



Brain Injury 101

Supporting Students with Brain Injury
in the Classroom



OBJECTIVES

- **Review federal and state definitions of traumatic brain injury (TBI)**
- **Learn about the discrepancy between:**
 - incidence rates of TBI among children and youth
 - vs.**
 - number of students counted in the TBI category of Special Education

OBJECTIVES

- **Develop an understanding of the causes and effects of TBI on children, their families, and communities**
- **Learn about normal brain development and the effects of brain injury on a developing brain**

OBJECTIVES

- **Develop an awareness of the potential physical, cognitive, behavioral, and psychosocial effects of a TBI**
- **An overview of successful strategies and resources for supporting students with TBI in the classroom**

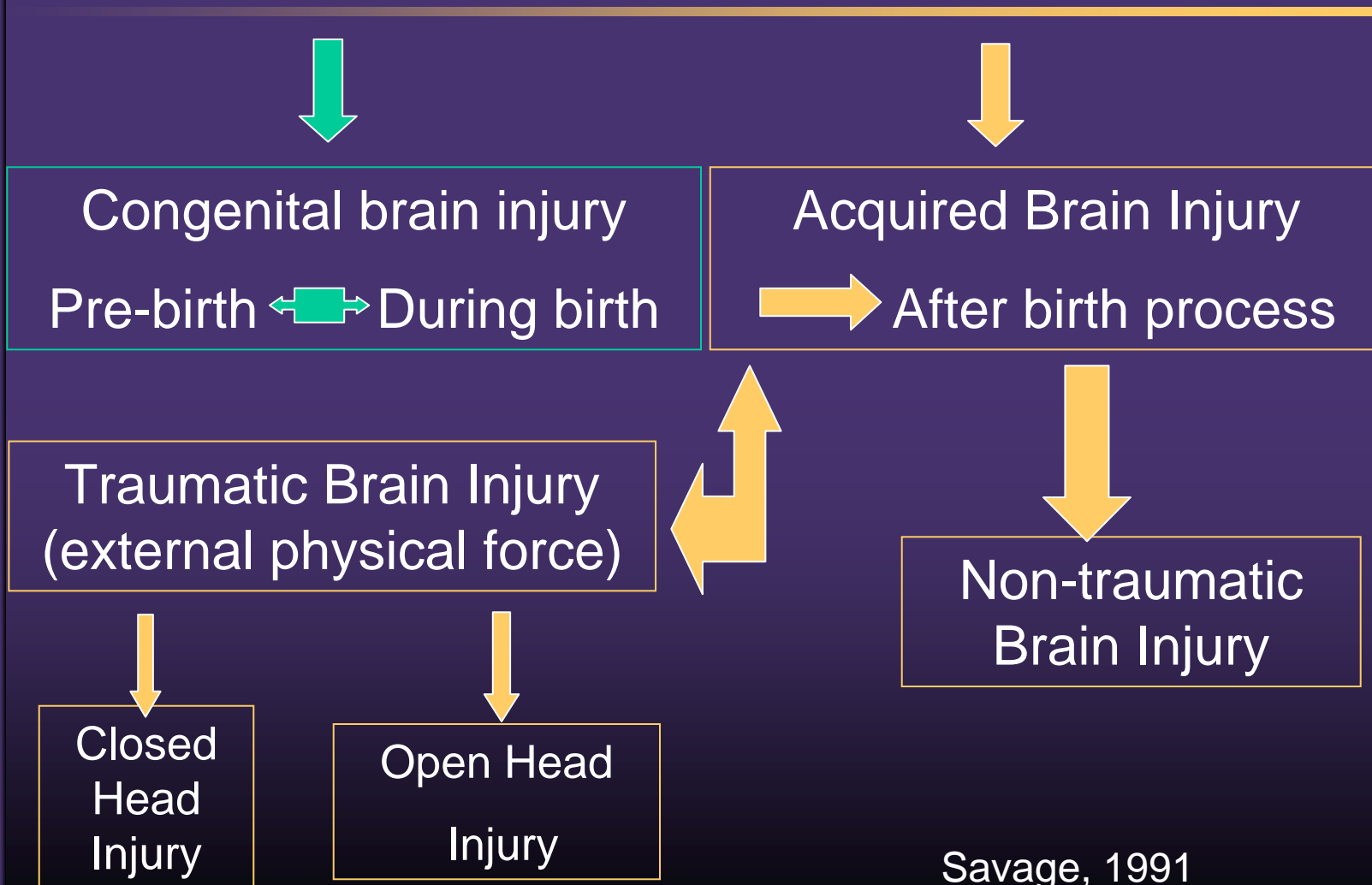
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WHAT
IS THE DEFINITION OF A
TRAUMATIC BRAIN
INJURY
(TBI)?

BRAIN INJURY



Savage, 1991

IDEA Definition of TBI:

an acquired injury to the brain caused by an external physical force resulting in total or partial functional disability or psychosocial impairment or both that adversely affects a child's educational performance.

TBI Definition (IDEA)

The term applies to open or closed head injuries resulting in impairments in one or more areas, such as:

- *cognition*
- *language*
- *memory*
- *attention*
- *reasoning*
- *abstract thinking*
- *judgement*
- *problem-solving*
- *sensory, perceptual and motor abilities*
- *psychosocial behavior*
- *physical functions*
- *information processing*
- *speech*

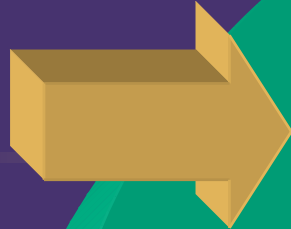
TBI Definition (IDEA)

The term does not apply to brain injuries that are congenital or degenerative, or brain injuries induced by birth trauma.

