Event Started: 2/12/2014

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>> The webinar will begin shortly. Please remain on the line.

>> Welcome, everyone in thank you for joining the webinar. The webinar today will address Causes and Risk Factors of Brain Tumors presented by Jill Barnholtz-Sloan, PhD. All lines are muted. If you have a question you would like to ask, these type and submit it using the question box in the webinar control panel on the right-hand side. Dr. Sloan will answer as many questions possible. Tomorrow you will receive an invitation to the a survey. Take a few minutes to share your comments about today's webinar and answer our questions. Your feedback is important to help us plan future webinars. We are still planning for the rest of 2014. We would love to hear what you have to say.

>> The webinar today is being recorded. It will post to the ABTA website under the any time learning section. If you have someone that could not be on the phone with you or a family member or friend that would be interested in the presentation, you can direct them to the Any time Learning section.

>> We will pause for a moment to begin the webinar recording.

>> The ABTA is pleased to welcome you back to the webinar series. The webinar today will discuss Causes and Risk Factors of Brain Tumors. My name is Jillann Demes. I am delighted to introduce the speaker today, Jill Barnholtz-Sloan, PhD.

>> She is an associate professor at case copperheads of cancer center at case Western reserve school of medicine. She is a multidisciplinary trained in biostatistics, epidemiology, and genetics. Her research focuses on gaining a better understanding of what causes brain tumors and how genetic changes in the tumors are related to clinical outcomes. Thank you so much for joining us. You may now begin your presentation.

>> Thank you and hello and thank you for joining us today. I want to thank the ABTA for inviting me to come and speak today about For those of us in the field, we would call epidemiology or a brain tumor epidemiology. We will talk about this term.

>> On slide you can see the e-mail address. It is listed there. If for some reason we cannot get to your question today, lease feel free to e-mail me and I will do my best to answer as promptly as possible.

>> What is epidemiology? It is simply the study of patterns of disease and populations. What we are looking at as we look at the proportion of the new individuals diagnosed with a certain the disease and we are looking at survival. We are looking at factors that cause the disease and we are looking at patterns of treatment. We are also looking at a variety of other clinical outcomes besides survival. A lot of these studies you may be interested in looking at -- usually there is an epidemiologist involved in at the risk factors or survival.

>> I want to show you a few slides that show the national statistics for the United States based on the central brain tumor Registry of the United States data -- this data is special because it is gathered from almost all of the states across the US -- 49 station -- published each year and freely available for you to download.

>> I am pleased to say that we have recently -- myself and my team at Case Western has taken over have the scientific group for that. We have enjoyed our experience so far and we hope that these statistics provided in the report -- I am showing you a smattering here. I hope these are useful and helpful for you.

>> Brain tumors come in two general groupings -- the malignant brain tumors and nonmalignant brain tumors. The malignant tumors have been collected in the United States since the early 70s at the state level. Into the early 80s when most states came on board. The nonmalignant tumors started to be collected in the mid-2000. This shows you that for children in general they get a much higher proportion of malignant brain tumors then nonmalignant while in adults they I have a much higher proportion of nonmalignant compared to malignant.

>> When we talk about different types of brain tumors -- malignant versus nonmalignant -- what does that mean? The most common type of nonmalignant brain tumor in adults is a meningioma. Followed by tumors of the pituitary.

>> The most common type of malignant brain tumor in adults is a glioblastoma.

>> For children the types of tumors that they get are different. The most common type of malignant brain tumor that they get is a medulloblastoma. They also get a high proportion of something called a pilocytic astrocytoma which is sometimes classified as malignant and sometimes as nonmalignant.

>> In terms of the proportion of newly diagnosed cases in the United States, that is what incident is.

>> The incidence rate is the proportion of newly diagnosed cases. This craft shows you how, based on the different types of tumors that we talked about -- if you just focus on the light blue line with the squares, that shows the proportion of newly diagnosed cases changes as someone gets older. You can see that meningiomas are relatively uncommon in individuals less than 45 years of age and more common as you get older. That is true for not just brain tumors but for most cancers. Most cancers because more common as one gets older.

