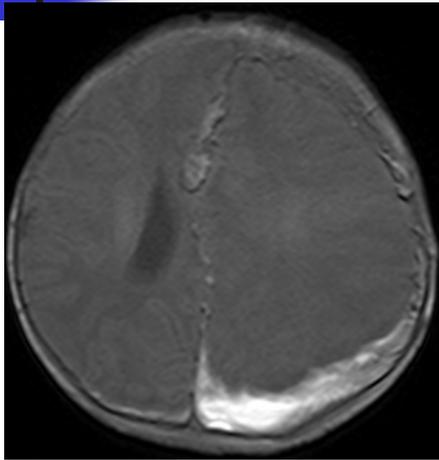
DWI

EDH-40w-15d

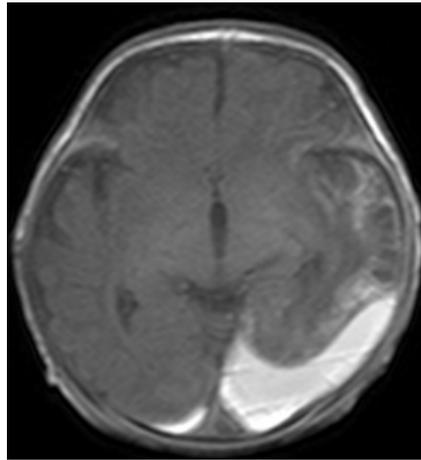
EDH 特点

- 颅骨与硬膜之间
- 梭形

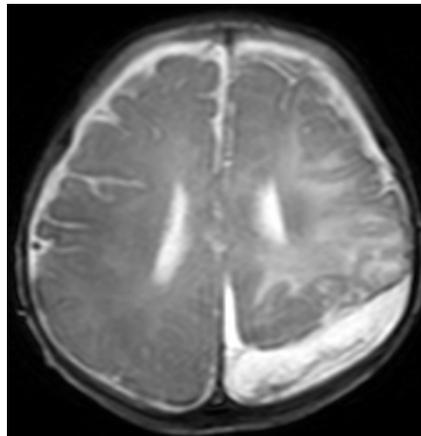
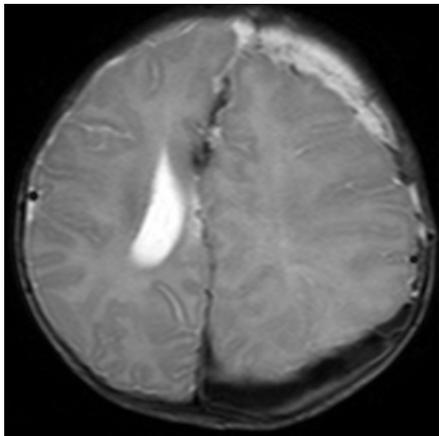
硬膜下出血 (SDH)



3d



17d

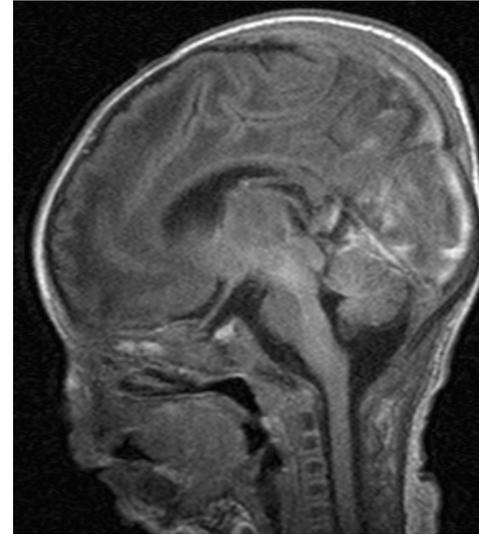
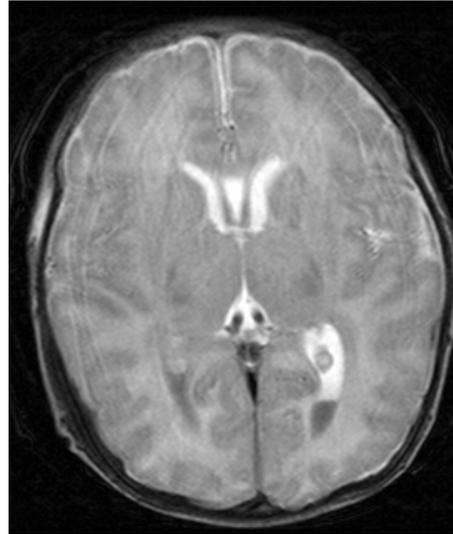


38w-SDH-22d

SDH特点

- 蛛网膜与硬膜之间
- 新月形
- 幕上/幕下
- 预后严重

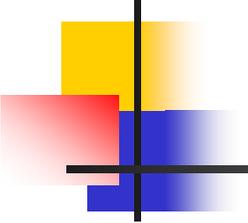
蛛网膜下腔出血 (SAH)



IVH-SAH-38w-7d

SAH特点

- 蛛网膜与软脑膜之间
- 脑沟内T1高/T2低SI



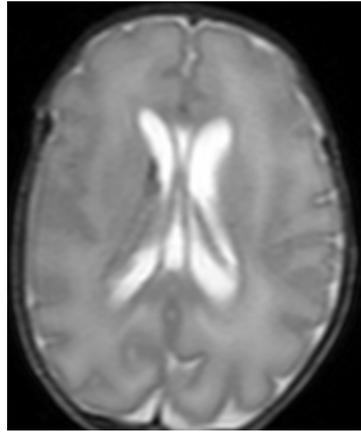
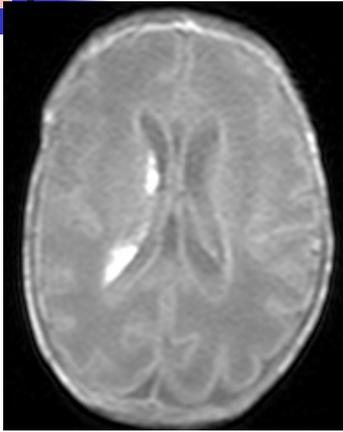
生发基质-脑室内出血 (GM-IVH)

多见于早产儿，根据Papile分级法

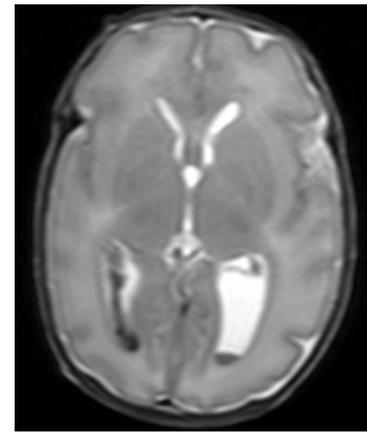
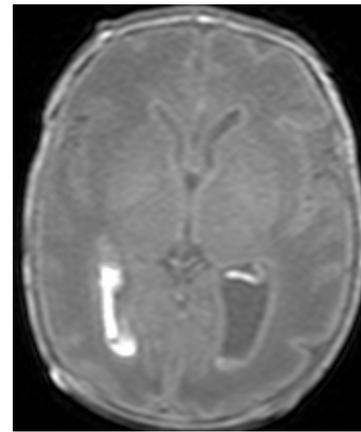
- I级 ---- 室管膜下出血
- II级 ---- 室管膜下出血破入脑室（即脑室内出血）
但不伴有脑室扩大
- III级 ---- 脑室内出血伴有脑室扩大
- IV级 ---- 脑室内出血伴有脑实质出血

