

# American Brain Tumor Association Webinar

## Neurological Complications of Brain Tumors

>> Welcome to the American Brain Tumor Association's webinar series. Thank you for participating in today's free educational webinar. Today's webinar is on neurological complications of brain tumors. It will be presented by Amy A. Pruitt, MD. Please note that all lines today are muted. If you have a question you would like to ask, please type and submit it using the question box in the control panel on the right-hand side of your screen. Dr. Pruitt will answer questions at the end of the presentation. Tomorrow you will receive an email asking you to evaluate the webinar and it's a very brief survey. Please take a few minutes to share your comments, your feedback is important as we plan for future webinars. Today's webinar is being recorded. The recording will post to the a BTA website shortly. Participants will receive a follow-up once the webinar is available. Let's pause for a moment so we can begin our webinar recording here.

The American Brain Tumor Association is pleased to welcome you back to our webinar series. Our webinar today will discuss neurological complications of brain tumors. My name is Vince Rock, program manager here at the American Brain Tumor Association. I'm delighted to introduce our speaker today, Amy A. Pruitt, MD. Dr. Amy Pruitt trained in neurology and internal medicine at Harvard Medical School and Massachusetts General Hospital. She is professor of neurology and vice chair for education at the University of Pennsylvania in Philadelphia her clinical specialties include management of brain tumors and the diagnosis and treatment of infections and other complications of transportation and cancer therapies. Thank you for joining us, Dr. Pruitt, you may now begin your presentation.

>> Thank you and thank you to the American Brain Tumor Association for inviting me to discuss the important topic of brain tumors symptom management. Thank you to all that are joining and I look forward to answering your questions at the end of the presentation. Patients with brain tumors have any disease and treatment related problems that really impact the quality of life and actually even overall survival. These require management from multiple types of doctors and other caregivers. Brain tumors symptom management can be conceived as I do with a spectrum of care addressing the needs of patients and family members from the diagnosis and active treatment phases on through supportive care or the increasingly important area of management of long-term complications of treatment as more people with brain tumors are living longer due to better therapies.

I have a couple of disclosures or lack thereof before I begin my presentation. I have no financial interest in anything. I have preclinical and clinical trial support from TEVA Pharmaceuticals for therapies unrelated to brain tumors. And I will be discussing some therapies for such important symptoms as fatigue and cognitive dysfunction that are not FDA approved. That is the FDA, for this indication so as I will emphasize and at the end of the presentation, please be sure to ask your own positions about their opinions on specific therapies and specific problems. I will begin to address with the entire ~~problem~~ with who is part of the neuro-oncology team?



It is a specialty that's been around for about 40 years now. Sometimes we've been joined by a whole host of other physicians. They help with symptom management and hopefully coordinate care among very -- any specialist. On my next slide I'm talking about some of the overviews that we are going to be talking about in the course of this discussion. Or the members of the neuro-oncology team and what are their goals? The common problems listed in 1 through 7 on the side on your screen are the important things that we will be discussing throughout this particular seminar. I hope we will have time to discuss long-term complications because as I mentioned these are going to be increasingly important parts of the long-term survival of patients with these diseases. Here is the team. Right in the center is the patient and the people who really are related to that patient, good friends, the day today and to our supporters. We put the surgeon at the top because I think that's where they like to be and the surgeon is certainly a very important -- important part because it is uncommon for someone to have treatment for a brain tumor if he doesn't have a diagnosis of what the problem is and that may be one of the questions that we will come to towards the end or in the Q&A session. A medical oncologist may be the person who does the primary administration of chemotherapy and I would encourage you all to keep your own primary care doctor involved as much as possible. This is a really important person in your care team. They have known you and possibly other family members for a long time before this particular problem arose and we try to keep our primary care referring physicians up to date with everything that's going on as we proceed through the treatment. Physical therapist, rehabilitation specialties and palliative care people will all be mentioned throughout the course of my presentation. A neurologist may actually be your main doctor.

One of the big questions that comes up when you have so many doctors is do you really have any one person who is the quarterback if you will. Sometimes it's the medical oncologist and sometimes it's the neurologist. Sometimes you have a specialist who is a neuro-oncologist. That maybe the person that you refer to. There may be different doctors for different phases of the treatment. It may be that you return to the care of the nurse -- first neurologist that made the diagnosis and that may be the person that follows you for much of the course. You may return to your primary care physician. A different team called the palliative care team specializes in the management of symptoms of serious illnesses may be right alongside your primary team. Over on the left-hand side of the diagram I have nurses and nurse practitioners. Virtually everyone in our neurosurgical and neuroscience departments work with nurses and nurse practitioners on a day-to-day basis. They are incredibly valuable symptom managers and will be communicating with you as your primary care doctor or neurologist.