Federal Public Law 101-476

Neither definition includes
“acquired” brain injuries caused
by internal conditions, such as:

- **stroke**
- **brain infection**
- **tumor**
- **anoxia**
- **exposure to toxic substances**



Important note:

**Brain injuries
that result from either an
external
or internal force
may have similar effects.**

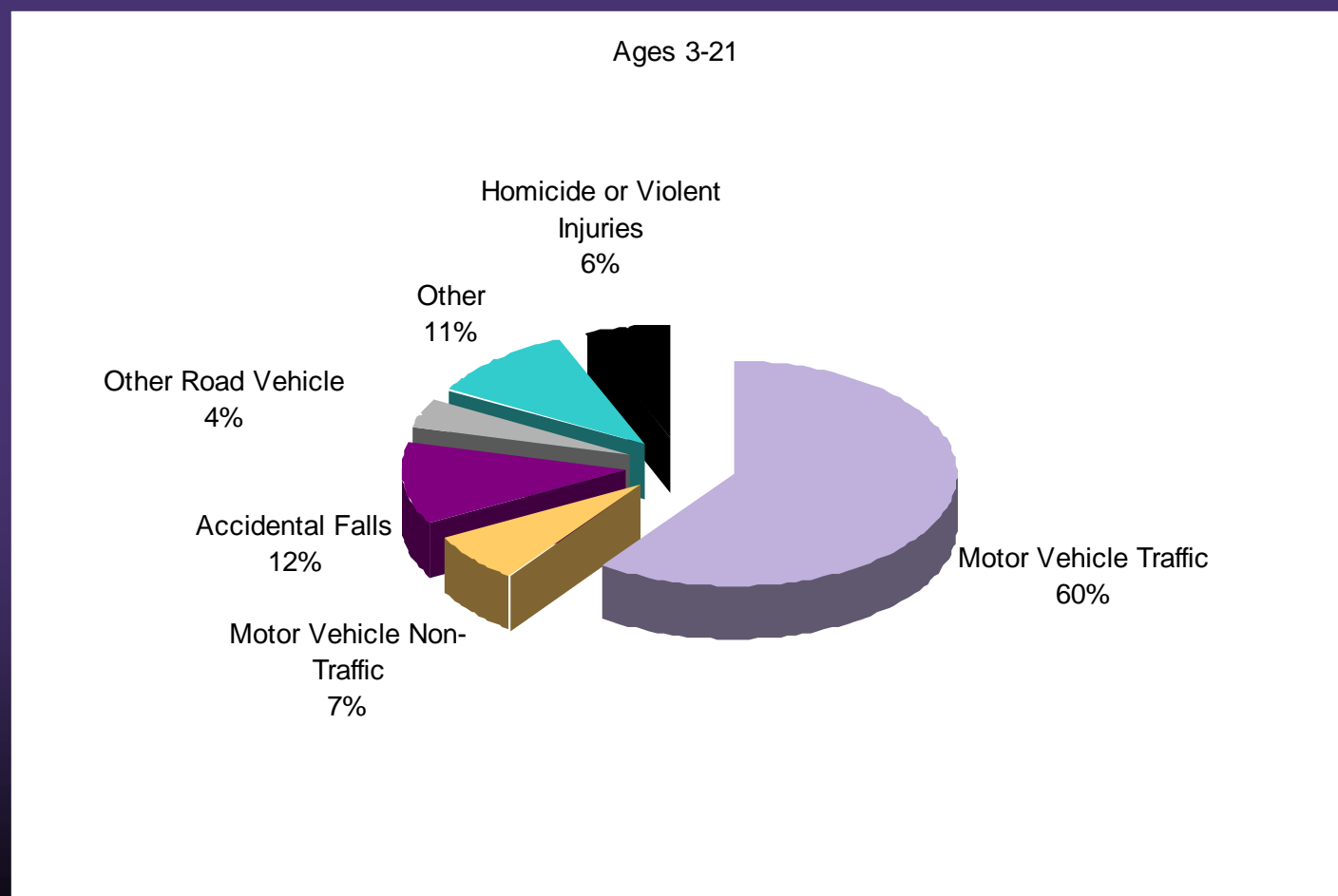
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WHO
SUSTAINS
A
BRAIN
INJURY?