I, II级预后较好；III, IV级预后差

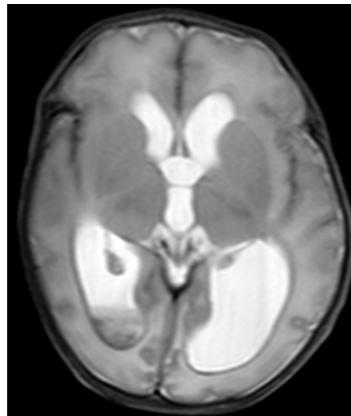
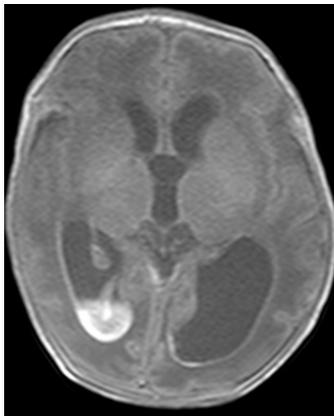
GM-IVH



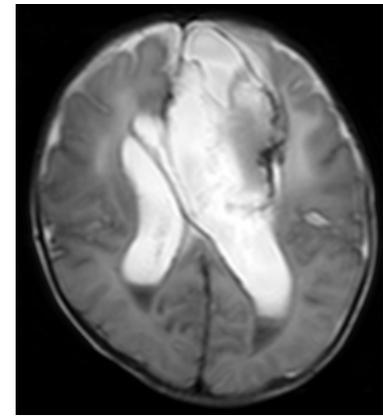
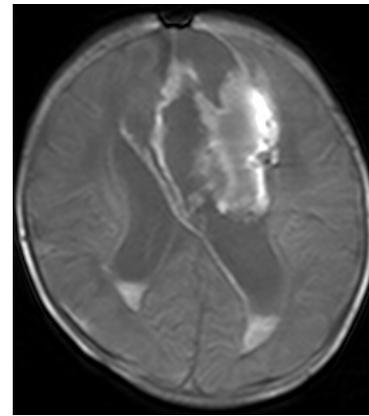
I 级



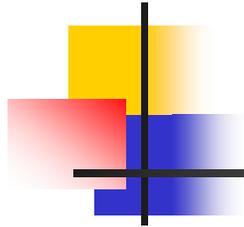
II 级



III 级



IV 级

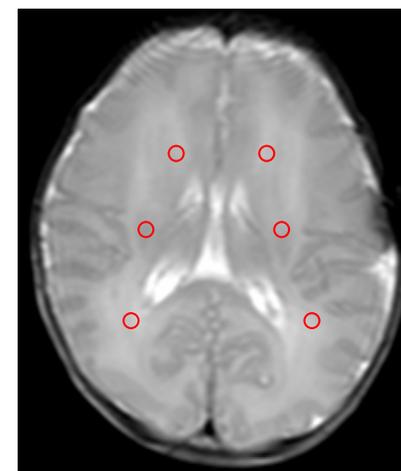


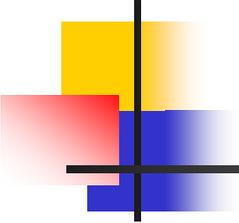
脑白质损伤

(cerebral white matter injury, CWMI)

CWMI

- 是早产儿脑损伤的最常见类型
- 多因素引起, 主要为缺氧缺血与宫内感染
- 常见胎龄24~35w早产未成熟儿
- 受累部位邻近侧脑室额部、体部和三角部
(为大脑前动脉、中、后动脉终末供血区)
- 严重WMI可发展成脑室周围白质软化 (PVL)
- 确诊必须依赖影像学





MRI诊断

多采用*Volpe*分类法

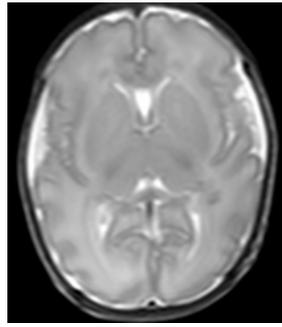
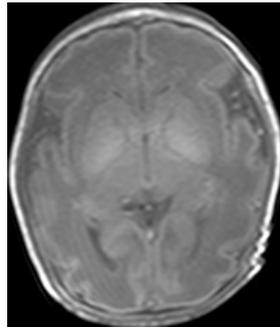
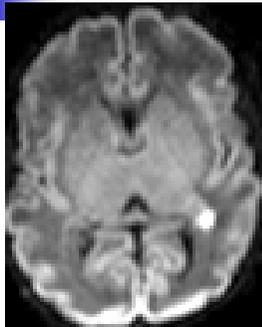
- 局灶性CWMI

- DWI示半卵圆中心、侧脑室旁点状或线状高信号
或常规MRI表现为T1WI高信号、T2WI低信号

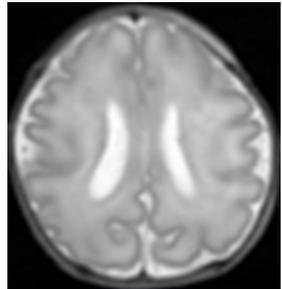
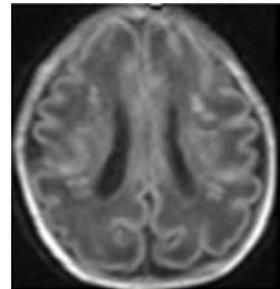
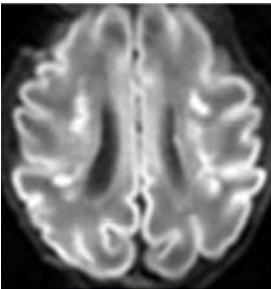
- 弥漫性CWMI

- DWI示侧脑室旁脑白质大片状高信号
常规MRI表现为T1WI、T2WI常无异常信号改变

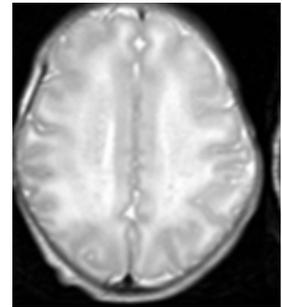
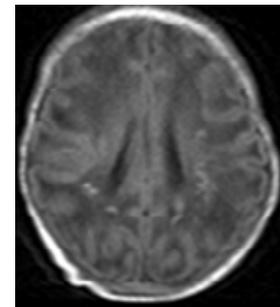
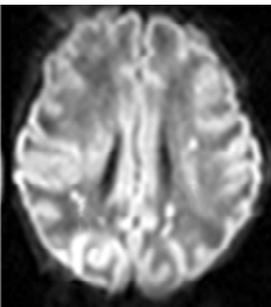
局灶性CWMI



3d
(单处点状)



7d
(线状)



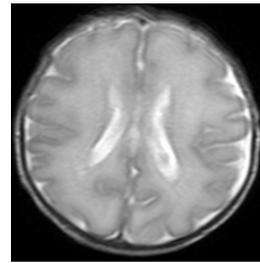
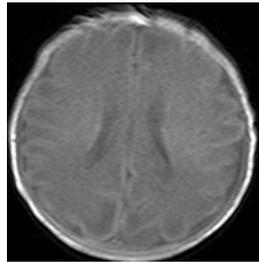
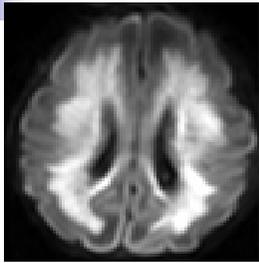
10d
(多处点状)