Equally important are social service people and psychologists. They can be helpful in symptom management along the way. I'm going to skip navigators and move down to the bottom. The radiation oncologist. That person may be your primary doctor during the 6 to 8 weeks you are getting radiation therapy for many of these problems. Down on the bottom are some other important people. Research coordinators. People who will help think through the informed consent process if you are involved in the clinical trial. Pathologist, you may want to go to more than one place for a second opinion. Is this really the pathology we are dealing with.



A radiologist is incredibly important in the diagnosis and follow-up and a pharmacist is behind the scenes helping make sure that we get the drugs when the quantities we want and when we need them and also helping with some of the financial ends of these very expensive drugs. I left one very important group out on purpose. That's the navigators. Some of you may have already had the experience of having so many doctors that you don't really know where to turn. There is a navigator who helps people through these symptoms. Ask about it, it can be an incredibly important ally in an often very stressful and confusing time. Whatever the number of people on your team, the team has the same goals. We want to choose the best possible treatment for the patient's personal situation.

You've heard about personalized medicine and from the cellular level under the microscope to the way a person wants to deal with these serious illnesses, it's a personal matter. That may differ from one person to the next with exactly the same kind of problem. We want to improve quality of life during and after treatment. We want to keep people out of the hospital as you have well learned that's no place to be when you're not feeling well. You want to be as home -- at home. There may be specific needs, patient generated goals that are really important here. Back to the things we are about to talk about. Seizure medications. Are they always needed? And is there a best drug? Steroids, almost everyone listening has probably had either himself or someone in his family on steroids and therefore almost everyone listening has probably experienced some of the side effects of medicines. 1:00, the big word is venous thromboembolism and it can be incredibly important and very dangerous and sometimes fatal around the time of the brain tumor or operation. Infections can happen when people need to stay on steroids for a long time. Mood and cognitive issues are, I believe, an under-recognized and underserved area of this whole endeavor and I'm going to spend some time on what we know about medicines and therapies that can help.

Fatigue is a huge problem. It isn't just that you had major surgery and that you have to trek into the hospital for a few minutes of treatment for five days out of seven, six weeks in a row. There are odds of whether reasons that people get -- lots of other reasons and that's because the steroids mess up the wake cycle. Gastrointestinal problems can happen or the opposite can happen and people can have nausea that sometimes isn't very well explained but for which we had better and there are therapies.

Let's not forget the last two things on the page. Rehabilitation and palliative care. Rehabilitation from the effects of surgery and/or the treatments incredibly important and having a stay in a good rehabilitation facility can make a world of difference in getting back to your usual activities. Palliative care I will define and spend more time on later. For those of you who are medically oriented there is a review article listed at the bottom here and this covers many of these from a medical perspective. Now on to some of the big problems. Tumor-associated swelling or base of genic edema. What does that mean? It means that the blood vessels -- there is leakage of a fluid filled with protein out into the area around the tumor.



Research is to help us find good ways to reduce swelling. I'm showing a picture of a glioblastoma here in the left frontal lobe. On these pictures left is right and right is left. This is the left frontal lobe -- lobe and the darker area that I've circled is probably the bulk of the tumor. However, you can see that there's a huge area around this where there is a massive amount of water and proteins leaking out into the brain and its pushing on with the spinal fluid is stored in the ventricles here. The person might not have a whole lot of symptoms if he just had this area where the tumor itself is causing the problem. You can see here when we add the dye it's pretty well defined. But all of this fluid around here is causing a great increase in the amount of symptoms and probably headache and confusion all states as well. What can we do about that and fortunately we have some very good drugs for this. Steroids are the mainstay of therapy.

Corticosteroids is another word for that appetite can improve with reduction in pressure and headache when it improvements well. And some tumors such as lymphoma, actual self-destruction will occur and actually be considered part of the therapy when you give steroids. So that large white area is what we want to get rid of and when you compare where the diet as you will have far fewer symptoms if we are able to get rid of that large white area from the leaky blood vessels. There are several different kinds of steroids and I put the one that is most commonly used at our institution and I believe that most institutions in red. That is dexamethasone and it's a pretty powerful drug. Your own body is going to make something close to something called cortisone and 20 mg of that is equal to about 0.75 mg of dexamethasone. As you can see it is the most powerful of the drugs. If I had to guess at what a second drug that many people might be using would be, it would probably be methylprednisolone. Why would we choose dexamethasone over methylprednisolone? They are both fairly expensive drugs and they are more expensive than the readily available prednisone. But let's look at one thing here. The half-life. How long the drug lasts in the blood. It's very long with dexamethasone and that means you don't have to wake yourself up at midnight and 6 AM and take something at noon and then 6 PM and then wake yourself up at midnight again. With methylprednisolone you have to take it several different times a day. Some of you may have the experience of going home with a very rigid schedule only to come back and see your doctor and have the doctor say why are you doing that?