Causes of TBI in Tennessee 2008

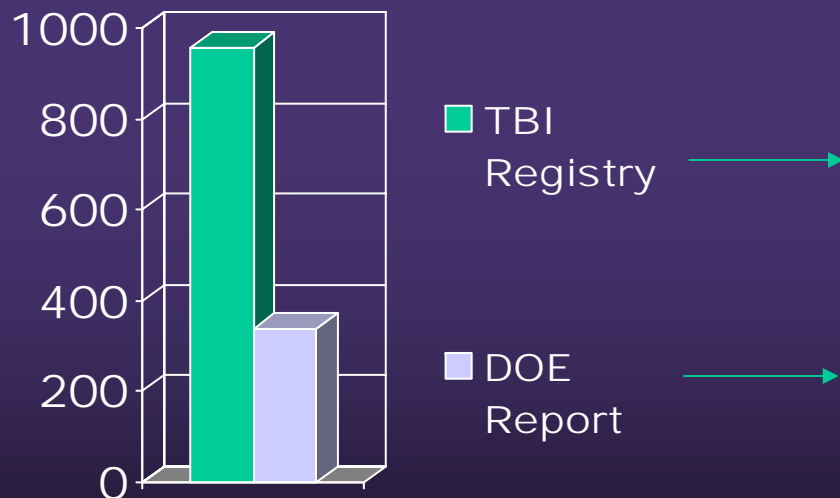


National prevalence rates of various disabilities

- **400,000 with Spinal Cord Injuries**
- **500,000 with Cerebral Palsy**
- **2.3 million with Epilepsy**
- **3.0 million with Stroke-related Disabilities**
- **4.0 million with Alzheimer's Disease**
- **5.3 million with Traumatic Brain Injury**
- **5.4 million with persistent Mental Illness**
- **7.2 million with Mental Retardation**

Students in Tennessee 2008 Statistics

Since 1996 in Tennessee, The TBI registry has recorded over **19,000** persons, ages 3 to 21, who have been hospitalized for treatment of a brain injury



The number of people, ages 3 to 21, who were recorded in the TBI Registry: **955**

Number of students classified as having a TBI according to the 2006-2007 Department of Education report : **336**

*What is happening with the **619** students?*

Reasons for the discrepancy

- Not all children who sustain a brain injury experience lasting effects
- The etiology of a student's disability may be unidentified or misunderstood
- The student may be served under a 504 plan
- The effects of the brain injury in children can be latent, surfacing as more advanced skills are required of the student at school
- When the effects of the injury do surface, they may resemble other disabilities, such as a learning disability or emotional disorder

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HOW
AND
WHERE
DOES TBI HAPPEN?

WHY TBI is so devastating

- **MYTH:** Younger children are more resilient and can therefore “bounce back” easier and more quickly from a brain injury.
- **REALITY:** It may just take longer for the effects of a brain injury to show up in a growing and developing brain.

Why TBI is so devastating

- **Myth:** Visible, physical recovery is a sign that the brain is healed.
- **Reality:** The cognitive and behavioral effects of a brain injury can last long after the person heals “on the outside.”

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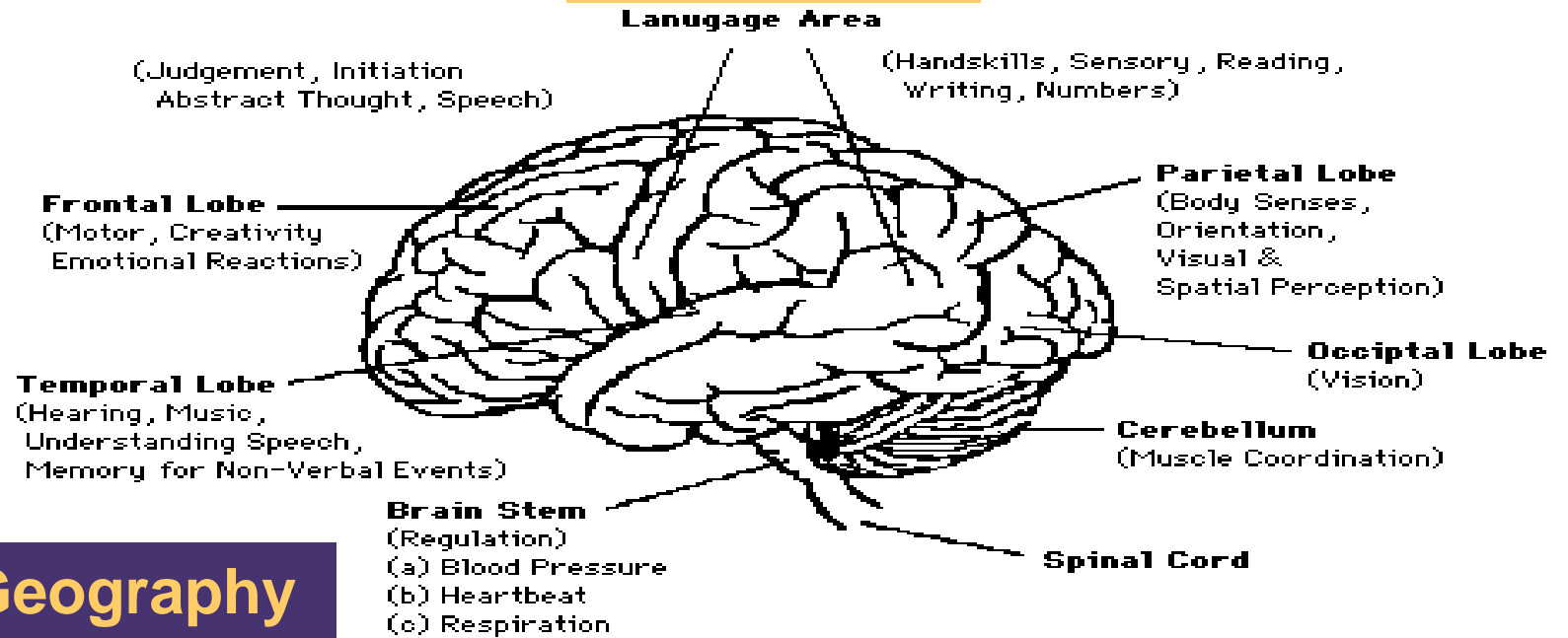
The Growing Brain and Injury

