Angioma Alliance

Angioma Alliance Newsletter

Editor-Cristina DeSalvo

Summer 2005

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ANGIOMA ALLIANCE SPONSORS FIRST SCIENTIFIC CONFERENCE

By: Connie Lee

We are very excited to announce that Angioma Alliance is sponsoring the first ever scientific conference for cavernous malformation researchers. This workshop will bring together over 20 researchers from ten laboratories in the United States and Canada, all of whom are key players in this field. They will discuss their latest work with each other in an open, friendly, and relatively informal atmosphere. The conference will be held on November 18th in Durham, NC.

The overall goal of the conference is to foster intense discussion on the mechanisms of this disease. The hope is that this will lead to new insights into the illness and may seed future collaborations among researchers. The workshop may include a discussion of submitting joint grant applications that would leverage the combined expertise and resources of multiple groups.

It can not be emphasized enough how much of a turning point this is for cavernous angioma research, and it has become possible only because of your support and participation in Angioma Alliance. As patients and family, we are heavily invested in understanding this illness, but researchers also know that we are a neutral force that will help the research community find common ground. In the competitive world of medical research, this is truly rare. We have great hopes for the success of this meeting.

Patient Registry Takes Center Stage

By: Connie Lee

Angioma Alliance is working to develop a very sophisticated and powerful patient registry. This registry will allow researchers to test hypotheses about the impact of family history, lifestyle, and other health concerns on the behavior of cavernous malformations. We are hoping to buy into a cooperative patient registry established by the Genetic Alliance Biobank once we have raised the necessary funds. At the Angioma Alliance Family Conference in June, the advisors who were present agreed that this particular system is by the far the best choice. However, the Genetic Alliance Biobank has been having difficulty raising the funds necessary to bring the buy-in price down to what we had originally expected. Right now, the price stands at $140,000 plus approximately $50,000 per year in annual usage expenses. In the world of research this is not a huge amount, but in the world of Angioma Alliance it is likely beyond our means. In response to this, our advisors have pledged to help raise a portion of the needed funds through their own contacts. Their generous offer is unprecedented, particularly since Angioma Alliance will own the data in the registry. Your financial support of this project, in addition to the advisors' pledge, will make the difference in pushing us over the top.

In this newsletter, the terms "cavernous angioma," "cavernous malformation," and "CCM" are used interchangeably.

Inside this issue:

BRAINSTEM CAVERNOUS ANGIOMA CHAT

Moderated by Jack Hoch

Sunday, October 2

8:30 p.m. EDT

7:30 p.m. CDT

6:30 p.m. MDT

5:30 p.m. PDT

Monday, October 3

12:30 a.m. GMT

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President's Letter

Dear Reader,

I made some statements at our family conference that I think deserve repeating here. Sitting in my position, I am offered a unique view of this illness. I have contact with many of you who are affected. I also have been able to spend time with some of the physicians and researchers who specialize in cavernous malformations. I can not tell you how fortunate we are to have such a caring group of researchers, neurosurgeons, and neurologists working with us.

There have been many examples of their kindness, but I want to share a few. First, I believe it is unprecedented for a group of researchers to suggest that they will raise money for a patient advocacy group – usually it's the other way around. But our researchers are different. At the family conference, Jack Hoch, Allison Ruggles, and I met with Dr. Issam Awad, Dr. Daniele Rigamonti, Dr. Mike Berg, Dr. Leslie Morrison, and Dr. Eric Johnson to discuss our need for a patient registry. During the meeting, many ideas were considered, but the researchers agreed a model that would allow Angioma Alliance to be in control of the information, rather than any other institution, would be the best choice. They were excited when they considered the many questions that could be addressed and the research progress that could be made if the information contained in a registry were made available to all researchers. There were more interesting research ideas voiced in five minutes than in all the published CCM papers combined. When it came time to consider costs, they offered their help in whatever way they could to make this a reality. To my astonishment, each of the physicians committed themselves to raising $25,000 – this is more than we have been able to raise as an entire organization. There was a point when Dr. Rigamonti, who had been relatively quiet in the discussion, turned to me with great reassurance and said "Connie, we can do this." They believe… and so do I.

The list of examples of caring is much longer. I am touched by the generosity of the expert surgeons who perform preliminary reviews of MRIs in order to help us find appropriate treatment, who answer emailed questions from patients around the country and around the world, and who drop their own plans in order to help us. I am grateful for our conference speakers who spend so much time preparing and giving presentations, traveling to our location, spending time with our attendees, and answering our questions – and receive no payment. And, I am forever indebted to our scientific advisors for the hours and hours of guidance, information, and support they give me and they have given to some of you.

As you read in our lead story, CCM researchers will be putting aside their competitive relationships for a day in November in order to share their work with each other. At least one scientist from every lab performing CCM research in the US and Canada will be attending. They are doing this because they know it will make a difference – to the progress of research and, ultimately, to us.