You don't need to set an alarm. You can take this a couple of times a day. With dexamethasone you can also take it once a day. Be careful here, there are a couple of drop what -- one which is [name unknown] Welch may make it necessary to take once or twice a day because it speeds up the destruction of the dexamethasone. In general we prefer this drug and we only give it once or twice a day. We give it first thing in the morning and we give it in the early afternoon. We don't give it at the time. If anybody is listening has experienced at like, then you know that your body has a little burst of steroids before you wake up in the morning and if you take a dose of dexamethasone at bedtime, a couple of hours later you will have a burst of steroids and you will wake up and be unable to sleep. It would be wonderful and for those of you who are listening that have brought the -- relatives, tell them an important patient care development would be to find a good alternative to corticosteroids. We have been using these since the 1960s when the first doctor who developed this actually took a large dose himself just to see if it was all right.



He took 40 mg at once and we now know that he did okay and he introduced this into patient care making a world of difference for people who are undergoing neurosurgical procedures. We need better alternatives because you will see in a minute the many side effects that come from needing to be on these steroids. VEGF, is a drug -- as a series of drugs that we -- reduce the swelling from the leaky blood vessels and some of you may recognize the word [Indiscernible] which was the drug that was introduced about eight years ago and has taken a very important place in helping people to reduce the need for steroids. We will come back to that in a little while. This is a daunting slide because this is all the complications of corticosteroids. Importantly they are not always related to the dose that you are taking. Some people can take really big doses of almost any of these drugs and have virtually no side effects. Others will take just a little bit. The type you might take if you had poison ivy or something and have a whole host of side effects. I've made two columns. In red I've put some of the very predictable things in the common column. Myopathy, that means trouble with muscles. I will show another side in a moment but very important to note that people who are taking steroids in bigger doses, will develop weakness in the muscles. It's often painless and it sneaks up on you. One day you have trouble getting out of a chair, off the toilet or out of a car in the next day there's trouble going upstairs and it seems to come up very quickly but it's actually been building up and since many people need to take it for a couple of weeks or months, one has to be very careful with that. Almost everyone will have some degree of appetite stimulation. And there's a tendency to retain fluid and salt. Some physicians will say be careful of the amount of salt that you take. Behavioral changes are extremely important. I'm going to come back to that in a moment. Most of us would feel a little nonspecifically revved up on steroids but for some people this becomes an active problem bordering really on cognitive changes and psychosis. So let's keep that in mind. We will come back to it. We try to take it early in the day so people get some good sleep.

Diabetes, we make many people glucose intolerant. Their blood sugars go up. If they never had diabetes before but now they may actually need insulin. That's a very important side effects. Many people will notice a little bit of tremor and some visual blurring. Some people will complain that there is instead of an appetite stimulating effect there is reduced taste and smell and there's nothing that taste very good. A very important thing for your physicians to keep in mind as you go through this is that osteoporosis in people who've been on this for more than a couple of months is accelerated. Taking calcium and vitamin D is very important but despite that some people will actually have a compression fracture. The symptoms of that might mean that they had sudden back pain in a very specific place and there are some good procedures and West -- which a substance is injected into the bone that allows the bone to re-expand and gets rid of the pain nicely. Hopefully none of you will experience any of that but it's something to be aware of when you need to be on steroids. In the right-hand column, these are somewhat less common symptoms. Psychosis as I mentioned as part of the spectrum of behavioral changes and some people will have hallucinations with it. Hopefully that's not very common. Some people will have very hard to treat hiccups and frankly I don't know what causes that but if you find yourself uncontrollably hiccuping, take a look at your medication list and if dexamethasone is on it is probably the culprit. Dementia is a scary word and some people have looked at MRI scans of people who have needed to be on steroids for a long period of time I noticed that certain areas of the brain that are helpful for memory might be a little bit smaller. This is really not comment and should not be a reason not to take the right amount of steroids that you need to control the symptoms.



Seizures are also very uncommon, it's really more likely that you will have seizures in tapering off the steroids. They don't cause seizures but changes in doses might bring them on. The next big word is epidural like Tumor ptosis meaning fact that gets deposited outside the spinal cord and can sometimes cause pressure on the spinal cord. These are things that happen in people who been on steroids for a long period of time. I mentioned the bone collapsing causing pain. This can happen in the hips as well and it can happen while after the person has been off the steroids. People will develop pain in the groin or may be pain in the hip area going into the upper thigh and it hurts more when used and on it. That is something to be big aware of. Allergy suppression is a funny thing. You might be very allergic to the seizure medicine that your doctor chooses but you're also taking [Indiscernible] because it's one of the best allergy medicines out there and then you go home and taper off the [Indiscernible] and all of a sudden you have a terrible rash. It turns out you are allergic to one of the medicines but it was just suppressed. The next two words RPLS/PRES, are symptoms that really are something a radiologist with diagnose. Sometimes it is posterior reversible encephalopathy syndrome in 20 years ago this year a radiologist and some medical folks noticed that certain changes on MRI scans started to happen when people were taking a lot of different drugs.