DWI

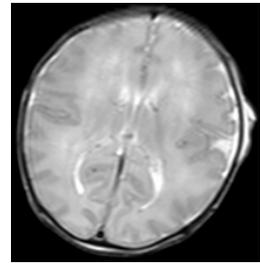
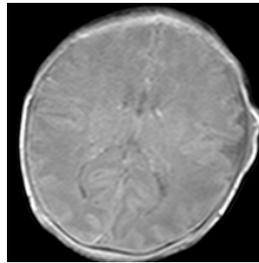
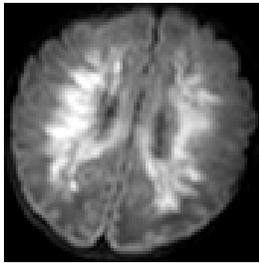
T1WI

T2W1

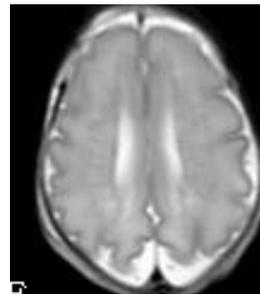
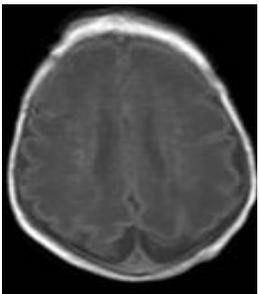
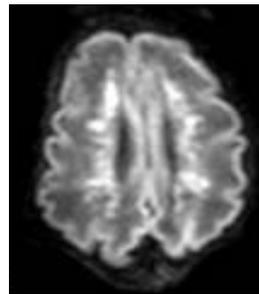
弥漫性CWMI



3d



3d



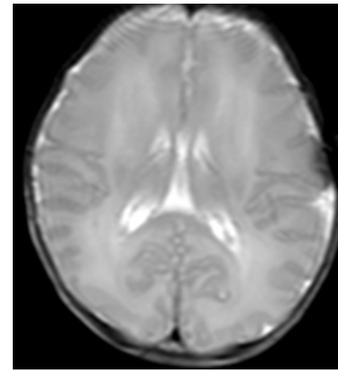
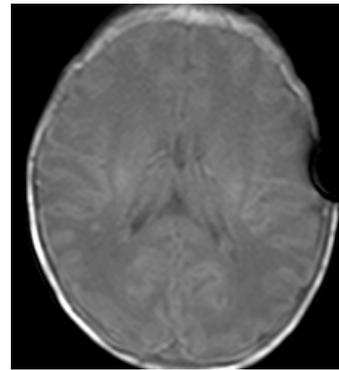
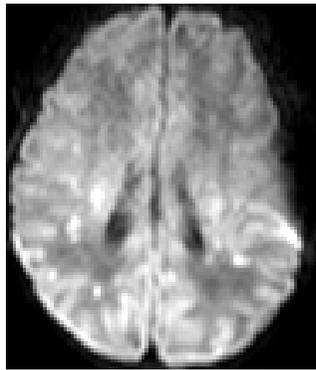
5d

DWI

T1WI

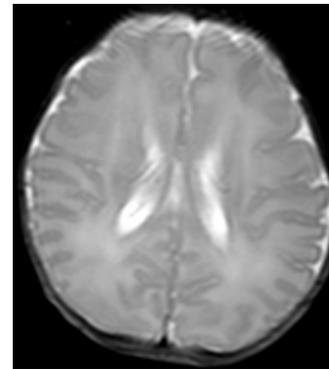
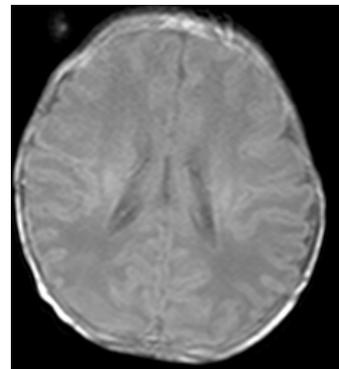
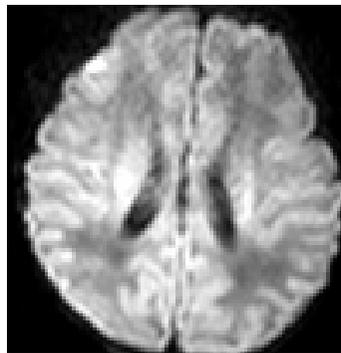
T2WI

局灶性CWMI---病灶消失



GA---33w

3d



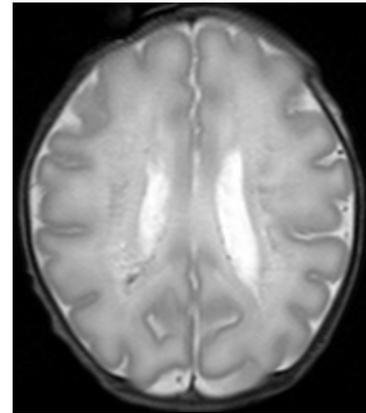
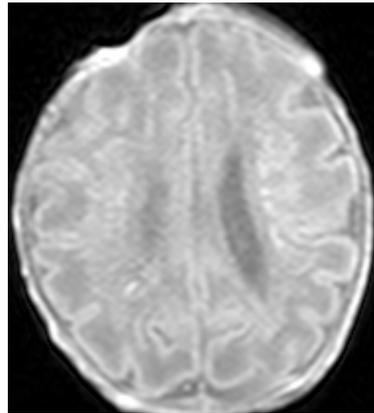
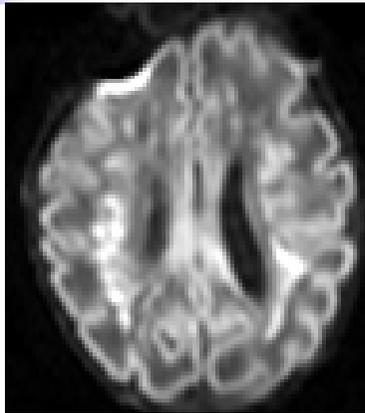
17d

DWI

T1WI

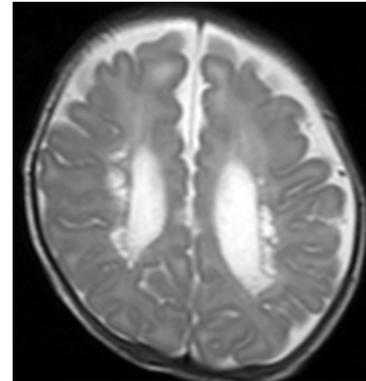
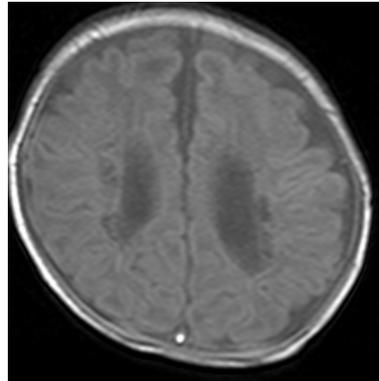
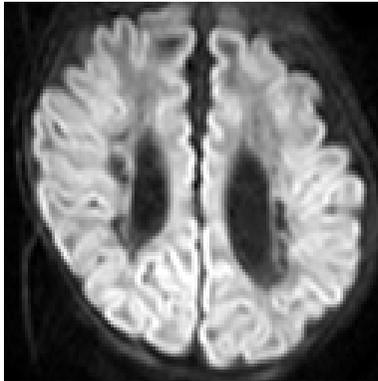
T2W1