>> There are a lot of reasons for this. It is more of a cancer biology focused talk, but if you have questions I would be happy to answer this off-line or chat with you.

>> This slide shows some of the same data -- the incidence of proportion of newly diagnosed cases by age. This shows you the most common types of childhood brain tumors. Again you can see that the blue line -- the pilocytic astrocytoma and the green line -- Angelo blastoma -- medulloblastoma are the two most common in children.

>> It regardless of age groups.

>> The red line shows you what we would call all other gliomas -- it is a mishmash of all the different types of tumors that one could get. That is why I am more focused on the pilocytic astrocytoma on the blue line and the medulloblastoma -- the green line.

>> Again this shows you the same information in a different way. It is in a tabular form versus a figure. This shows the most common type of brain tumor and the second most type of brain tumor by age group. Again, the embryonal tumors for children ages 0 to 4 includes medulloblastoma is.

>> You can see that for adults again it is meningiomas and glioblastoma is the most common and for children it is the embryonal tumors and medulloblastoma or pilocytic astrocytoma.

>> What causes brain tumors? I imagine this is a question -- I asked myself as a researcher and I can only imagine that many of you have asked yourself I wish that I could tell you that I have an

answer for you. In terms of risk factors that explain a large amount of brain tumors. Unfortunately, I don't have the answer for you. I wish I did.

>> It is not for a lack of trying. I have a list of all the different things that we have studied over the last few decades trying to gain a better understanding of what causes brain termers with the hope that we could prevent it.

>> In terms of the main risk factors that we believe to be true -- when I say "we", there is a group of epidemiologist that have joined together in an organization called the brain tumor epidemiology Consortium. When we get all of us together -- all the experts in the room, these are the risk factors we believe to be true. Ionizing radiation to the header next does cause an increase in brain tumor risk. And if you have allergies or asthma, this causes a decrease in your risk for brain tumors.

>> In terms of unproven causes of brain tumors, maybe some of the things on this list are things that you have thought about or are worried about. There is a long list of things on the list. As you can see, these are all factors that have been studied in multiple studies where the results have been inconclusive. The results have not shown them to be risk factors for brain tumors. I will go through some of these a little more specifically. Especially the ones that have gained a little more attention in the newspapers in the scientific literature in recent years.

>> I will talk about ionizing radiation to the header next. This is a definitive risk factor for brain tumors. This is to explain to you where this information came from and why we leave this to be true. There are two very large studies that have provided us very good evidence that ionizing radiation is a risk factor for brain tumors. The first most conclusive study is the study of a group of individuals who were immigrating to Israel in the 1950s. They came in family groups. At the time a lot of them had something called tinea This, a fancy term for ringworm of the scalp. It is highly contagious. At the time the thought in terms of the standard treatment for tinea It is was to radiate someone had. Now they realized that this is not the right treatment. At the time that was what they were doing. What happened was that many of these children and adults were radiated. They followed these individuals for more than 40 years. What they found is that there is a fourfold increased risk of meningioma in the individuals that received radiation for Tinea capitis and about a twofold increased risk for any type of glioma.

>> Another city -- study were you would think individuals would have a large exposure to ionizing radiation would be the atomic bonds study.

>> They followed almost 80,000 atomic bomb survivors over time. They followed them to see what sort of diseases they got. They don't seem to get, thankfully, brain tumors. A lot of them, interestingly enough, get thyroid tumors. There is a high rate in that population.

>> In addition, to go along with this, why we believe ionizing radiation is a risk factor for brain tumors has to do with these studies of children with cancer. As a group, these are generally called childhood cancer survivors studies. There is a large study in the United States -- a large study in Europe and Great Britain. What these studies show is that for children who received ionizing radiation of some sort that they have a increased risk of glioma. They have also looked at CAT scans and how many CT scans the children to have had and as they get to be adults whether are not it increases their risk of glioma. There is evidence that the amount of CT scans they have had is associated with -- again -- this is radiation -- associated with the risk of cancer. This includes brain tumors.