When the blood pressure went up when they had changes in medication and these can mimic some of the effects of the swelling of the tumor but will go away when you change the medicine. Gastric irritation, stomach upset -- we always used to put people on antacids whenever they got put on any dose of Decadron or something like it. It turns out not really necessary unless you have previously had bleeding or unless you had a bleeding ulcer or unless you are having to take continuously very big doses of dexamethasone or one of the other steroids. If you are on these medicines for them untreated time, there are a couple of really important infections to worry about. One is shingles or herpes zoster which is shown here in the chest area. There's a bunch of red areas that come out in a line that goes around the thorax. For a week or so before him there can be pain in that area. You look in that area and don't see anything and then after a week or so these rashes come out. They can be treated very effectively but the worry is that people may have pain even after the rash goes away. So anyone in his 50s or older should think about getting the shingles vaccine and this is before you get put on any chemotherapy or steroids. Pneumocystis pneumonia is another complication and your doctor will ask about cost or any change in breathing. PML is progressive multifocal leukoencephalopathy. It's gotten a lot of press of late because people who been taking multiple sclerosis medicines have developed this infection that previously was seen only in people with AIDS infections. It's an uncommon and usually it happens only after people have been on the drug for months. Preventing is the best thing and so if people need to be on steroids for a long period of time bactrim which is a drug that those of you who are so full allergic cannot take or atovaquone as an alternative or sulfa allergic people is a really good one and dependents I will get back to on the second.

Let's go back to the behavioral changes. Agitation. Is this person also taking a seizure medicine called levetiracetam. This is a good drug. It's easy to take and can be given by mouth or intravenously. It takes care of seizures but it can also produce agitation. Take the drug earliest in the day and before you change anything check with your physician to make sure that he or she is on board with that. I mentioned some of the other changes. The muscle weakness happens in one to 10 to 1 out of five patients. It's much more in the legs than the arms. It usually occurs after a couple of weeks on the dexamethasone.



Most people between the ninth and 12th weeks. Breathing is not usually involved but it can be so if a person is just getting weaker and weaker, go back to the doctor. and say does he really need to be on this medicine. Can we change this so that he is on effectively last? There is a lower risk if you are also taking certain seizure medicines which we are about to get to and if you're getting into trouble with his weakness, changing from methylprednisolone to dexamethasone may be important. The very most important thing is to stay as physically active as possible. That involved with physical therapy. Stay as active as you feel you really can be. Here's an important one. This is actually the most dangerous complication of steroids and we call it adrenal insufficiency. Simply defined it is when the body still needs steroids because it's been getting them through pills and the tumor doesn't need them anymore so the physician has have you take -- taper off your steroids and denigrates early but a few people -- maybe one in 50 doesn't get his own pituitary and hypothalamic areas of the brain back making his own hormones again and he is at risk for dropping his blood pressure if he gets an infection or has to have another operation. The problem is the symptoms are very nonspecific. There can be just a feeling lousy, cold, sleepy, tired. Nothing that really clues you in until the doctor looks back and says we just stopped the steroids I'm going to check to see whether you are making enough of your own body steroids now or maybe I give you a little bit more and it's one of the best things that can happen because you're going to feel great within two days of starting the steroids in a low dose.

One other thing that steroids do and I don't know if anyone listening has primary CNS lymphoma, glioblastoma the most common adult malignant brain tumor doesn't do this but primary central nervous system lymphoma can disappear when the patient is on steroids. If you have the person on the left comment. The doctor looks at the scan and says look at this white area here. I need to do something and he gives steroids in a week later it's almost all gone. There's just this little here that takes up the dive that suggests there once was a tumor there. That's great except we don't know what the diagnosis is. We still need a biopsy and we need to take away the steroids before getting a diagnosis. We taking care of the swelling and most of you who've had an operation will find yourself on seizure medicines as well. I know this because our colleagues in neurosurgery will almost always put people on seizure medicine. Does everybody need to be on a seizure medicine? Here are the data. It depends on the location and what kind of tumor the person has. Up to 70% of brain tumors may have a seizure at some time in the course of their illness.

Most occur before any treatment has been given and once the steroids I started and the operation is over the risk of seizures becomes less. However, about one third of people will have recurring seizures which we also call epilepsy. Location counts, tumors that are out on the surface here -- this is a person who has melanoma. There are multiple brain tumor areas here and when they are on the surface they are particularly likely to generate a seizure. If they are deeper down in here they are much less likely to. People who have low grade glioma tumors like astrocytomas or [Indiscernible] are the group most likely to have recurring seizures. Glioblastoma's and [Indiscernible] are really somewhat less common. Meningiomas, a relatively slow-growing tumor have a pretty high risk because a lot of them are out here on the surface of the brain. Lymphoma is low and metastatic disease, disease that has spread from the lung is less likely to have a seizure problem. Should everybody with a brain tumor take seizure medicines just because he's had an operation? Our national -- the American Academy of Neurology says no. When they looked at large numbers of people taking Dilantin, -- or Depakote, half of them had low levels and it really didn't make a difference.