局灶性CWMI---PVL



GA---34w

7d



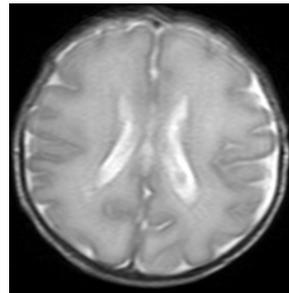
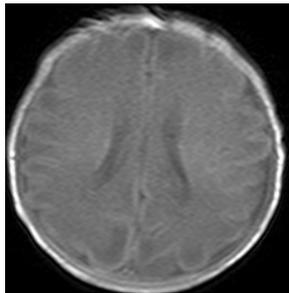
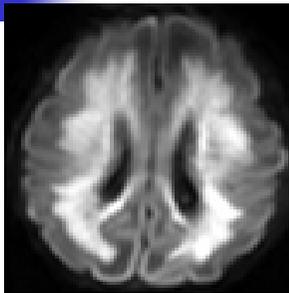
40d

DWI

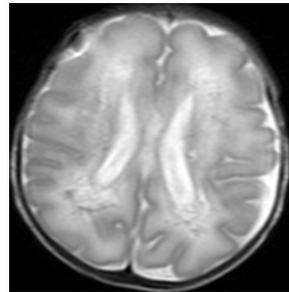
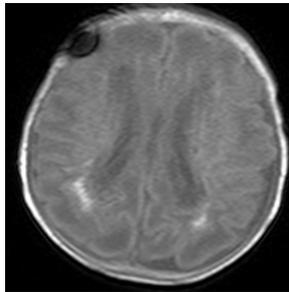
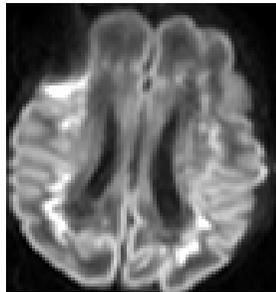
T1WI

T2WI

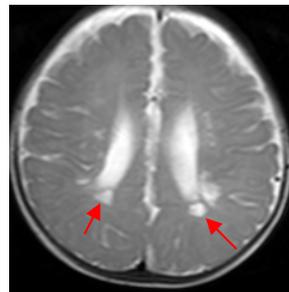
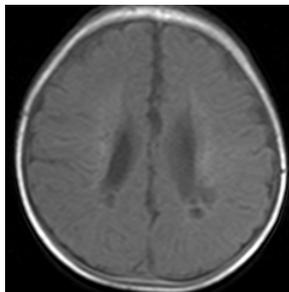
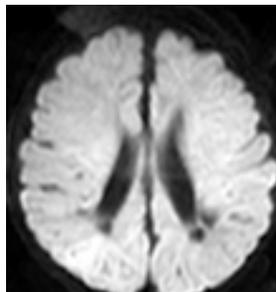
弥漫性CWMI ---PVL



3d



14d



2m

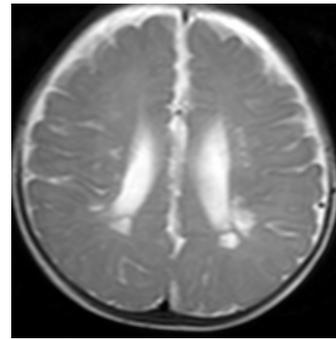
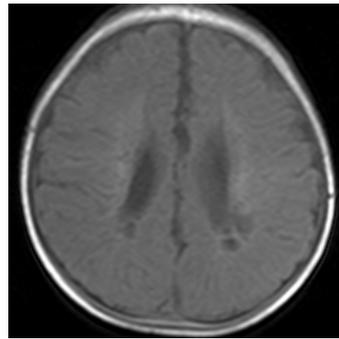
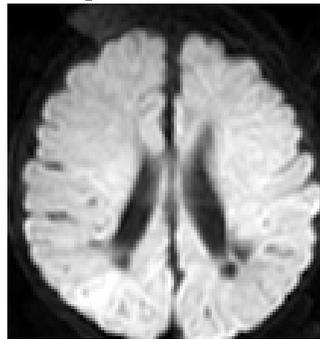
DWI

T1WI

T2WI

弥漫性脑白质损伤动态变化

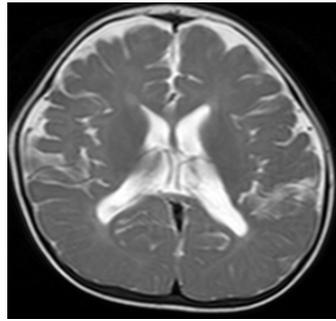
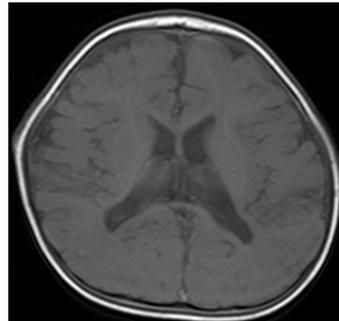
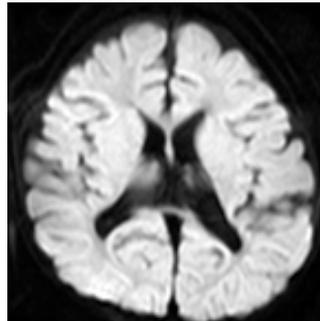
PVL远期MRI表现



2m

PVL远期结局

- 囊腔消失
- 脑白质减少
- 脑室不规则变形
- 胼胝体发育不良

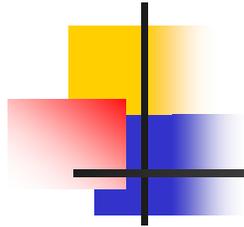


7m

DWI

T1WI

T2W1

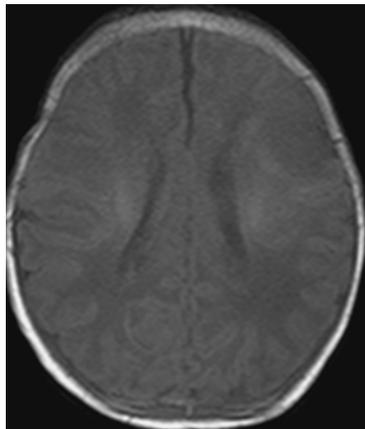


新生儿脑梗死

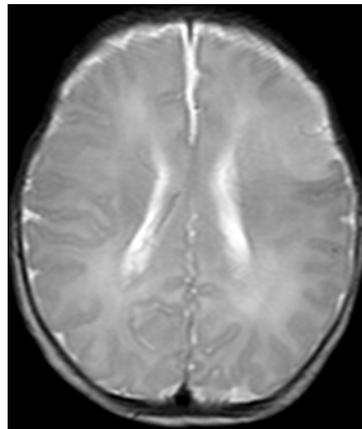
(neonatal cerebral infarction, NCI)