As frustrating and discouraging as it is to have so many physicians know so little about cavernous angioma, please know that there is a special group of generous physicians and researchers, all of them experts in the field, who really care.

Connie Lee

Angioma Alliance President

Brainstem Cavernous Angioma Chat

We placed our scheduled chats on hold over the Summer, but we are starting them up again! Our first chat will be in October for anyone affected by a brainstem cavernous angioma. Jack Hoch of the Angioma Alliance Board of Directors, who has a brainstem cavernous angioma himself, will moderate. The Angioma Alliance chats are a wonderful opportunity to share information and support in real time with others who are living with the same concerns. The Brainstem Cavernous Angioma chat last year was one of our best attended chats, and we look forward to a great turnout again. We hope to see you there!

When: Sunday October 2nd at 8:30 pm EDT (7:30 CDT, 6:30 MDT, 5:30 PDT, and on 3 Oct at 0030 GMT).

Where: On the day of the chat, we will post a link to the chat on our Community Forum, email listserv, and on the Chats page of our website. Please check the link earlier in the day and contact us at info@angiomaalliance.org if you have difficulty accessing the link. You will need your screen name and password to login. When you enter, you will see the chat transcript appear at the top of the page and a textbox at the bottom to type your questions or responses. Click on "Send" or press Enter to have your message appear in the chat.

ANGIOMA ALLIANCE INCREASES INTERNATIONAL PRESENCE

United Kingdom Group Based in Dorchester

By: Ian Stuart

Angioma Alliance UK is based in Dorchester, the "market town" and capital of Dorset, in Southwest England. The town lies at the centre of some of the most beautiful countryside in the country. Angioma Alliance UK, formed in February 2005 and constituted as a charity in July of the same year, is comprised of cavernous angioma patients from all over the UK. Since its formation, our group has had its first web chat and received a grant for $4,000 from the Millennium Foundation (part of the UK's National Lottery), as well as an anonymous donation of $400. Consequently, we now have a Treasurer to manage our funds, Ron Davis, and a Secretary, Ros St. Clayre.

Angioma Alliance UK aims to provide a support group for those with cavernous angioma through its communication and outreach skills (for example, the compiling of letters to surgeons, neurologists, potential new members, and existing members) and by providing a service which makes the general public aware of cavernous angioma.

In the short term, our grant, provided to us by UnLtd Millennium (funded by the UK lottery), will enable us to: acquire a printer, offset postage costs, obtain a supply of fliers, produce publicity in the form of posters for doctors' offices etc., and, in the long term, establish a separate telephone line for Angioma Alliance UK. In addition, Tim Loasby, a lecturer at Kingston Maurward College in Dorchester, and colleagues, are planning to raise further funds for the group with a sponsored bike ride in September.

We want to continue our work, writing to doctors and specialists in Dorset, nationally and internationally to establish an informative website with links to the existing American site. We hope to embark on a series of educational workshops in the Fall to area schools to allow students to learn about this most disabling and hidden condition.

Interested parties from Dorset, across the UK and Europe are encouraged to contact Ian Stuart:

angiomaalliance@hotmail.co.uk.

Photo By: Jon Barton, Clarify Communications

Ian Stuart (42) was diagnosed with cavernous angioma sixteen years ago. His symptoms, which are progressively worsening, are a Holmes Tremor to the right side, dysarthria (slurred speech), diplopia, and gait ataxia (mobility difficulties). After completing his Ph.D. at the University of California in 1991, Ian taught at USC in LA before returning to England in 2002. He receives outpatient services at Queens Square, London. Ian coordinates Angioma Alliance UK.

Meet the Members

Scott (24) had a cavernous angioma during his final year of studies at the University of Plymouth. Scott underwent successful Gamma Knife Surgery in 2004 and since his treatment has run two half marathons plus the 2004 London Marathon.

Penny (45) had a number of seizures before receiving a diagnosis of cavernous angioma. Penny responds well to medication and neurologists have advised a wait-and-see approach. Penny's angioma is located in the area affecting speech.

Mark (37) experienced a bleed in January 2004 and was diagnosed with cavernous angioma in the ponto-medullary junction of the brainstem. Mark currently has few neurological deficits and has elected for conservative management as an outpatient at Queen Square, London.

Emma (35) had two brainstem haemorrhages in 2002 which resulted in ten hours of surgery. Emma is now fully recovered despite having further surgery due to the leaking of cerebrospinal fluid.

Anne-Marie's son Owen (3 years, 9 months) was diagnosed at seventeen months with multiple cavernous angiomas. Despite having hundreds of seizures and being hospitalized for six weeks when he was given steroids and anticonvulsants, Owen is now healthy but with significant speech and language delay. Anne-Marie's sister also had a bleed from cavernous angioma at the age of 14 and Anne-Marie is currently waiting for her own MRI study.