They had a whole host of problems including cognitive problems, metabolic problems, liver, low blood count, rash, weakening of the muscles, weight gain and mood change and one in four had to change or discontinue these antiepileptic drugs because of one of those problems. Specifically people with brain tumors can get into some confusion only -- confusion all syndromes. One seizure medicine can produce swelling right here that you see in this MRI scan. That can be confused with a tumor. I mentioned behavioral changes on levetiracetam. Weight gain on almost all of them. Cognitive issues and all of them except the most urgent which is a great drug but takes a long time to load. Enzyme induction, that means speeding up the metabolism of certain other drugs so that it actually interferes with the effectiveness of many other medicines and some can be part medicines or blood thinners or chemotherapy agents. Importantly the drug that is most commonly used as initial therapy in primary brain tumors, temozolomide, is not affected by seizure medicine. That is not a consideration here. This is what happens when he really did have analogy and were on dexamethasone. The steroid was taken away and this person was on [Indiscernible] and developed a theory -- rash with the skin peeling off. Interactions of anticonvulsants -- all of the drugs over here will speed up the elimination of many other drugs that I just mentioned.

On the right-hand column are the non-enzyme-inducing drugs. That means drugs that are not going to interact as much with other medicines. The three elves, the Xhosa Mike, the most urgent and let the term assets and. They can be given intravenously and that's attractive if someone is had an operation or is unable to take oral medicines. Some drugs will actually increase the toxicity of different types of chemotherapy agents by prolonging their time in the blood. It's a complicated situation and people have done many meta-analyses it is looking at a whole bunch of different studies and having them all up and trying to decide whether no result -- net result is good for the problem are not. There was a period when people were putting a lot of patients on valproate or Depakote because there were some studies that suggested that it improved survival in glioblastoma patients. The most recent information is that it does not. It's not a bad thing to be on but there is no justification for the choice of valproate or levetiracetam for any reason other than seizure control. There really isn't a drug of choice that can be considered part of the chemotherapy regimen. You have the operation and you go home. In the hospital maybe you had those unpleasant boots on. Or maybe somebody's been giving you injections in the abdomen of the Heparin like compound and that's annoying but it's life-saving in many situations.

Brain tumors produce a hypercoagulable state. It means that it's more likely that blood can clot and when someone has been weak in one leg and is confined to bed or not up very much, they can get a thrombosis and that calf which by itself is painful but worse the blood clot can travel up the leg and into the lungs and that can be fatal. Cancer treated venous thromboembolism is better treated with hyper noise and those are the things that we inject in the abdomen while you are in the hospital but probably not continued when you are at home. If someone has a blood clot or a clot that goes to the lungs the choice is between these Heparin noise that are injected and warfarin sometimes that's actually an insurance-based things. Not all insurance plans will cover enoxaparin and related drugs. There are physical measures that can be very helpful. Those in knowing pressure stockings and pneumatic boots that inflate and again the Heparin injections. Some of you may have a heart rhythm problem like atrial fibrillation have heard about [Indiscernible].



These are wonderful new oral agents that supplant warfarin for people who have a tendency to have blood clots and maybe strokes but there is very limited information in the setting of cancer and in particular in this setting. Probably your doctors are not choosing that. It is very common. There are tissue factor in Khalil tissues. One in every five or six patients may have trouble with this. The risk factors are age, the older the person the more likely it is. Blood types a and B are a little bit more at risk and this is a person who has a swollen leg on the side. Is a clear difference between the two legs it may or may not be painful. It may cause fever. Meningiomas, slow-growing tumors that are curable with surgery have a one in 20 risk after an operation. Our surgical colleagues are very careful about this. They've done some wonderful studies. You might say if I have a brain tumor I've just had an operation. Somebody gives me a blood thinner, our time more likely to have a bleeding episode in the brain? It was a rather small increase and there was a trend towards less clotting. This study actually had to be ended early and we do not usually continue prophylaxis, meaning prevention, of blood clots outside the hospital. If the person is actually had a blood clot, then you definitely need to continue therapy. Probably lifelong because the risks remain. This is just an algorithm that shows you what your doctor might be thinking. You worry that there might be a problem. It hurts a little bit.

A doppler ultrasound will be done and probably a computerized tomography scan of the chest and a blood test for something called D-dimer. If the operation is happened within a week or if it's a very high risk tumor type or if there is blood on the scans, then you can tap the blood thinner and you might get what's called an inferior vena cava filter. If there isn't a reason not to take blood thinners, then you can have all these different options here and again we tend to go with the low molecular weight hyper noise like dalteparin. If the insurance covers it it's a good thing. Let's move on to fatigue and mood changes. I mentioned at the beginning that these I believe are really underrecognized and certainly undertreated. During radiation therapy, people begin to feel more and more tired and we actually don't really know why but when someone says can I go back to work right in the middle of radiation therapy, I always caution them that they may feel better at the beginning of the therapy than he does at the end of may find that he needs more and more sleep.