NCI

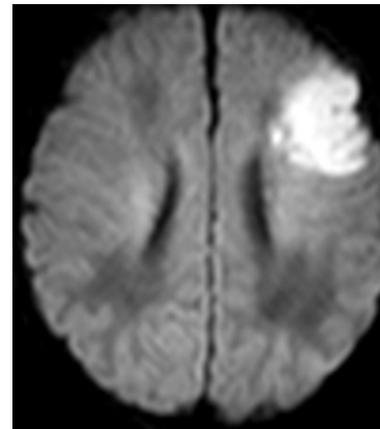
- 惊厥是NCI最主要临床表现
- 多数患儿找不到确切的发病原因
- **DWI是早期诊断最佳检测手段**
- 目前尚无特效的治疗手段
- 多数患儿预后尚良好



T1WI



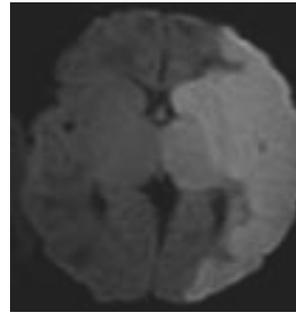
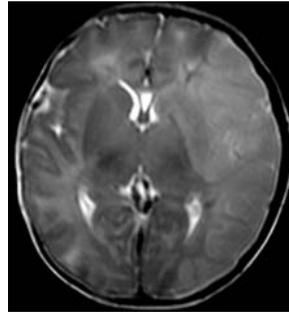
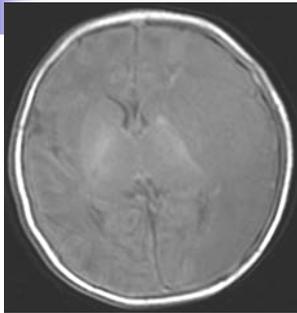
T2WI



DWI

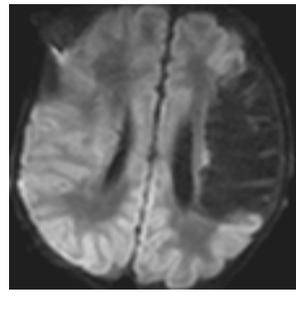
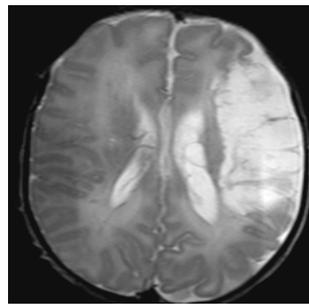
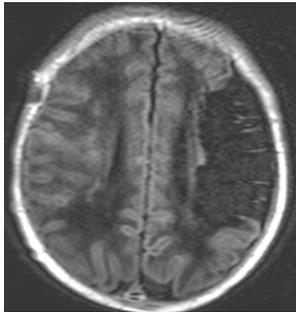
生后17h

NCI-左侧大脑中动脉

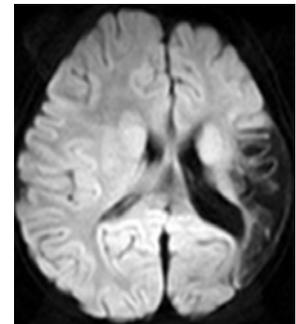
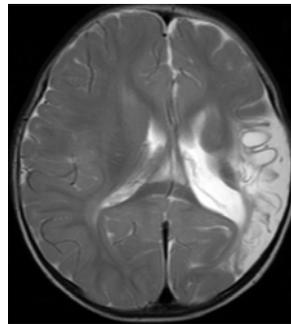
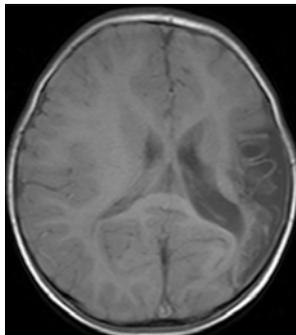


38w-NCI-5d

外院—感染 / 抽 1

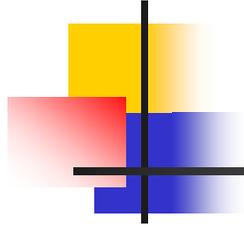


38w-NCI-17d



38w-NCI-15m

预后较好



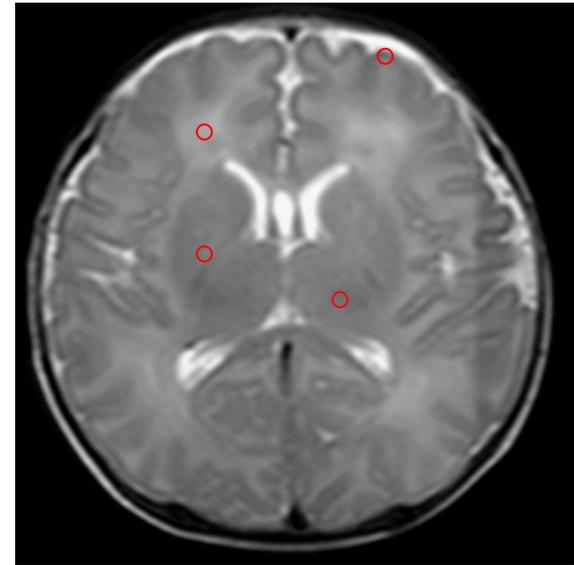
新生儿脑病

(neonatal encephalopathy, NCI)

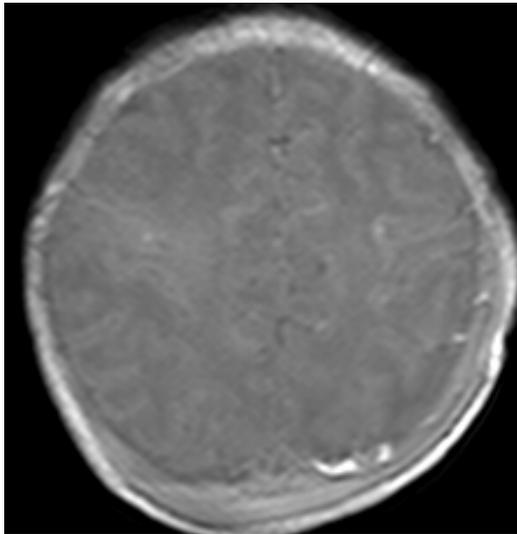
缺氧缺血性脑病

HIE常见MRI改变

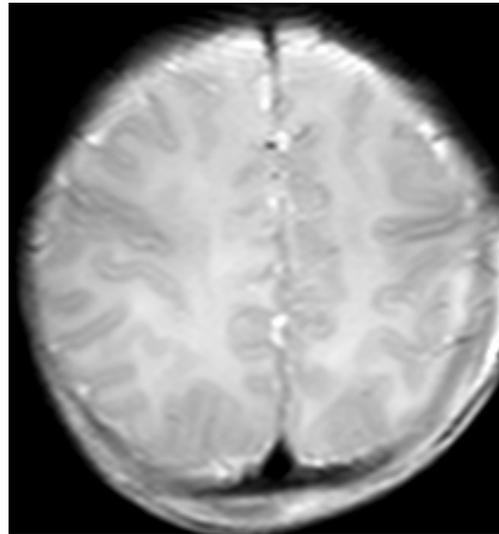
- 大脑皮层损害
- 脑白质损害
- 异常内囊后肢（**PLIC**）
- 基底节损害