>> What about dental x-rays and brain tumor risk? There are a studies that some of you may be familiar with. This came out about 1.5 years ago. Having dental x-rays on a yearly basis or later was associated with an increased risk of meningioma. It is important to keep in mind that although these

studies do show some evidence of association between dental x-rays and brain tumor risk, these studies are asking people to remember back to when they were children as to how many dental x-rays they had and what type of dental x-ray they had. I think many times we try our very best to remember things that happened a long time ago but maybe we don't remember it as accurately as we would like.

>> You have to keep that in mind when you look at some of this evidence. This is all based on something called recall. So, it is dependent on how accurate the recall was -- each person that was asked these questions.

>> What about allergies and brain tumor risk? This is interesting because we have now been able to show over and over that if you have allergies or some type of allergic condition like eczema or psoriasis or asthma, it decreases the risk of glioma. Some of the reasons are the belief -- the biological hypothesis behind this is that when you have allergies your body is on constant surveillance. Because of the allergic reaction. It has been in the heightened awareness no. It is possible that because of this that it also can get rid of other things such as possibly the beginnings of a cancer cell.

>> What about cell phones? This has gained the most attention over time. In terms of the potential association with brain tumors. I absolutely understand why individuals would think that cell phones could potentially be related to brain tumors because most of us hold the cell phone right next to our head. Most of us, when we hold the cell phone holder predominately with one hand on one side of the head. I don't know about you, but I am right-handed. I will typically hold my cell phone with my left hand to my left side of my head because I want to be able to use my right hand. So a lot of these studies have looked at handedness and they have asked questions about whether you are right-handed or left-handed and which side -- which side of your head you will the phone two. Obviously if you are going to get the exposure it is based on where the phone is and on what side of your head it is on.

>> These data are the most updated I could find. This shows the number of cell phone prescriptions for per 100 people. The blue line is in the developed countries -- this would include the United States -- in 2013 there were hundred and 28 cell phone subscriptions for every 100 people. This means that most of us have more than one cell down to.

>> How to be think about investigating whether or not cell phones could be related to brain tumor risk? One of the ways that we think about this -- if people are starting to use cell phones at an increased rate -- the rate of cell phone use is increasing rapidly. If cell phones are related to brain tumor risk, then we should also seek the proportion of newly diagnosed brain tumors increasing. There is no clear evidence of that. I will send it again. Even though use of cell phones is increasing rapidly, there is no rapid increase in the proportion of brain tumors diagnosed.

>> So, if cell phones were truly a risk factor for brain tumors, we would expect that brain tumors would be increasing with increasing use of cell phones. There have been multiple studies in both the US and all across Western Europe that have looked at this relationship between cell phone use and incidence of brain tumors. No one has found the Association to be true.

>> There have been multiple studies which we call case patrolled studies which is a standard design that an epidemiologist was used to investigate a risk factor. A case would be defined as someone who has a disease of interest. The control is defined as somebody who does not have the disease of interest. Then you ask the case and control questions about different risk factors and you compare the answers. That is how you calculate the risk rates.

>> All of the studies listed on the slide that have looked at glioma, risk of glioma, meningioma, and vestibular schwannoma or an acoustic neuroma -- these basically show over and over again that there is no increased risk of these types of tumors associated with cell phone use.

>> The one caveat that I can say is that a lot of these studies have not been able to look at -- they are not old enough -- long-term cell phone use. So in most of these studies the definition of long-term cell phone use is 10 years or less. What we don't understand is how long it actually takes a cancer to develop. Does it take 10 years or 20 years or 30 years? We don't have a good understanding of that. Therefore, maybe 10 years is just not enough time to potentially see an association. But right now there have been many studies done in the US and throughout Europe. Large studies that have included arch numbers of brain tumor patients and controls -- none of these studies have shown definitively that there is an association between cell phones and glioma. Or cell phones and meningioma and cell phones and vestibular schwannoma.