André (43) has two cavernous angiomas in the left ponto-medullary and left posterior frontal area. These angiomas continue to cause diplopia (double vision) and numbness to the right side. Due for an invasive procedure, neurosurgeons have now decided on a wait-and-see approach. André is to be reassessed after an MRI in the summer of 2005.

Sacha Bonsor is the nationally recognised writer of Dipped Into Oblivion, a study of her own battle with brainstem cavernous angioma. Sacha had surgery in 2001 with Dr. Spetzler in Arizona but had a further haemorrhage in 2004 and repeat surgery in November.

Katie (31) has a brainstem cavernoma which bled twice (1990 and 2001), in addition to other cavernomas located elsewhere in the brain. Katie's 2001 bleed left her with marked physical deterioration but no cognitive impairment. Katie recently qualified as an occupational therapist.

FUNDRAISING UPDATE

We wish to express our deepest appreciation to Andrea Price of Upland, California. Andrea raised more than $3,000 for Angioma Alliance by soliciting pledges and participating in the San Diego Rock and Roll Marathon. This was our largest individual fundraiser to date. Andrea is the sister of Liz Neuman, our current Fundraising Chair, and aunt to Jake and Sam, who are both affected by multiple cavernous angiomas.

Upcoming Events…

Stay Tuned for More Information

Fall 2005

Fish Fry hosted by Kim Hofelich in Indiana

Despite a heavy rain, Kim Hofelich raised $500 through a charity concert in Columbus, Indiana. She is following this with a charity fish fry on Saturday, September 24th. Kim and her family and friends will be cooking and serving from 11 am to 7 pm at the Hope Heritage Day Celebration, in Hope, Indiana. During the Heritage Day parade, Kim and her friends will be raising awareness of Angioma Alliance by riding horses, carrying an Angioma Alliance banner, and tossing candies labeled with Angioma Alliance stickers to the crowds. Thank you Kim for all of your hard work!

This summer, children attending summer camp at the Heritage YMCA in Naperville, Illinois held a fundraiser to benefit Angioma Alliance. They washed cars and sold lemonade to raise $101 for our work.

The Fundraising Committee, chaired by Liz Neuman, is hard at work to raise money for Angioma Alliance's upcoming events and projects. Please consider ways in which you might be able to help secure funding for our patient registry, CCM research, exhibits and conferences, website updates, and a print version of this newsletter. Hosting an event can be as easy as showing Angioma Alliance's fundraising video to a group of family and friends or organizing a rummage sale, sports tournament, or wine-tasting. Many of our members have launched individual letter-writing campaigns, and the results have been substantial. Also, corporate sponsorship will allow us to achieve our goals and spread the word. If you have a suggestion, please contact Angioma Alliance to learn about the benefits and advantages of becoming a corporate sponsor.

There are many ways in which you can support CCM research and Angioma Alliance's efforts. Please direct all fundraising questions and ideas to Liz Neuman or Connie Lee at info@angiomaalliance.org.

Get Connected !

Angioma Alliance "Links" Provides Resources for Web Surfers

The "Links" page on the Angioma Alliance website has been reevaluated and improved to include the most up-to-date information and resources. Here is just a sampling of what you will discover:

- *The Anatomy of the Brain*
- *Genetics Research*
- *Support Groups and Referrals*
- *Invaluable Information on Doctors and Health Care Providers*
- *AND SO MUCH MORE*

Special thanks to Pat DeSalvo, our volunteer Researcher, for tackling this lengthy project.

Send your recommendations to info@angiomaalliance.org.

This is an ongoing project, check back frequently!

WWW.ANGIOMAALLIANCE.ORG

PROFILE: JOYCE GONZALES
Uncovering Her Family's Story

By: Cristina DeSalvo

Joyce Gonzales, 48, and a mother of two, gets excited as she explains the process of her genealogical research. It is obvious that she takes pride in her progress to date and in her goals for the future. It has not always been easy to keep such a positive outlook, however, with Joyce and a number of her close relatives sharing the KRIT1 gene – a gene that causes multiple cavernous angiomas to form in the brain and spinal cord.

Joyce's journey with this disease began in 1989, when she was 31 years old. Unexplained pain and strange sensations led Joyce to visit multiple doctors and neurologists. She accepted an original diagnosis of Chronic Rubella Veremia, and suffered additional, undiagnosed hemorrhages quietly for nearly ten years. In the early 2000s, Joyce once again began experiencing symptoms and, doubting the earlier opinion, visited additional doctors and neurologists. In October 2003, Dr. Andrew Metzger, of Albuquerque, New Mexico, discovered three cavernous angiomas in Joyce's brain, including one in the brainstem, as well as one on her spinal cord. In January, 2004, Joyce underwent surgery by Dr. Robert Spetzler of the Barrow Neurological Institute in Phoenix, Arizona, to remove the angioma on her spinal cord, which had hemorrhaged on several occasions and was identified as the source of persistent pain in her arm. Though the surgery was successful, Joyce's final bleed had caused irreparable damage and she was warned that the pain in her left arm probably would not subside. At that time, Joyce learned that one more bleed on her spinal cord could have caused total paralysis.