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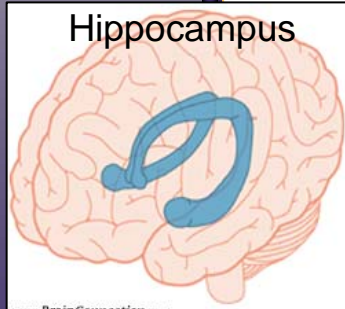
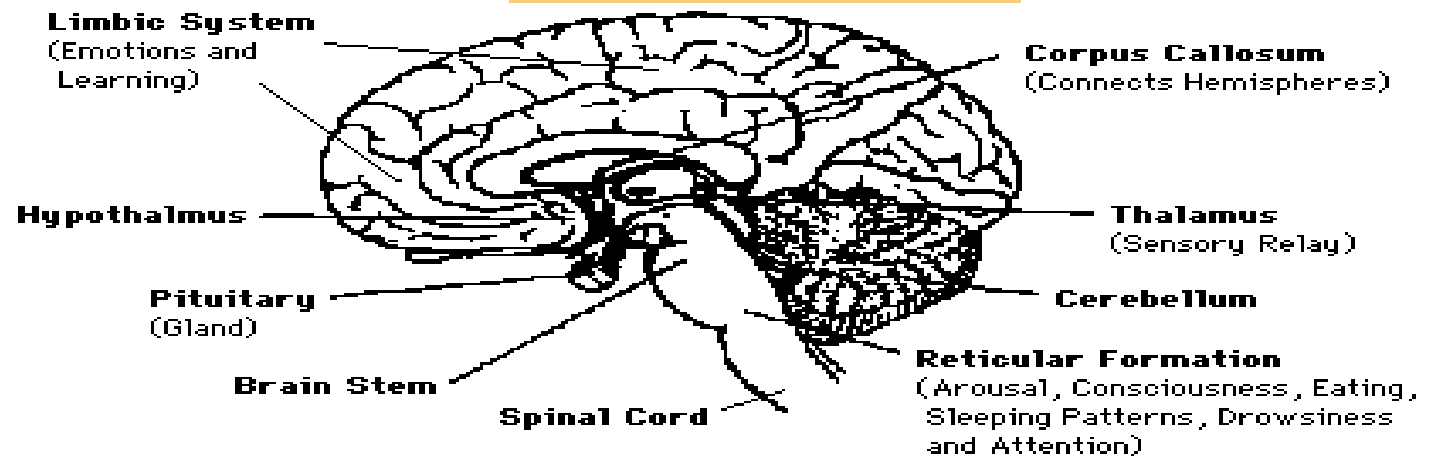
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Surface View



Geography of the Brain

Midline View



www.BrainConnection.com
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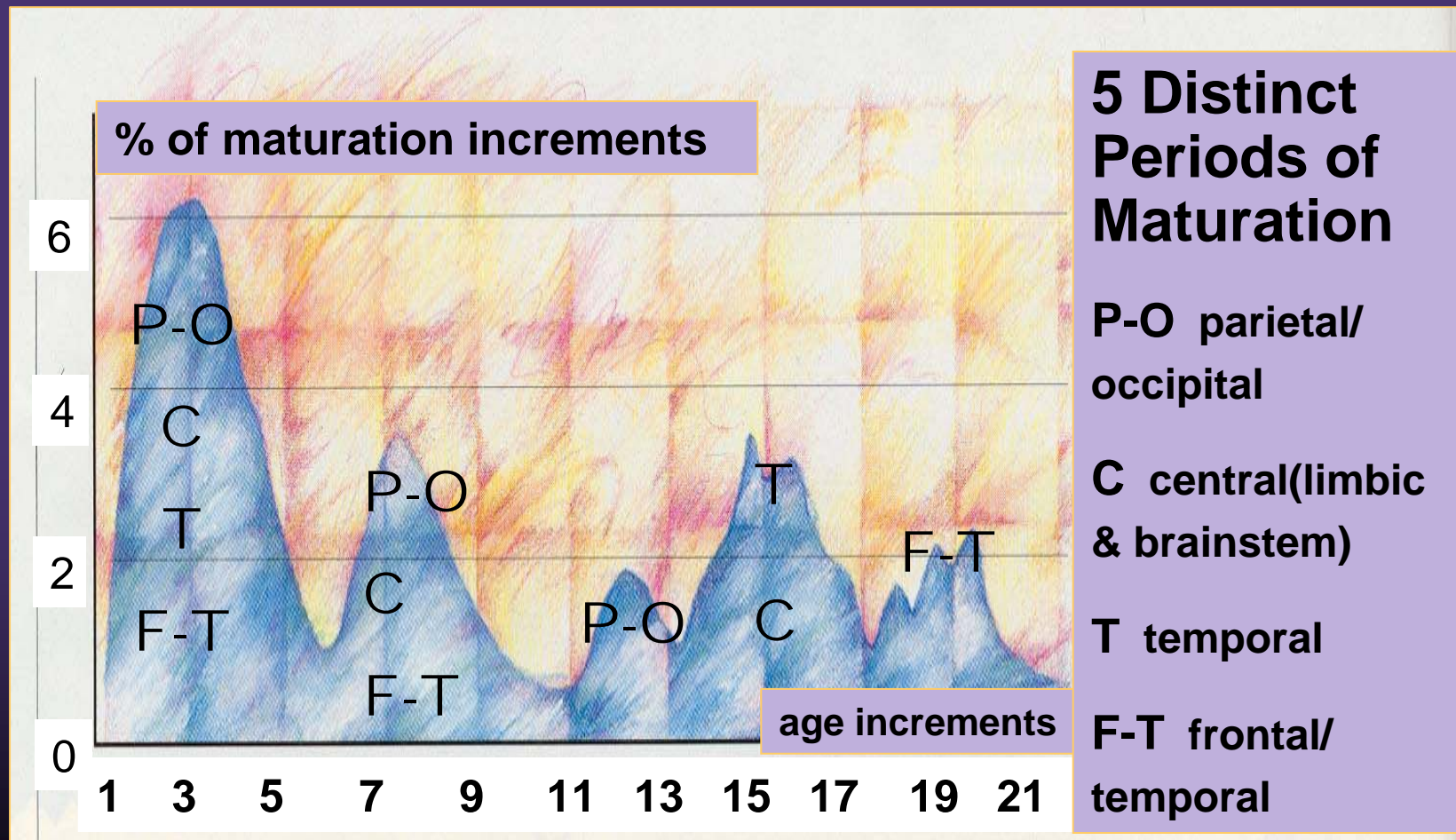