>> What about inheritance of brain tumors? One of the forms of cancer that you hear people talk about the most in terms of inheritance is breast and ovarian cancer. That is because we know what mutations -- the error in a specific gene can actually increase your risk for getting the cancers. This is actually an inherited mutation. You can inherit the mutation from mom or dad. In the case of brain tumors, we have done multiple different studies to better understand this question as to whether or not brain tumors are actually inherited. Can you inherit the risk of a brain tumor from your mom or dad? What I should say for all cancers combined -- brain tumors included, only about 5% of all of the cancers are actually inherited from mom or dad. I will say that again. Inhibiting something from mom or dad that can cause you to get cancer only happens about 5% of the time.

>> We have done multiple different types of studies that have tried to answer the question about inheritance. There are very rare cases where someone does have an inherited mutation. For neurofibromas the doses -- it is an inherited mutation. There is a cluster of different things that can happen to someone that has that mutation. Included in that cluster of things is the potential risk for development of some specific types of brain tumors. There are other inherited syndromes that are very rare where you would also inherited a mutation and that mutation would cause you to be at risk for hitting a brain tumor in combination with multiple other types of cancers. These are very rare -- 1/4000 or 1/60,000 individuals.

>> There are also other individuals -- when you ask them about their family members and you say tell me about your mom and your dad and aunts and uncles -- tell me about your siblings in your grandparents and have any of them ever been diagnosed with cancer? who was also diagnosed with a brain tumor. We have been steadily -- studying these families. If you are involved with this, we thank you for your involvement. We appreciate you being willing to be involved in the research. We are moving toward identification of a location on the genome where there could be an inherited mutation or a small number of families. What we have been able to show from the epidemiological data is that individuals that have a glioma -- their family members may also be at risk for giving a glioma. But we don't know right now what genes are possibly involved with that risk.

>> This is something we are trying to figure out. When we were looking for genes that cause cancer, we can do this in two different ways -- we can use families -- this is the study I was talking about where -- I don't know if any of you have seen a pedigree drawnout, but the way to understand this is that the circles are the females. These quasi-females. Anyone who is linked by a bar these that they are related. If you just focus right here on this part of the pedigree, this is dad and this is mom. They have three children -- two daughters and one son.

>> Hopefully that makes sense. If you are looking at things online and you see a drawing of the pedigree or if you have ever talked with a genetic counselor and they have drawn your family

pedigree, this will help you to understand what is going on. The challenge with doing family studies is that sometimes what happens is that one family or a small grouping of families will have a very specific potential mutation associated with arabesque that really is not applicable to families with the cancer.

>> Again, the one mutation that is inherited that is much more broadly applicable to breast and ovarian cancer patients are the BRCA 1 and 2 mutations where it can be tested and they can calculated risk. Unfortunately, we are not there yet for brain tumors. But we are trying hard with the studies -- the international collaborations with these studies.

>> The other type of study that we talked about our something called the case control studies where again the cases are individuals diagnosed with a brain tumor and the controls are individuals without the brain tumor. Just like we were able to compare the difference in environmental exposures between the cases and controls and understand whether they were associated with the risk of brain tumors, we can also compare the genetics from their blood between cases and controls and look to see if there is anything in their genetics that is associated with risk of a brain tumor.

>> Thing I was telling you about was the GLIOGENE study supported by many grant. The money from the ABTA. Family with two or more gliomas were recruited. There have been studies that were published. They have found that for some of these families they are linked to a very particular location on chromosome 17. We are now in the process of looking further under -- in the area on chromosome 17 to see if we can identify the actual gene where the mutation is. Stay tuned.

>> This shows you the difference -- this is chromosome 17 -- left to right on the screen. You can see that this is a fairly large peak here. This is the initial peak here -- then the second peak was over here. Just to give you an idea of how big this is, this is in [indiscernible] -- a unit of measure used in the genetics. It is about 50. This probably includes thousands of genes. It will take is a little more time to figure out exactly what genes are under peak. To try to understand better and go back and look at the families if the genes are actually relevant.

>> The large case control studies that we do we look at genetic factors are called genome wide association studies. We have found multiple different chromosomes. This is chromosome nomenclature -- chromosome 9. P means the petite or small arm. All chromosomes have a petite or OP arm and a The long arm called Q. There is a centromere in the middle. It tells you the band of the chromosome it is on.