HIE-大脑皮层损害



T1WI



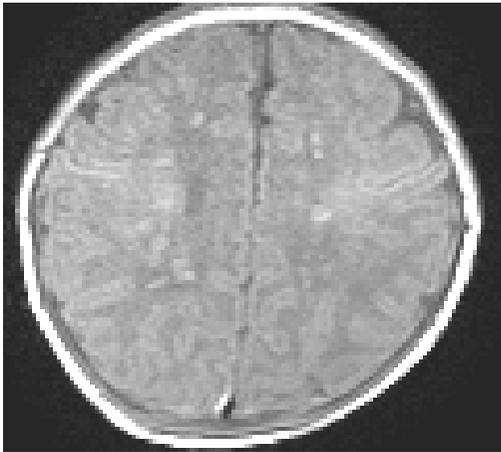
T2WI



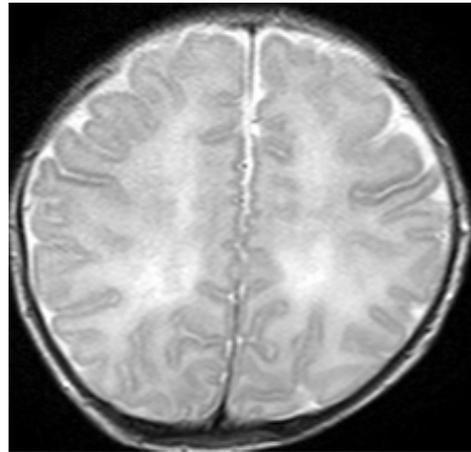
DWI

41w-HIE2-3d

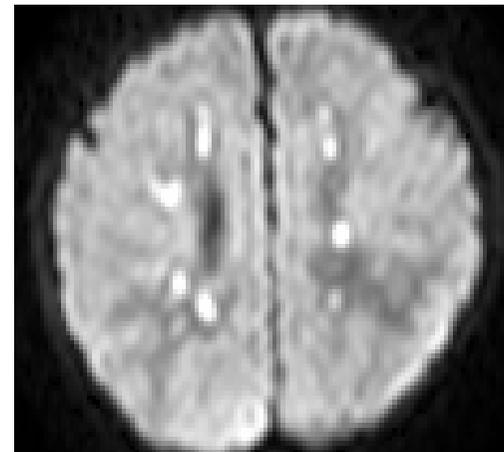
HIE-脑白质损害



T1WI



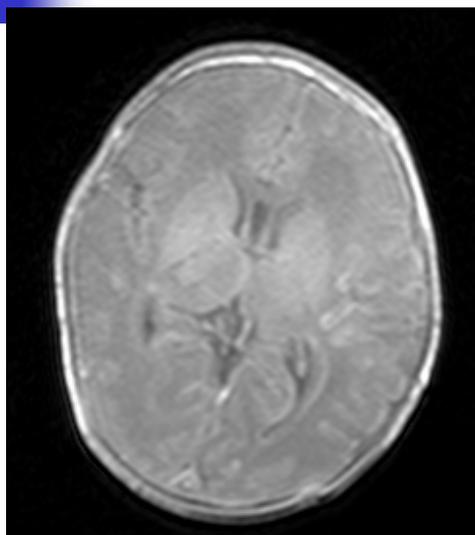
T2W1



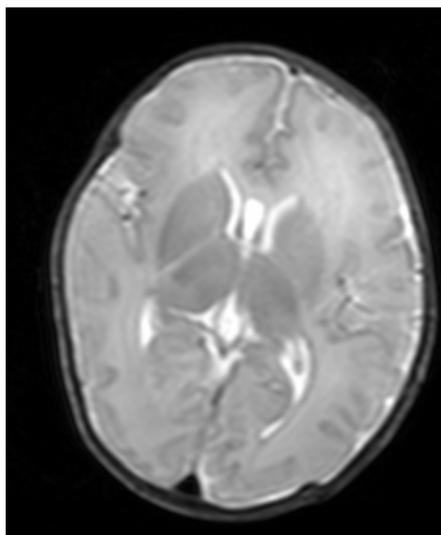
DWI

HIE2-PVH-39w-7d

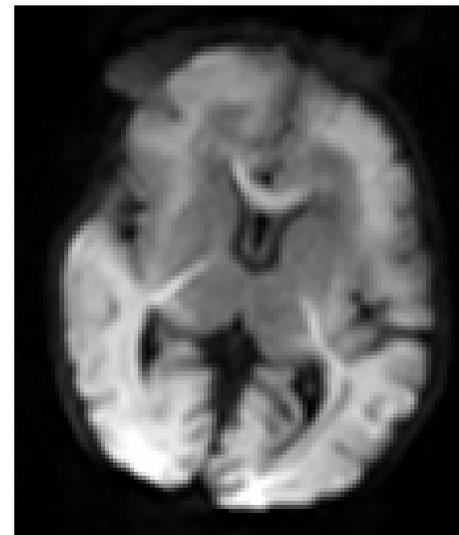
HIE-PLIC损害



T1WI



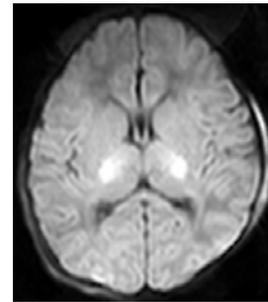
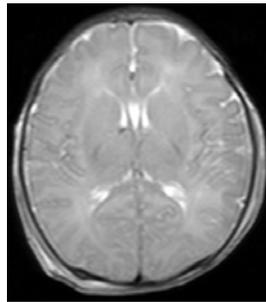
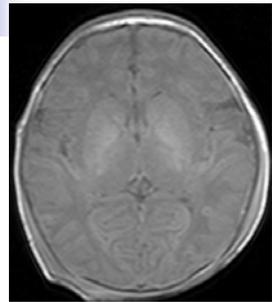
T2W1



DWI

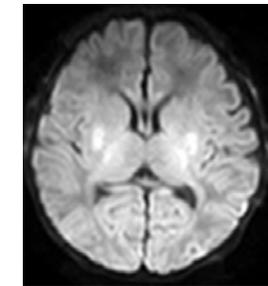
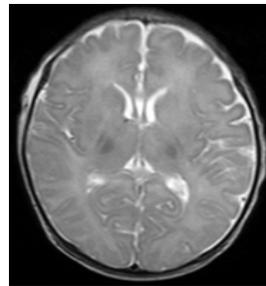
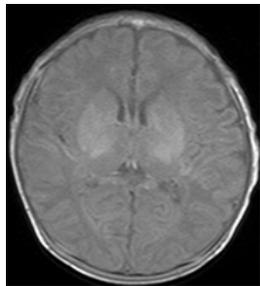
HIE3-40w-8d

HIE-基底节损害

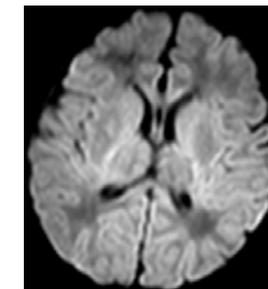
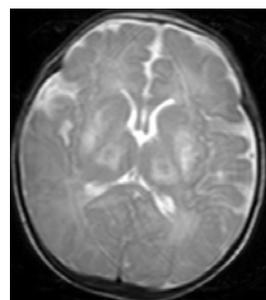
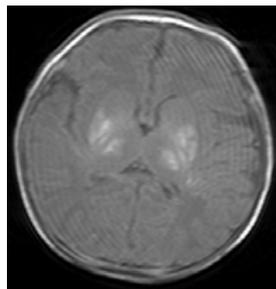