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TBI in children

**can be especially devastating,
as a child's brain is in an almost
constant state of development.**

Rates of Development for the Four Regions of the Brain



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The Anatomy of a Brain Injury

Two types of TBI

OPEN-HEAD INJURY

(penetrating)

Example:

- **Skull fracture that penetrates the brain**
- **Gunshot wound**

CLOSED-HEAD INJURY

Example:

- **Coup-ContraCoup**
- **Diffuse axonal injury**

Two Classes of Brain Injury

- **PRIMARY**

THE INJURY IS MORE OR LESS COMPLETE AT THE TIME OF IMPACT

- ▶ SKULL FRACTURE
- ▶ CONTUSION/ BRUISING OF THE BRAIN
- ▶ HEMATOMA/BLOOD CLOT ON THE BRAIN
- ▶ DIFFUSE AXONAL INJURY

- **SECONDARY**

THE INJURY EVOLVES OVER A PERIOD OF HOURS TO DAYS AFTER THE INITIAL TRAUMA

- ▶ BRAIN SWELLING/EDEMA
- ▶ INCREASED INTRACRANIAL PRESSURE
- ▶ INTRACRANIAL INFECTION
- ▶ EPILEPSY
- ▶ HYPOXEMIA (LOW BLOOD OXYGEN)
- ▶ HIGH OR LOW BLOOD PRESSURE
- ▶ ANOXIA/HYPOXIA (LACK OF OXYGEN TO THE BRAIN)

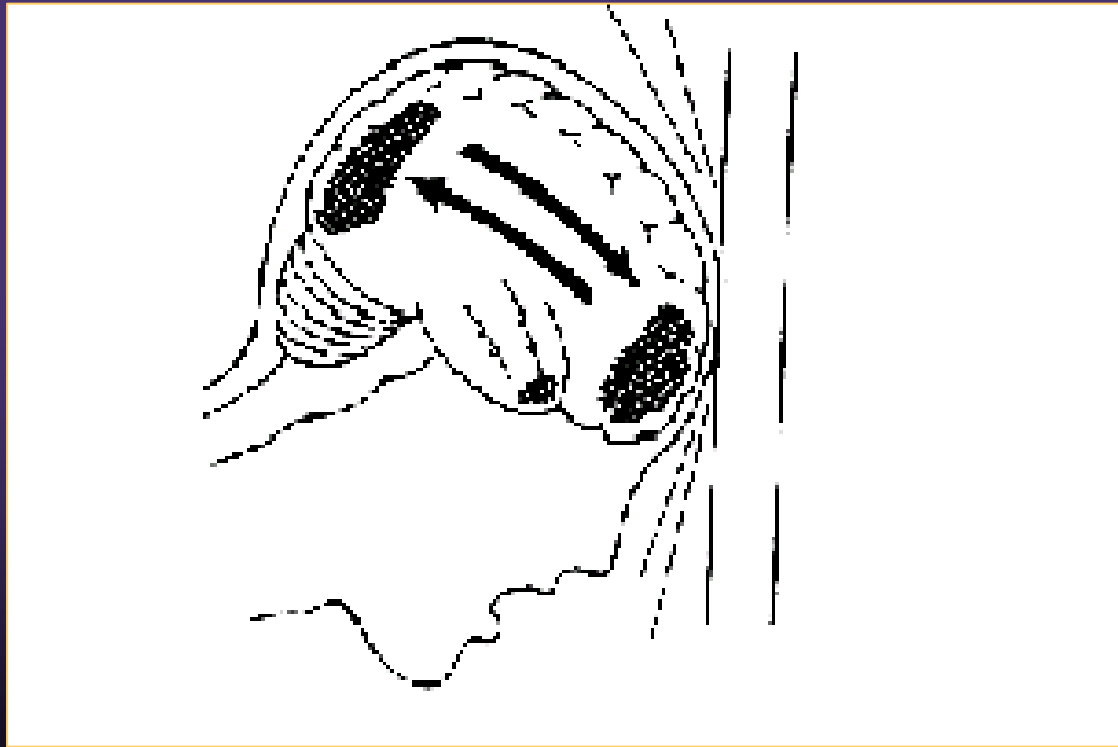
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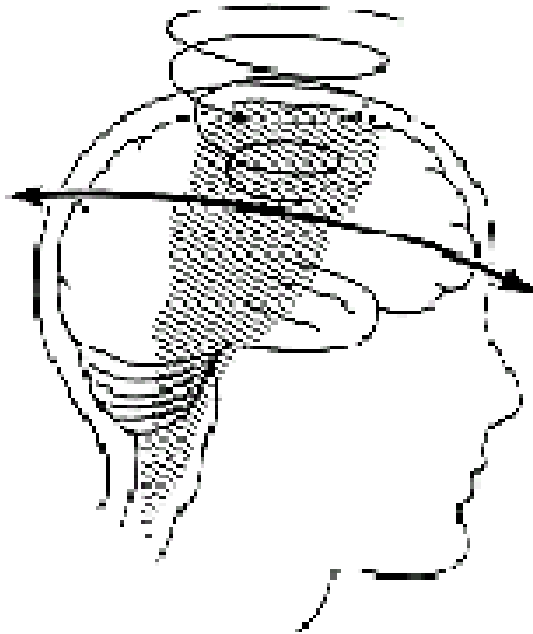
PRIMARY INJURIES