>> This is a gene on 9 P and this is a gene on the long arm of chromosome 20. We also found genes that are different between cases and controls. On the long arm of chromosome 8 -- in a different gene on the short arm of chromosome 9 in the long arm of chromosome 11. This graph shows you that if you put all of these together, between all of the different to genes there are 9 different risk variants that you can have. These are single letter flips. The genome is made up of billions of letters. It is the same 4 letters repeated over and over again. It is ACTG. What these studies look for is a single letter change. These studies confirmed that there were 9 single letter changes involved in the genes here. They were associated with risk of a brain tumor.

>> It is very few individuals that have 7/9 of the letter changes. The vast majority of the individuals have somewhere between 3 and 6 of the letter changes.

>> It does increase your risk of development of a brain tumor with more of the letter changes that you have.

>> By the time you get -- if you have 6 of the letter changes, you have a twofold increased risk of element of a brain tumor.

>> For the individuals out here that have seven or eight of the letter changes, you can see here that it is a small proportion of the individuals included in these studies. These studies include thousands of cases and thousands of controls.

>> What about prognostic factors? Epidemiology not only studies of risk factors for development of brain tumors, but we also studied factors associated with survival or other clinical outcomes. The Nona prognostic factors that we know of are the histological type of brain tumor that you have -- astrocytoma and all ago and meningioma. The extent of your surgical resection -- how much of the tumor to the doctor get out? That is what this graph shows you. It is a relatively old paper from 2001, but what it shows is individuals with rigid than 98% of their tumor resected and they do a little better than those that had less than 98% resected.

>> Age at diagnosis is definitely associated with clinical outcomes and age at diagnosis over 50 and age at diagnosis over 54 lyrical outcomes for all cancers -- and something called the car Noffke -- car Noffke performance. It is a measurement on a 0 to 100 scale. It asks the fundamental question of how well you're doing in daily life. And there are some interesting work being done looking at quality of life. Other different -- depression and anxiety measurements. These may or may not be associated with prognosis. The literature is becoming more and more clear that they are associated.

>> There is something called a biomarker. In this case these biomarkers are derived from the tumors taken out and we look at different genetic changes that occur in the tumors and we try to look and see if they are associated with the outcomes.

>> Just to give you a little bit of data, again from the brain tumor Registry in the US on survival over time for brain tumors, what about the mile markers for brain tumors? -- Biomarkers? This is the next frontier. There have been multiple biomarkers found to be associated with response to treatment with chemotherapy and radio therapy or improved survival for brain tumor patients. The ones that most people talk about and believe to be true are am GMT methylation -- am GMT is a DNA repair gene.

>> -- MGMT -- If these are working correctly, these genes will repair the damage. Methylation is something called and epigenetic phenomenon. This means that if a gene is methylated it is turned off. In this case if MGMT is methylated, it means that the DNA repair mechanism is turned off. Then losses of chromosome [indiscernible] especially for oligodendroglioma -- and some of the latest work has been done in ID H 1 and 2 mutations. While the are are present in all gliomas, they are most common in great 2 and 3 gliomas. They are relatively uncommon in glioblastoma. Also, something called a DNA metal later phenotype. We already talked about MGMT methylation in which the gene is turned off. If we look at the tumor at a broader level of methylation, there is a turning off pattern or turning on pattern across the genome for these tumors.

>> For those that have the turning off pattern across the genome, they have better survival.

>> This is showing you data taken from some of the studies that looked at some of the biomarkers. The focus over here is the survival curve. This shows that individuals who have methylated or turned off MGMT had better overall survival.

>> Here for individuals who had oligodendroglioma -- those that lost one piece in the short arm of one and the long arm of 19 have the best survival.

>> This is showing you data on the ID H 1 and 2 mutations. The important thing to focus on here is the value included in the parentheses. This shows you the grade of the tumor tested. If you look in primary glioblastoma, the great 4 tumors, you can see that very few had ID H 1 mutations were is if you look over here for the greater 2 and 3, it is relatively common.

>> ID H 1 is a gene involved in cell metabolism.