The inhibitors like VEGF, inexplicably greatly worsen fatigue and it may be the most bitter complaint that someone who's taking this otherwise excellent drug may mention. What can you do? Enforce regular sleep habits and take those caricatures early in the day when you also -- don't exercise right before going to bed because that make it more difficult. There are some medicines that are available. Methylphenidate which is really speed, it is used with children with attention deficit disorder.

In adults it has an alerting to fact -- affect. To some extent it's physical. Modafinil also known as Provigil and are modafinil are other drugs that are used as well. Before you start adding those things take a list -- look at your medication list. The careful of the most -- that mostly partisans called -- cause cognitive effects. They can interact with chemotherapy and steroids and the list gets so long when you wake up in the morning feeling hung over. Less is more. Get rid of any sedating medicines first and then turn to your doctor and say is there a role for methylphenidate, modafinil -- there have been trials and there was a modest benefit in certain areas of fatigue but they were very modest.



Sometimes it's hard to get these covered by insurance. It may be worth a try if that seems to be a limiting factor. Is it mood? One of the symptoms of depression can be feeling tired. Change the antiepileptic drug from a drug that might be causing behavioral changes and now the time is to change to lamotrigine. There's no reason not to take antidepressants. I think some people are afraid of that. You shouldn't be afraid of it. You should be able to take any antidepressant with the exception of one bupropion which can increase seizure with -- risk. The direct effect of tumor are extremely important.

Even before the operation you may have noticed that it's hard to understand everything and that family members may have noticed that it's tough to understand for the patient to understand all the implications in decisions that need to be made right away. Radiation therapy can actually worsen this. Some chemotherapy can worsen this. Some people will get detailed neuropsych -- neuropsychological testing. Everybody needs someone who can help with the decision-making from the beginning and get enough sleep, treated depression and make sure that you have a cortisol that's adequate. Maybe your thyroid is down and check your B12. Some physicians, radiation oncologists have begun to use this drug which is an Alzheimer drug for people who are getting treatment with radiation therapy. There's a couple small studies that show a slight improvement in delayed recall loss in treated patients. There is only mild benefit of this very well-known Alzheimer medicine as well -- it's also known as Aricept. Putting it all together.

Most people with glioblastoma have been treated with this regimen. They get temozolomide during radiation therapy and up to six or more cycles on a monthly basis. What should you be thinking about? What should your doctor be thinking about besides the chemotherapy and radiation? It's all the symptoms we just been talking about and there are many opportunities for you and your physicians to avoid problems. No pneumocystis pneumonia, get a PPD test before you start, don't take seizure medicines unless seizures occur and then choose them carefully. Make sure you get a flu and Pneumovax vaccine. We're aware of the symptoms of blood clots and the signs of those. Take the vitamin D supplements, watch out for bone fractures many people will screen for hepatitis before they start the medication and so importantly treat mood and fatigue. Now we're going to turn to a couple of outcomes after the active phase of the treatment to finish here. Right beside us is a specific group of team members that are pretty new to the neurology world and I'm sorry to say it's taken us a lot longer than in some other fields like the medical oncology world to bring this model. It used to be that people would get disease direct therapies and then when they were no longer working, there would be a team that came in for just symptom management for palliative care it might help with decisions about end-of-life care.

Palliative care at that point was equated with hospice. I want to say as pronounceable as I possibly can, palliative care is not hospice. It is specific medical care for people with serious illnesses like the illnesses we've been talking about. There is a new model and that is palliative care from the very beginning. Attention to just the sort of symptoms that we've been describing. Increasingly neurologists are getting specific treatment -- training and palliative care. We now have a fellowship that emphasizes aspects of neurologic palliative care and what do they do? What do they do that your doctor doesn't do? They are sensitive to the things that are likely to happen along the way. So for example, constipation.



People are not up a lot and they might be taking some pain medicines. Bowel motility -- compounding suppository applications. The palliative care team members know where to get these so the person can't take medicines by mouth maybe he can get the same dose by rectum or a suppository. Nausea can be treated. There are clear guidelines on how to add nausea medicines and sometimes delicately treating the steroid dose will help very much. Finally this team is involved in decisions about end-of-life choices and they are teaching all of us how to talk to people who are in these difficult situations.