HIE3-39w-BGT

2d



8d



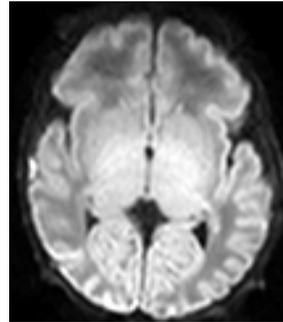
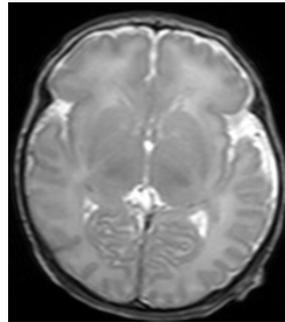
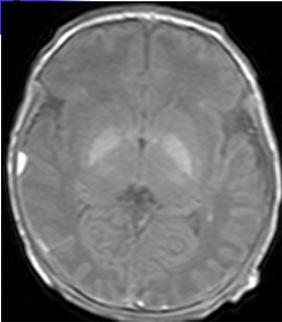
21d

T1WI

T2WI

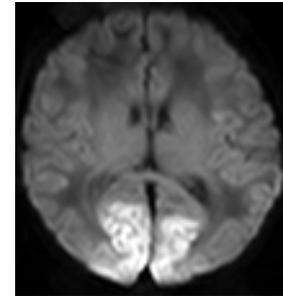
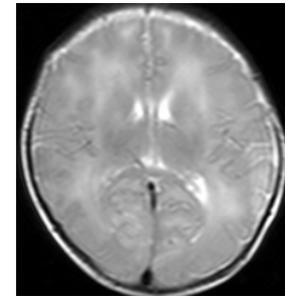
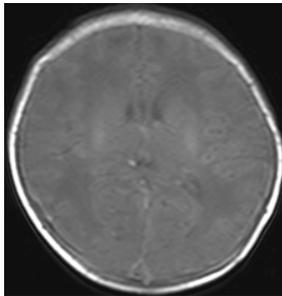
DWI

其他原因脑病-特定受累部位



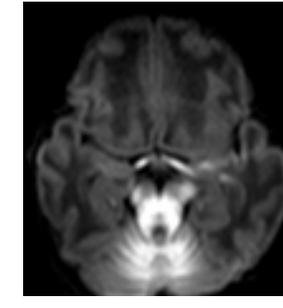
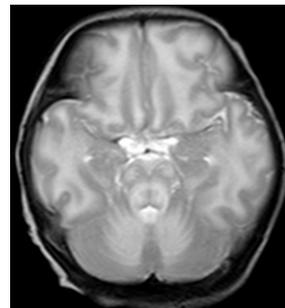
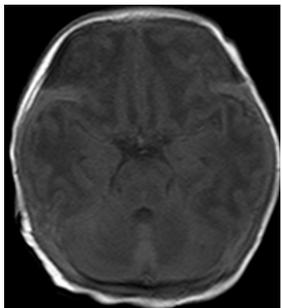
胆红素脑病-15d

(苍白球)



低血糖脑病-3d

(顶枕叶)



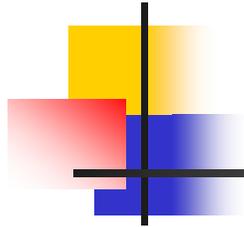
枫糖尿病脑病-7d

(大脑脚、小脑等)

T1WI

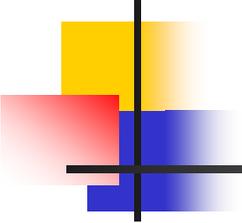
T2WI

DWI



新生儿脑膜炎

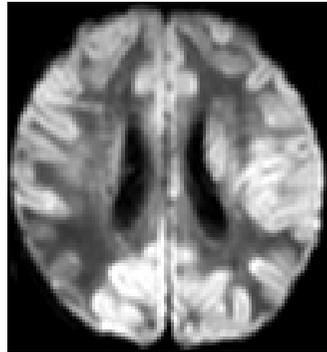
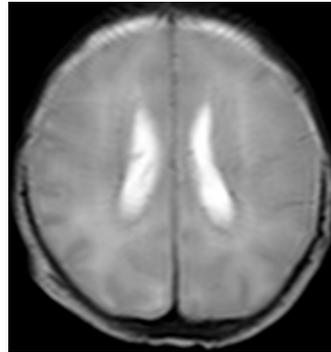
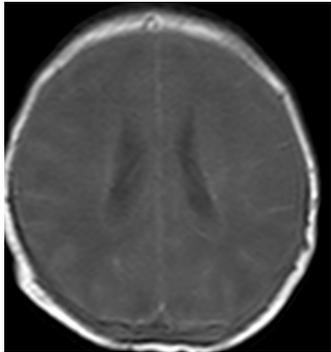
(neonatal meningitis)



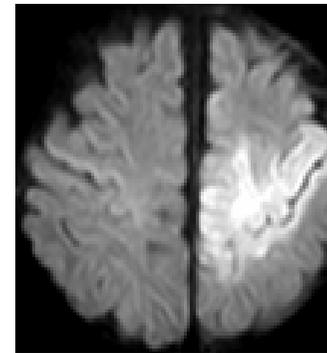
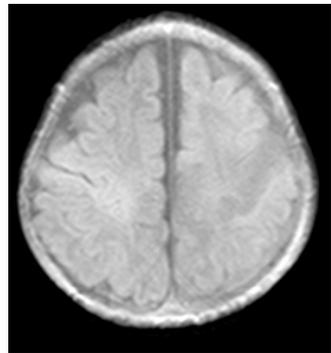
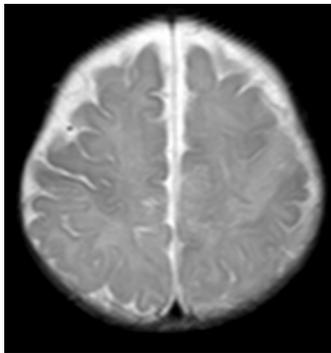
细菌性脑膜炎

- 早期临床表现不典型, 常被漏诊
- 需**CSF**检查明确诊断, 细菌培养阳性更有意义
- **MRI**多有异常改变
- 多数患儿预后差

细菌性脑膜炎



皮层受累---大肠埃希菌



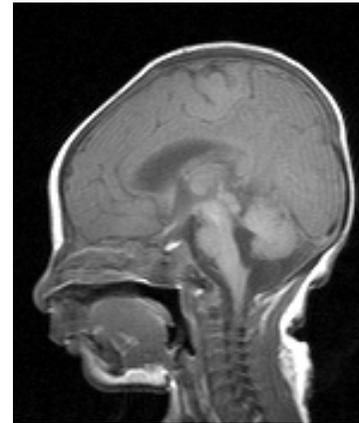
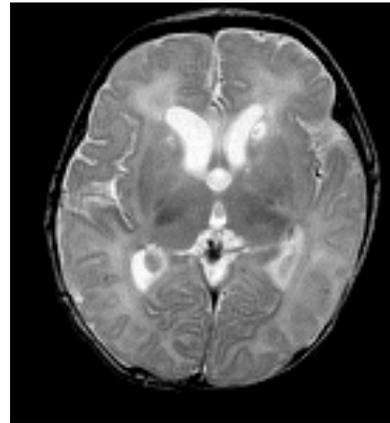
脑梗死---阴沟肠杆菌