>> For those individuals who have the ID H 1 mutation, they seem to have increased survival.

>> Interesting data coming out -- there is a more recent paper than the one I am quoting here. These are the court papers that are now being confirmed from the cancer atlas project which is a large undertaking by the national cancer Institute -- holy molecularly characterizing -- fully molecularly characterizing these. This shows that you can take gene expression where the color red means upregulated expression and green is down regulated gene expression and you can break glioblastoma sent to 4 distinct groups. This is based on their gene expression profile.

>> In some studies these gene expressions groups have been associated with different clinical outcomes as well.

>> This is the methylation profiling. These are the individuals shown with the red bar that have the hyper metal later phenotype. They have a lot of the color red which means they have increased methylation so they have an increased number of genes across the genome that have been turned off. Showing in this line is that they have the best survival.

>> These are glioblastoma patients -- somewhere between eight and 10% of all glioblastoma patients -- the tumors would have this type of metal later.

>> This is the updated data from the most recent paper. What it is showing is that for individuals who are younger who have MGMT methylation and have an ID H 1 mutation and to have the hyper metal later phenotype, they are all in a better -- they have improved survival.

>> With a larger set of tumors, this paper now includes 500 glioblastoma is where the previous one I showed you included about 200. We were able to show that some of these biomarkers are still true.

>> This is very exciting because the biomarkers are now being widely used by physicians. They are being used in clinical trials to help stratify the patients . it is very exciting that we got to the point where we had something that could be looked at and this could be important for clinical outcomes.

>> This is but all the stuff that we talked about is related to genetics. This is summarized on this paper. This is something that is just come out -- called the world Cancer report and there is a chapter on brain tumors. This shows that as you go from great 1 to 4, all of the different types of genomic changes that occur in the timeframe that these occur in. It is important to note that there is a difference in what is thought to be a primary glial blastoma versus a secondary glioblastoma. The important thing to remember is that when people talk about secondary glioblastoma is what they mean is that it started out as a lower grade glioma and over time it turned into a great 4 tumors.

>> -- Grade 4 tumor.

>> This is my team. They do a lot of hard work. They are involved and very dedicated. They help me find things that are important for brain tumors. I think that very much.

>> -- I thank them very much.

>> These are some at Weber resources for the studies and the data we talked about. This gives you the information. You can look up a lot of different things. The central brain turmeric registry -- this has the annual report on brain tumors. The surveillance epidemiology and end results program is the national cancer registry program. If you are interested in brain tumors or any other type of cancer, you can look here.

>> For the American Cancer Society they also publish accent figures every year. The accent figures are based on these other resources. Plus other resources -- in the state for data.

>> The cancer genome Atlas project -- we just talked about this.

>> Thank you very much. I am happy to take any questions.

>> Thank U so much. That was amazing. So everyone knows, half of the staff is here listening to this. It is a wonderful presentation.

>> If you have questions, type them into the question box. We will get to as many as we can.

>> The first question is -- could the herpes virus caused brain tumors?

>> Yes, thank you for bringing that up. I apologize that I did not include that because I said before we started talking about the risk factors that I was going to talk about some that had received recent press. You are absolutely on the mark about that. The CMB and the herpes virus recently have gotten some attention. In my opinion, in reading some of the studies, there our flaws in the study design. They could bring in some biases into the studies. This may or not make a conclusion from these studies. I am will say that is the first thing. The second thing is that in terms of the herpes virus, I do not believe that there is any definitive literature out there that the herpes virus causes brain tumors. You need to remember that the important thing about viruses and the important thing about the brain is that not everything gets into the brain. This is important because we do not want all of these crazy viruses going around and infections going around to get into the brain. The brain has a lot of protective mechanisms in place. The thing about a lot of these viruses is that a lot of times when they go to look at brain tissue it is not actually present in the brain tissue.

>> I can't remember whether or not they found the herpes virus to be present in the brain tissue. With the [indiscernible] virus, this was present in the brain tissue and that was some of the reasoning to see if it was associated with brain tumor risk. These studies have been very inconclusive.