This next slide as courtesy of a colleague who has been a pioneer in looking at neural oncologic palliative care. This is a chart from one of his writings. The symptoms that we deal with our different from general cancer patients in the last few weeks of life. We have this profound fatigue and weight loss and Anorexia -- appetite loss in most general cancer patients. There may be more pain and thankfully there is not that much pain and primary brain tumors but making up for that are all of these things that make life much more difficult and make it more difficult for the patient to communicate with his loved ones. Drowsiness, poor communication, speech difficulties, focal deficits -- seizures we hope are not going to be a big problem. We lean heavily on steroids and on continuing see some applicants whether by mouth or effect -- by rectum as long as we can. It's time to talk about that with your doctor if you haven't. Pause in the work of the visit and say I wanted to do something else I'd like to put this on our agenda today. And we take a moment to talk about what would happen if I get a lot sicker. I want to see the big picture. I want some advice about advanced directives while I help make those decisions for myself.

Advanced directives are sometimes called living wills. If it's getting worse I want to tell you what's important to me and I want you to help me get there and I want you to talk to this person. Designate someone who will make you -- help you make medical decisions if you are too sick to make them. Expect emotion. Is going to be hard to talk about those things and it's going to be very scary. It's such an important conversation that you really should have it early on in your relationship with your neural oncology team. However, therapies are getting better. Our patients are living longer and every year we see some new things that happened after people have lived a long time from radiation and chemotherapy. This person has a second tumor, a meningioma that grew then years later. This person will need a shot because the ventricles are getting bigger after radiation therapy. This person has episodes that are not seizures that come and go and they are called the alert syndrome. They shouldn't be treated with seizure medicine. He's going to be okay. This person they have progressive cognitive damage from the radiation therapy.

All of those things we are saying years out from successful therapy and US patients and family members should be aware of those. Here's a checklist. It's a big checklist. And bigger fonts over here are the things that happen from seizure medicines, from chemotherapy and corticosteroids. The osteoporosis we talked about, the PRES syndrome, cataracts, infections, second tumors, weight gain, diabetes. And then the problems related to radiation therapy. Just hold onto this slide and handed your doctor and say are you paying attention to all of these things that happen in a great many of our patients who have lived a very long time? So treatment is over and now we need to be vigilant. Hold onto that checklist. How can we minimize the things that anyone person experiences? Stay active. Cardiovascular and bone health are incredibly important. Blood pressure should be treated just as it always was. So should cholesterol. Vitamin D should be checked. Exercise helps.



Minimize medications except treat anxiety and depression. Please don't be afraid to describe symptoms. Even if you don't think they are related. There are some that are hiccups but it might be. If there's pain in the groin, I have a brain tumor. Maybe it's one of those fractures. Tell the person that's taking care of you everything you can think of. Describe your symptoms and ask for help. I have not covered in this short presentation any investigational studies or clinical trials.

I intentionally did not do that because I think that is a role in your particular situation for you to discuss with your team. Here are some resources. Our sponsor today the American Brain Tumor Association's website is a wealth of information. The American Cancer Society and these are some university-based websites. It has resources both for caregivers and patients and for their positions with links to the Mac -- National Cancer Institute and other organizations that sponsor clinical trials. The same is true of Massachusetts General Hospital as well as John Hopkins site and they are -- there are many others. I've given a quick tour of the things that can happen. We hope that most of them don't but the best treatment is prevention.

Thank you for listening to this presentation. I want to emphasize the second bullet point here. This is really information for you to consider to be an engaged and informed patient and family. It is not then as specific medical advice to anyone about diagnosis or treatment. We will address some questions in a moment. It's certainly not a substitution for your own physician who knows you best in these decisions need to be made with that person or those people. There are no sponsors for this other than the American Brain Tumor Association. And thank you very much for listening. I look forward to helping with some of your actions.

>> Thank you so much. Dr. Pruitt will now take questions. If you have a question you would like to ask please type and submit it using the question box in the webinar control panel on the right-hand side of your screen. Dr. Pruitt, a couple people asked about necrosis radiation. Could you speak a little bit about what kind of complications necrosis can cause and how?

>> Radiation necrosis can take a couple of forms. It's often a differential diagnostic consideration in people who are several months out from treatment. On the MRI scan it can look like another mass and can cause the same symptoms that the tumor initially did. There are several advanced imaging studies that we utilize to try to decide whether this is really a recurring tumor or whether it's radiation necrosis. Some of the words you may have heard are a pet scan, or MR spectroscopy or perfusion studies. Once all of those are done, sometimes a biopsy is actually needed or sometimes one needs to take out the mass because it's causing just as much trouble as the original tumor. There are some new treatments for this. Bevacizumab, during the presentation I mentioned this, is the drug that's developing a track record in the treatment of radiation necrosis. Most likely your doctors will have put you back on steroids to reduce swelling because this can produce edema as well. So that would be a first-line treatment, by the another one and some might have heard about a die in a hyperbaric chamber. The mass form is one form of radiation necrosis and the other form of radiation necrosis is what I showed you -- can they still see my screen?

>> Yes.



>> In this slide this is a form of radiation injury that isn't a big mass. It's just all of this white change here. That has the effect of basically multiple little strokes. It causes trouble on both sides of the brain. More on the side where the tumor originally was in the clinical symptom of that would be cognitive changes particularly short-term memory, attention, would problems and getting things done. Trying to prevent that with memantine is really in its infancy and trying to treat the mass form with bevacizumab is the subject of several early but pretty encouraging studies. Something to ask your team about.