Coup-Contra Coup

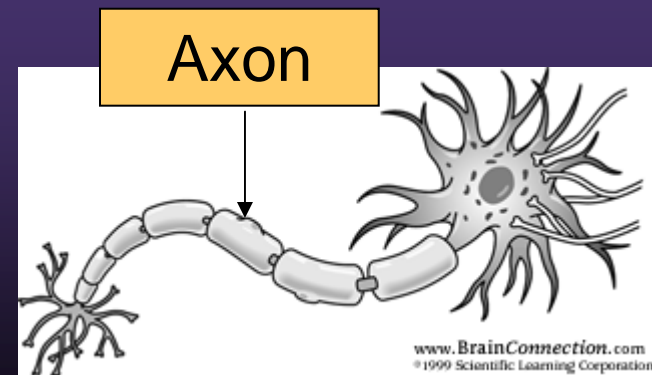


PRIMARY INJURIES

Diffuse Axonal Injury

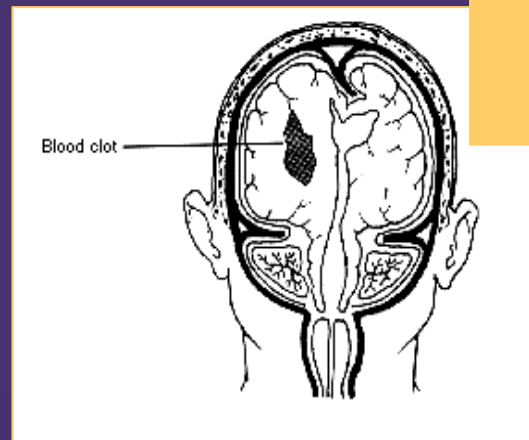


Rotational forces on the brain cause the stretching and snapping of axons

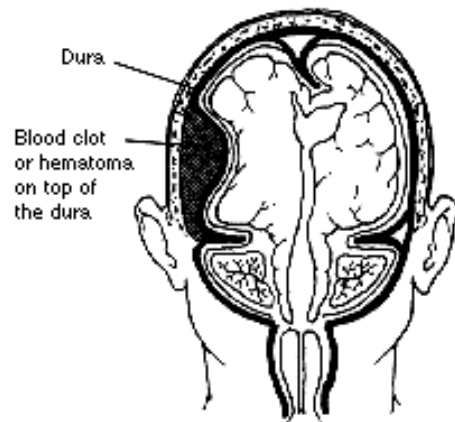


PRIMARY / SECONDARY INJURIES

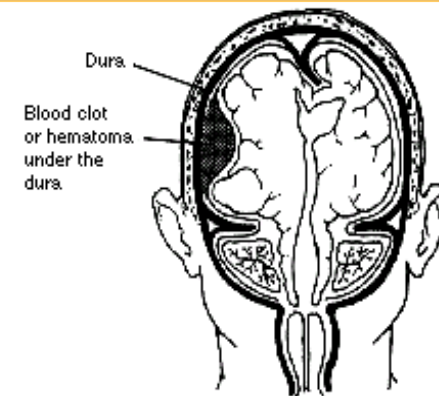
Intracerebral
Hemorrhage



Epidural
Hematoma



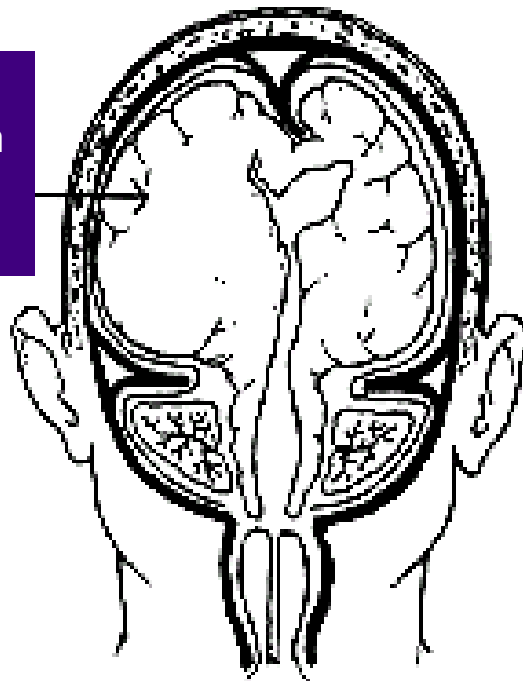
Subdural
Hematoma



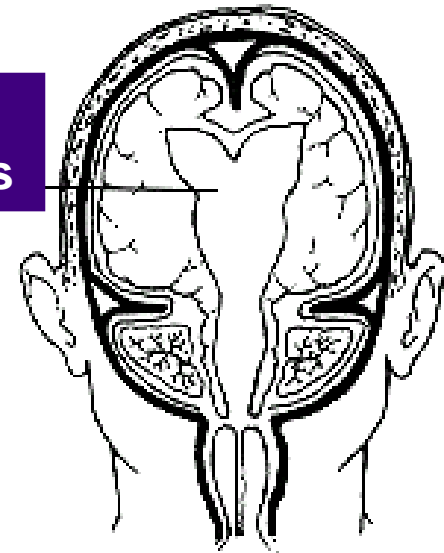
SECONDARY INJURIES

Brain with Edema

Edema
(swollen
brain
tissue)



Enlarged
Ventricles



Brain with
Hydrocephalus

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Consequences & Challenges

**After
Traumatic Brain Injury**

TBI ↔ ENORMOUS VARIABILITY

**TYPE OF
INJURY
&
SEVERITY**

**AGE
AT THE TIME
OF INJURY**

**AVAILABLE
KNOWLEDGE,
RESOURCES,
&
SUPPORT**

RECOVERY

**PRE-EXISTING
DISABILITIES
OR BEHAVIORS**

TBI Can Affect...

- **Physical skills**
- **Cognitive skills**
- **Behavioral /
Psychosocial Skills**

Possible Physical Effects

- **Impairment of:**
 - **Speech**
 - **Vision**
 - **Hearing**
- **Difficulty with:**
 - **Balance**
 - **Spasticity**
 - **Paralysis**
 - **Paresis**

Less obvious physical effects:

- headaches
- fatigue

Possible Cognitive Effects

- **Impairments in:**

- ⇒ attention or concentration

- ⇒ ability to initiate, organize, or complete tasks

- ⇒ ability to sequence, generalize, or plan

- ⇒ flexibility of thinking, reasoning, or problem-solving

- ⇒ abstract thinking

- ⇒ judgment or perception

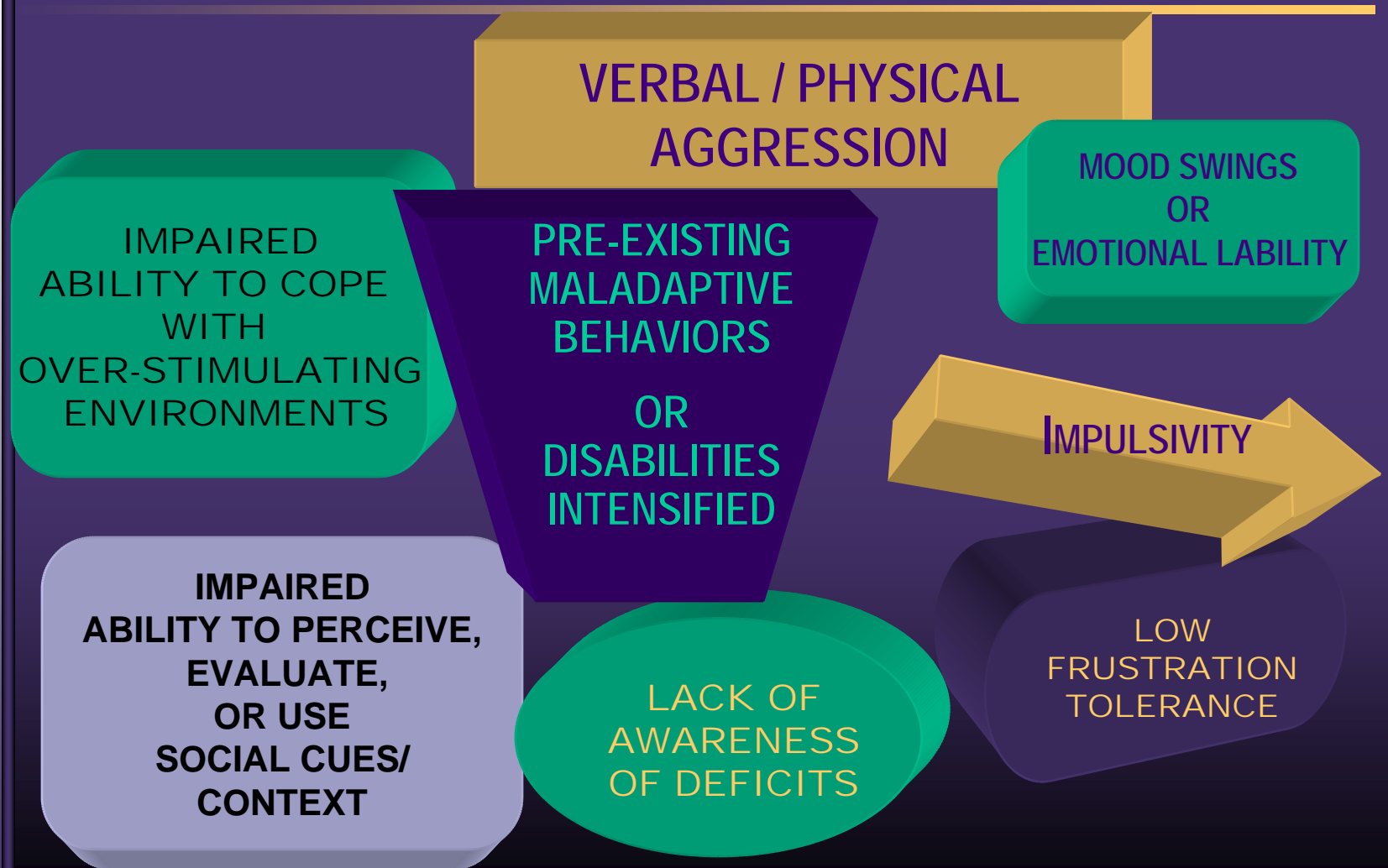
- ⇒ long-term or short-term memory

- ⇒ confabulation

- ⇒ ability to acquire or retain new information

- ⇒ ability to process information- slowed speed

Possible Behavioral / Social Effects





What the Future Holds

**Supporting Students
with
TBI
at School**

Be creative in designing services...

Use the tools you have to work with these students, but keep the following in mind:

- **Progress can be inconsistent and unpredictable**
- **Student may experience reduced stamina and fatigue for some time after the injury**
- **Student may process information slower after their injury**
- **Impairment of memory may hinder new learning**

Plan for transitions...

Hospital to school

Grade to Grade

School to School



Consider Ongoing Supports...

- **Establishing effective means of communication between school and home**
- **Establishing primary contacts for the family both at the school level and at the administrative level**
- **Developing peer supports for the student**
- **Updating evaluations as needed**

Initial School Re-entry

- **Eligibility**

A physician's letter should be obtained documenting the Traumatic Brain Injury

Interview the family of the injured student to obtain pre-injury academic and social history, as well as changes they have seen since the injury

A school staff person should be designated to visit the student before he or she returns to school to make anecdotal observations

Information to obtain:

- **Medical**
 - Documentation of the injury, site(s) of injury or lesion, duration of coma, services received post-injury, medications, contact information for doctors
- **Medical Release**
 - Specifies the student's ability to participate in physical activities at school
- **Rehabilitation Records**
 - Initial evaluations & discharge summaries from all therapies administered
 - Specific recommendations for adaptations to the school environment
 - Therapy recommendations
 - Instructions related to use of adaptive equipment

Information to obtain:

- **Psychosocial**

- History of student pre-injury from an educational and social perspective
- Relevant information on siblings, including ideas about how to address their reaction to the injury
- Educate support team about possible suicidal ideation post-injury (especially with adolescents)

- **Educational**

- Contact person for family
- Initial and subsequent IEP's
- Records from support personnel
- Attendance records
- Records from other schools attended, if applicable
- Specific information related to sensory issues

Considerations for Formal Assessment

- ◆ The nature of formalized testing may compensate for cognitive weaknesses (e.g., attention, initiation, flexibility, information processing, executive functioning).