>> Thank you.

>> There are a lot of questions about what about my children -- if there are one or more patients in the family with a brain tumor, where do they get them tested? How do they ask for this? Can you go over the basics?

>> Sure. Is important to remember that only about 5% of all brain tumors are inherited from mom or dad. I know it is frightening to look at your family and say I have this cancer and this cancer. Could it be possible that I could pass along something to my child? I know it is frightening. It happens in a small number -- a small proportion of brain tumors are inherited. The second is that I think if you have questions about this, and if you want to talk to somebody about it, there are people trained specifically to talk to you about this question. Medical doctors are trained specifically called medical geneticists. That's the term. Usually they have people working with them called genetic counselors. My recommendation to you would be to ask your primary care provider or the physician you are seeing on a regular basis right now -- if you are in treatment and seeing the radiation oncologist or neuro oncologist or neurosurgeon, to say to them that you are concerned about your family history. You would like for them to make a referral to a medical geneticists and or genetic counselor for you.

>> Okay. There are two questions regarding pre-termers and head injuries. Is there any correlation?

>> Studies that have looked at had injuries and whether or not had injuries are associated with increased risk of brain tumors has shown no association.

>> You can't get any more clear than that. Thank you.

>> Can you repeat the e-mail address? There are people that want to know how to contact you. Please repeat that.

>> Sure -- jsb42@case.edu

>> Thank you.

>> Also, if you Google my name my website should come up and my e-mail addresses on my website.

>> Perfect. You can call us here on the CareLine at a 800-886-2282. Or e-mail us -- abtacares@abta.org.

>> Someone wanted to know about alcohol consumption. Cannot cause brain tumors?

>> We have looked at alcohol consumption and smoking. I think everyone is probably aware of the very strong association between smoking and lung cancer risk. But all of the studies that have looked at alcohol use or smoking have not found any association with brain tumor risk.

>> As I said from the beginning, I wish I could tell you that there was a big whopping risk factor that we knew about that we could then tell you not to do. But there just isn't. We just don't have one of those for brain tumors. Yes, we believe I and I think radiation to the head or neck to be a risk factor -- a definitive risk factor for brain tumors, but it is a small proportion of people that get ionizing radiation to the head or neck. This doesn't explain the large amount of brain tumors out there. We unfortunately do not have the answer yet. We continue to try to find the answer. I am hopeful that we can.

>> We all are.

>> Someone is asking if you could repeat the name of the brain tumor epidemiology organization that you mentioned the beginning of the presentation.

>> I mentioned to two different ones -- the first one was the organization and the source of all the statistics on brain tumors that I was showing you. It's called CB TRUS.

>> The other one is the international brain tumor epidemiologist that meet once a year. The current US president -- it's called the brain tumor epidemiology Consortium or BTEC.

>> If type I if I type this in your they cannot see this, right?

>> No.

>> But again if they e-mail us or call us on the CareLine, we can share the information with them.

>> And CBTRUS and BTEC have their website and GLIOGENE have their website. If you call the Caroline we can provide you with that. And if you e-mail me I will give you the information as well.

>> Thank you for your offer. We appreciate it.

>> I know you mentioned different things that you overlook that -- cell phones, radiation, wires. Are they looking at them separately? Someone is a question -- what if you are exposed to multiple of these types of risk factors? Has not been studied as a whole? Or were they all studied separately?

>> In general they are usually studied separately and if we don't find anything separately then they don't usually move forward with it.

>> I can tell you that looking at it with in conjunction with other things unless we have some sort of reasoning for doing that. There are a series of studies that try to look at if it types of exposure to electromagnetic fields and other types of radiation sources. Again, they really haven't found anything conclusive. The one area that I didn't talk about it all -- occupational exposures. Things you would be exposed to a your job. There is a series of literature that looked at different occupations and different things that you would be exposed to at the job. The risk of brain tumors. There is nothing definitive out there, unfortunately, about having any specific job being associated with brain tumors, but for the occupational studies, they definitely account for all of the different things you could have been exposed to at each of the different jobs.

>> Thank you.