>> Thank you. A couple people asked about managing seizures may be with complementary or alternative medicines. A couple that were referenced were using marijuana and Omega threes. Could you maybe speak to some of that in general?

>> Sure. That's a really good set of questions and as you know it's been in the news of late. Let me be clear that the use of marijuana while beginning to be endorsed by several national organizations, for the treatment of certain kinds of seizures, has not been specifically looked at for the seizures in people with brain tumors. There hasn't been good controlled studies where one group gets it and another gets a placebo. It hasn't been looked at for the group of concerned today. The one thing that I would say and I say this to my patients both with tumors and with multiple sclerosis, they are cognitively vulnerable. Because of the treatment and because of the other drugs they are on and the problem itself, so what does that mean? It means if you smoke or take some form of combustible or other form of marijuana, the altered sensation or cognition that someone who doesn't have all those problems might experience is going to be so much worse than a person with a brain tumor. One has to be careful about that. I think that's a long-winded answer for saying it can be dangerous and the original looking at cognitive or at seizure control is for a totally different type of seizures. Those are genetic in children. As far as the Omak and other alternative vitamins -- there's nothing wrong with that.

All I ask is that I want to know what else people are doing. Alternatives should not be there hasn't been a good study but often that is what it means. It means somebody says it might work so let's added on. That is far less dangerous or worry some than having someone smoke marijuana or take it in some fashion. The answer is not on marijuana and as far as I can tell most of the supplements that people are thinking about and basically just good vitamin usage is fine.

>> Thank you. You had a wonderful slide early on your presentation about the care team and all the various people who were involved in that. Is there a primary person or primary point of contact that you would recommend people report symptoms are side effects to?

>> I think as I said that person may vary from one time to the next. At the beginning it could be the surgeon and that surgeon's nurse practitioner or nurse. It could be the radiation oncologist during the six weeks after the treatment. It's often the medical oncologist or the neurologist/neuro oncologist who maintains that control position. Long after the treatment it may be the original neurologist or primary care physician but please be clear on that.



Even today I've had that situation where there are six doctors and the patient was a clear to whom he should report these things. Identify -- we should identify at each stage I'm the person that you need to talk to. Don't be afraid to call to people, they will tell you which one it really should be. You have to be your own advocate and say I need to get through and figure out who's in charge here.

>> Great. We have time for one last question. Somebody asked if the neurological effects or complications manifest differently in pediatric brain tumors as opposed to adult?

>> We didn't have time to address that. I don't see very many children but I can tell you what is known -- first of all the distribution of tumors is different in children compared to adults. Instead of having tumors in the locations like the frontal lobe or the temporal lobe -- some of that I showed you. More than half of children have tumors in what's called the posterior fossa or the back lower part of the brain. The brain stem and cerebellum. The types of cells are different as well. Medulloblastoma's, brain stem astrocytomas are different types of tumors and they are different locations so you might imagine that they would cause different problems.

A child might be more likely to have a structured -- obstruction and hydrocephalus and need a shot. A child might be more likely to have double vision or dizziness. A child might be more likely to have somnolence or sleepiness during the early weeks of radiation therapy than an adult might. We always try to limit the fields of radiation therapy for a child because as you saw towards the end of the presentation, there really are a host of complications that occur late after radiation therapy. It's one thing if you are 75 but if you are seven you have a whole lifetime to develop complications from radiation therapy. We try to minimize radiation to devise clever chemotherapy and more appropriate surgery. I think the straightforward answer is they are quite different in part because the cells and locations are different.

>> Thank you. That is all the time we have for today. Thank you all for joining us and thanks once again to Dr. Pruitt for her wonderful webinar presentation. To help connect patients and caregivers with information and resources that can help support them in the brain tumor journey, call the ABT a Caroline which is staffed by caring professionals. Let's pause for a moment to conclude our webinar recording. We invite you all to continue to check back on our website [www.abta.org](http://www.abta.org) for on-demand webinars that feature experts addressing a range of topics from treatment options in tumor types to diet and coping with diagnosis.

Our next webinar will be in made during Brain Tumor Awareness Month on patient advocacy, holistic wellness and living your best life. This will be on Wednesday, May 11 from 1 PM to 2 PM central time. Please check back for more information on this and other webby -- upcoming webinars. Also please join us for partners and treatment and care, the American Brain Tumor Association's one-day educational and networking meeting held in communities across the United States patients, families and caregivers are invited to participate free of charge together the most up-to-date brain tumor information from leading experts, receive guidance on managing symptoms and to network with each other. To register or for more information please visit [www.braintumormeetings.org](http://www.braintumormeetings.org). This concludes our webinar and please complete the evaluation survey by email. You may now disconnect. [Event Concluded]

