There are many different reasons why patients with brain tumors develop cognitive problems or personality changes. John is soft-spoken and rarely raises his voice when problems arise. Sally loves to sing and can easily memorize new songs. These traits are part of John and Sally’s personalities, and demonstrate their thinking power or cognitive abilities. How would a brain tumor affect the way John thinks or Sally acts? Without good information about location, size, and type of brain tumor or the treatments given, it would be difficult to tell. A person with a brain tumor may have very subtle changes in cognitive abilities, or they may not be able to remember the name of their best friend! Let’s look at things that can cause changes.

Some Cognitive Abilities are:

- Using words correctly
- eye-hand coordination
- spatial relationships
- attention & concentration
- storing information
- recalling information
- putting things in order
- arithmetic calculations
- recognizing consequences of actions
- clear thinking
- problem solving

Location of tumor

Different areas of the brain act as “control centers” for thinking and behaving. The brain is divided into two sides (left and right hemispheres) and four lobes (frontal, parietal, occipital, and temporal lobes). Each area controls different things. For example, most people have their speech center in the left side of the brain. A brain tumor in this area can mean a person has difficulty saying the correct words, even though he or she is fully capable of understanding what is being said. If the tumor is in the frontal lobe (behind the forehead), patients may feel “disconnected” and lose some of their normal control. An adult or child with a brain tumor, who previously was very polite, may become rude, disruptive, or overactive and have trouble paying attention. If you don’t know where your tumor is located, ask your doctor or nurse to explain.

Size and type of tumor

If a tumor grows very quickly, such as with glioblastomas, healthy brain tissue will be affected from pressure and swelling associated with the tumor. Patients with these tumors are more at risk for personality, behavioral, or cognitive changes. Slow-growing tumors, such as pilocytic astrocytomas, may not cause as many changes because their slow growth enables the brain to compensate for the tumor.
**Treatment effects**

**Radiation therapy** can produce sudden changes, usually as a result of the brain swelling from the radiation, much like sunburn can cause puffiness. Later, even weeks or months after radiation therapy has been completed, patients might experience fatigue or drowsiness. These symptoms can contribute to a patient feeling and acting differently. Studies have shown long-term effects on attention and memory in children with brain tumors who have received radiation therapy.

**Chemotherapy** seems to have a less direct affect on personality or the ability to think and perform. Possible side effects of chemotherapy, such as hair loss or lowered blood counts, can cause energy loss, lowered self-esteem, and depression. Since many patients receive multi-drug treatments, researchers have not been able to pinpoint any specific agents as responsible for cognitive changes. More attention is being paid to these effects during clinical trials. Some new protocols require that cognitive testing be performed. Patients treated with monoclonal antibodies may have side effects similar to changes experienced with radiation or chemotherapies.

**Different medications**

Prescribed medications can sometimes be a double-edged sword. They help one thing but may cause cognitive changes that are not so obvious. Steroids, such as Decadron®, are very important for reducing swelling in the brain, but can cause hyperactive or restless behavior until the body adjusts. Medications that help control seizures, like Dilantin®, may cause drowsiness or interfere with clear thinking. Side effects may indicate that more or less drug is needed. Keep a good written record of when you take your medicine. Note any problems that develop, like being drowsy, grouchy, or more forgetful. Report sudden or dramatic changes to your treatment team immediately.

**Diagnostic aid**

Learning to cope with changes brought on by a brain tumor can enhance quality of life. Contact with a neuropsychologist for cognitive testing soon after a brain tumor is diagnosed may help in many ways. Neuropsychologist Renee Dunn, Ph.D., and Pediatric Psychologist Melanie Bonner, Ph.D., work with patients of the Brain Tumor Center at Duke. They use tests that measure such things as concentration, memory, organization, and problem solving. Test results help determine whether a brain tumor has or has not affected thinking abilities. Results also can provide basic information about side effects from treatment. This helps the neuro-oncologist or radiation-oncologist make adjustments to treatments and hopefully obtain better outcomes. While treating the disease is a primary focus, the medical team will want to choose methods and doses that reduce the risk of causing cognitive problems when possible.

The neuropsychologist may also identify ways to address cognitive problems affecting daily activities, schoolwork, and employment. Recommendations may include anything from strategies for memory recall to ways to adjust for reduced vision. A referral to occupational, physical, or speech therapists may also be considered. Upon a patient or family’s request, information about cognitive changes and ways to cope can be shared with siblings, teachers, classmates and others.

Reassurance gained from interaction with the neuropsychologist can lessen the effect of cognitive and/or behavioral problems and improve the quality of life for both patients and families.

**Finally…**

Having a brain tumor can be quite shocking. Emotions and feelings about the situation need to be expressed and recognized. Sometimes it is not easy to separate emotion from tumor damage or side effects of treatments, but the neuropsychologist can help. Remember, too, that the people nearest and dearest to you may be having problems coping. Please share your feelings with others in safe, supportive situations. See a counselor, your clergyperson, or join a brain tumor support group. Getting these feelings out can relieve tension, ease the mind, and allow for better use of your energy to fight disease.