>> There is a question about the emotional aspects of worrying about inheriting it or being exposed to things that would cause a brain tumor. What do you say to people -- every time they get a headache they worry that they might be getting the same that brain tumor as their father or brother or sister?

>> In terms of worrying about potential exposures, unfortunately as you can see we really don't have -- the only definitive risk factors that we know is ionizing radiation to the head or neck. I would hope that that would ease your worrying about environmental exposure. In terms of worrying about your family, I would recommend that you talk with your physician about going to see a medical geneticist or medical counselor. This is what these people are trained to do. They are trained to talk to you about these types of questions. To help you work through these things so you don't have to suffer with anxiety.

>> You shouldn't have to. So I would recommend that you try to talk to your doctor about getting a recommendation for you to see someone in your area.

>> Thank you.

>> What about exposure to radon gas tax

>> -- Radon gas?

>> I apologize because I don't know the occupational literature probably as well as a some of my colleagues do. Radon gas you can be exposed to in your home depending on where you live in the country. There are higher levels of radon in the ground depending on where you are. Also you can be exposed to it at certain occupations. In terms of the exposure from certain occupations, there is nothing linked to radon gas specifically that I know of. The same goes for potential exposure in your home. Nothing has been linked to brain tumor risk that I am aware of.

>> Whoever is asking that question, if you e-mail me, I can maybe look in the literature a little more. I am not as familiar with this. I know all the occupational brain tumor epidemiologist and we are writing some review papers and there was nothing in the Purdue papers about radon gas.

>> I think if there was something there they would have included it.

>> Questions about Mono and Lyme disease -- do you know anything about those?

>> These are infections. The important thing to realize is that your brain is a very special part of your body. It has a lot of protective mechanisms in place beyond your skull. A lot of these infections, even though they make you feel awful and your body feel awful, they may or may not actually get into the brain. So, that is the important thing to remember when you think about infections. There is nothing I

know of that is looked at either of those in terms of the relationship with brain tumors. If they have, there is no evidence that shows they are.

>> Here is an interesting question -- can having a brain tumor diagnosis make you more prone to develop MS?

>> Interesting question. MS, like brain tumors, is relatively uncommon. When you look -- what I mean is -- to put this in perspective -- but I'm by what I mean uncommon -- if you look at all the cancers diagnosed in the US on an annual basis, almost 80% of all cancers diagnosed in the US can be classified as one of the big four -- breast, colon, prostate, and long. -- Long.

>> This means that the remaining 20% of cancer diagnoses in the US could be anywhere else in the body. Brain tumors are included in the other 20%. They only make up about 1% of all cancer diagnoses in the US. They really are uncommon. I don't know the incidence rate of MS, but it is very uncommon as well. So these two things being linked together -- I'm not sure if anyone has studied not because I don't know -- if you look at the large brain tumor studies -- whether they have had anybody who also had MS in the studies. If they did, it was so few that it would not have made the study meaningful.

>> Okay. I will ask another question. We have had so many, but we are out of time. Could grow hormones as a child contribute to and adult diagnosis of a Clio one, -- glioblastoma?

>> There is no evidence that it doesn't I am aware of. But I'm not sure anyone knows the answer to that question.

>> Thank you all and thank you Dr. Barnholtz-Sloan Dr. We have all of your questions. We will try to answer your questions. We apologize. We know this is an important topic and this creates a lot of question and dialogue. We appreciate you staying on the line and for presenting this.

>> Thank you, everyone, for joining us. Again, if I can help, I am happy to do so.

>> We would appreciate that.

>> Let's pause for a moment. We will conclude the webinar recording.

>> Continue to check back at the website -- www.abta.org -- for other brain tumor related topics in the webinar series. The next webinar is Thursday, February 27 from 2 to 3 PM Central time. It is the diagnosis, management, and treatment of medulloblastoma. It will be presented by Dr. Paul Fisher, a professor of neurology and pediatrics in the division chief of neurology at Stanford University.

Thank you for joining us. Be sure to complete the survey that you receive shortly following the session. You may now connect.

>> Thank you.

>> [Event concluded]