T1WI

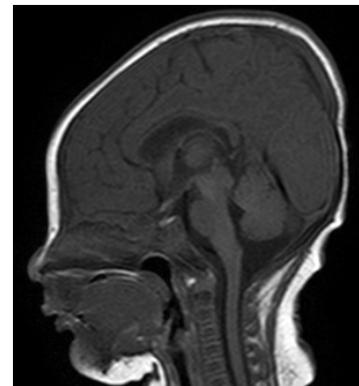
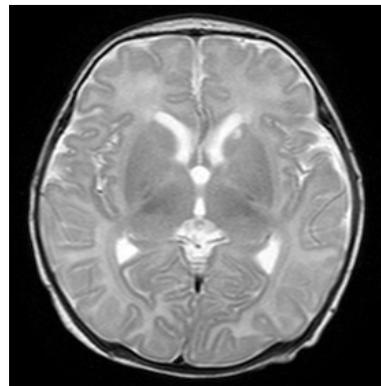
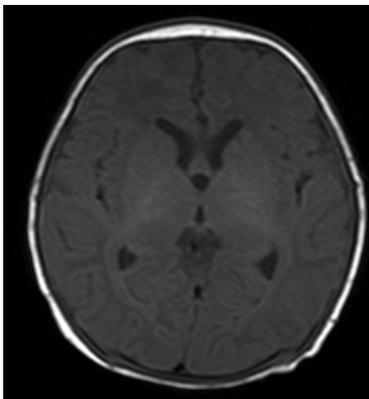
T2WI

DWI

细菌性脑膜炎

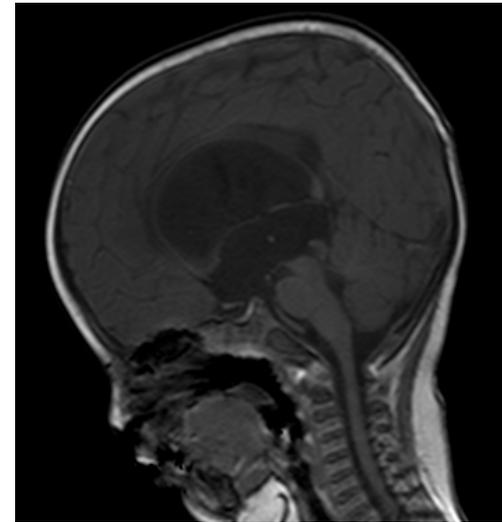
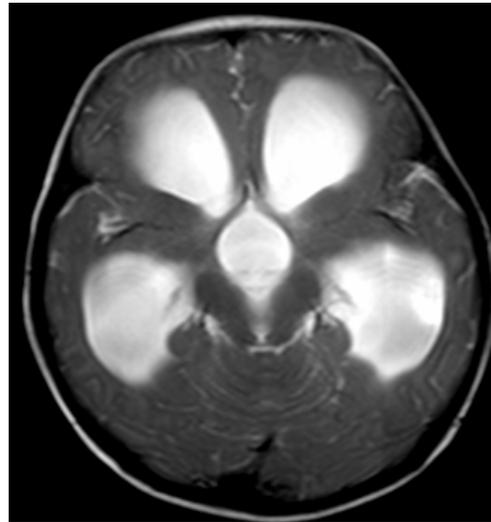
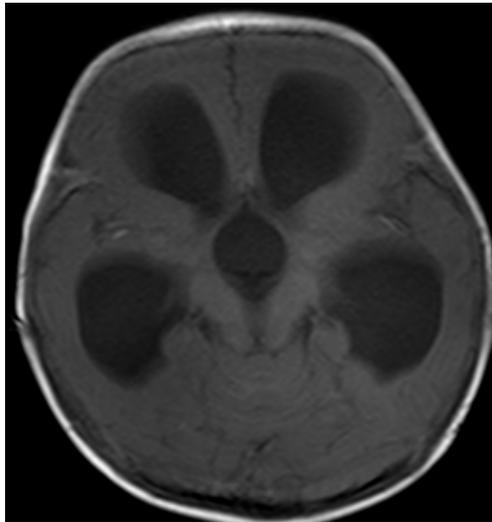


PM-39w-7d



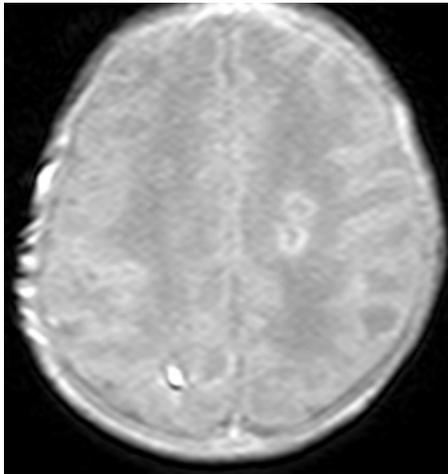
PM-39w-28d

细菌性脑膜炎

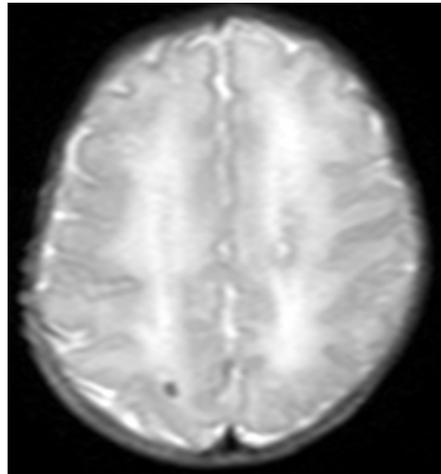


PM-39w-6m

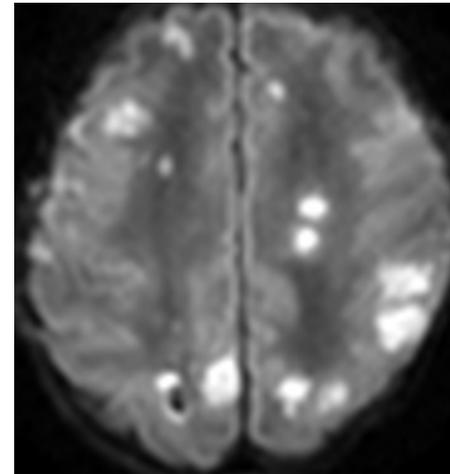
真菌性脑炎



T1WI

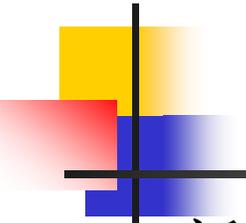


T2WI



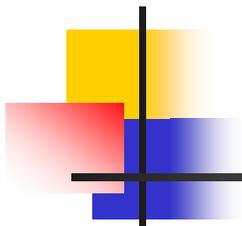
DWI

早产儿- 白色念珠菌感染 - 多发性脑脓肿



结束语

- 新生儿期进行**MRI**检查, 不论是足月儿还是早产儿即使是机械通气的危重患儿, 均是安全的
- 与头颅超声及**CT**扫描相比, **MRI**更客观、准确评价新生儿脑损害程度及远期预后的评估
- 在新生儿出生早期, **DWI**能诊断常规**MRI**尚不能发现的病变



谢谢!