- ◆ New learning is often not assessed.
- ◆ The student's "scatter" in abilities is often not revealed (i.e., gaps below basals and strengths above ceilings).
- ◆ Scores may not reveal the extent of reduced functioning in the classroom. Alternatively, some students may perform better in the "real world" with natural cues present than testing would predict.

Considerations for Informal Assessment

- ◆ **“Real-life” classroom performance is represented.**
- ◆ **New learning can be assessed.**
- ◆ **Hypotheses about breakdowns and possible interventions can be tested.**
- ◆ **Current functioning can be compared with pre-injury performance.**
- ◆ **Environmental variables affecting performance can be evaluated.**
- ◆ **Work samples and classroom evaluation can provide a direct link to intervention strategies.**



Sample Strategies to Consider:

Scheduling Modifications

Attend school part-time initially

Schedule several in-school breaks

Provide “study halls” with resource teacher

Schedule most difficult subjects early in the day

Keep number of classroom changes to a minimum, or assign a “buddy” to assist the student in changing classes

Begin with one-on-one/small group instruction, adding additional students with improvement of concentration

Consider ESY, homebound services or tutoring for summer months

Will child be supervised at all times?

From: TBI Inservice Training Module, Janet Siantz Tyler, PhD., Kansas Dept. of Education, TBI Project



Sample Strategies to Consider: Instructional Strategies

Classroom rules & expectations should be well structured and explicitly taught

Instruction should contain repetition & feedback

Avoid multi-step instructions if possible

Supplement verbal instructions with writing / modeling

Provide ample time to process, complete tasks, and respond

Assist the student in keeping his/her materials and schedule organized

Teach compensatory strategies for test-taking, note-taking, reading materials, etc.

Try external aids such as lists, diaries, computers, calculators

Videotape the student's progress in class to provide feedback and show progress

From: TBI Inservice Training Module, Janet Siantz Tyler, PhD., Kansas Dept. of Education, TBI Project

IEP Development

TO INCLUDE:

- Obtain eligibility documents, including information about current levels of functioning
- Include individuals in IEP meetings who can help to identify the adverse effects of the brain injury on the student's performance

TO ADDRESS:

- Student's current and past strengths/ areas of need
- Medical needs
- General modifications / accommodations
- Involvement of student in general curriculum
- Extended school year options

Developing IEP Goals

- **Focus on 2 or 3 priority issues**
- **Identify metacognitive & organizational strategies**
- **Write measurable goals that incorporate the strategies**
- **Include specific information about how the strategy should be taught and implemented across settings**
- **Write short-term goals that are truly short-term**



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