Joyce's encounter with this disease inspired her to investigate the mysterious death of her mother years before. In New Mexico, the KRIT1 gene, a major cause of multiple cavernous angiomas, is common among Hispanic families. Coming from a long line of Hispanic ancestors, traced back nearly 400 years, Joyce feared the worst. Through her own research and discussions with doctors, she learned that in all probability her mother passed away from a brain hemorrhage caused by a cavernous angioma. While this always will be speculative, Joyce is almost positive that her mother possessed the KRIT1 gene because it does not skip a generation. Of her mother's siblings, five were diagnosed and three await the results of their genetic testing.

"Virtually every CCM researcher knows about Joyce, and it is her genealogy work that has been inspiring them to push forward so strongly on the patient registry." – Angioma Alliance President Connie Lee

When Joyce first discovered and understood the genetic implications of this information, she began educating her family members in every way she could. She sent literature and encouraged genetic testing and awareness but, while several members of her large family heeded her warnings, the devastating information was too overwhelming for others to handle. In May 2005, Joyce's young cousin, nine years old, suffered a massive hemorrhage of a cavernous angioma in her brainstem. She passed away only three days later, and the tragic loss motivated relatives to seek genetic tests.

Joyce's own genealogy research has been supported by Dr. Leslie Morrison of the University of New Mexico and Dr. Eric Johnson of PreventionGenetics in Marshfield, Wisconsin. Morrison is at the forefront of cavernous angioma research in New Mexico and worked with Joyce on a presentation in January of 2005. Joyce was an active member of the New

Mexico Genealogy Society, so she proposed a joint presentation where Morrison handled the technical aspect while Joyce discussed her personal experience with the KRIT1 gene and cavernous angiomas. There is a possibility that they will collaborate on similar efforts in the future.

Dr. Eric Johnson assisted Joyce in uncovering more family history and evidence of a persistent KRIT1 gene. Working with Dr. Johnson, research indicated that northern New Mexico, southern Colorado, and Western Arizona have a proportionately large population with the KRIT1 gene. In all likelihood, these families share one ancestor, a founding grandparent from whom that gene was inherited and can be traced. Through her genealogy work, Joyce has come close to discovering who that founding patriarch is, and she believes he may have been born as long ago as 1667.

When the KRIT1 gene is found to be so prevalent in a family, it is significant because of the number of people affected. Pinpointing the common ancestor will allow Joyce to identify several surnames that may indicate a higher risk for developing hereditary cavernous malformations.

As she continues her own research and collaborative efforts with Drs. Morrison and Johnson, Joyce remains focused on educating her family and encouraging genetic testing and awareness. Happily, three of her closest family members were recently tested, and were negative, for the same gene that has caused Joyce and so many of her relatives physical struggle and emotional turmoil.

Joyce's short-term goals are to become more involved in fundraising and awareness education. She has observed such a huge need and believes she can make a positive impact in the lives of those affected by CCM. According to Connie Lee, Joyce already has. Virtually every CCM researcher knows about Joyce, and it is her genealogy work that has been inspiring them to proceed so urgently with the patient registry.

Joyce describes her current role as that of a resource, a contact for people who do not know where to go or where they can find accurate information and reliable genetic testing. Her 16-year journey is truly remarkable and her research already has become a major component of promoting awareness and understanding of cerebral cavernous malformations.

Angioma Alliance thanks Joyce Gonzales for giving permission to publish her story and for being a purveyor of Angioma Alliance's mission and goals. We are grateful for her extraordinary contributions to Angioma Alliance and CCM research.

Joyce Gonzales has worked closely with Drs. Morrison and Johnson, both members of Angioma Alliance's Scientific Advisory Board.

Dr. Leslie Morrison is a pediatric neurologist and an assistant professor at the University of New Mexico Medical School. Dr. Morrison has a research interest in neurologically based genetic disorders, particularly familial cavernous angioma. Dr. Morrison has worked with Dr. Doug Marchuk, another of our Scientific Advisors, performing a genetic analysis on those with the common Hispanic cavernous angioma founder mutation.

Eric Johnson, Ph.D., is the Director of Molecular Diagnostics and Biobanking at PreventionGenetics, in Marshfield, Wisconsin. He was a senior research scientist, Director of the Neurogenetics Laboratory, and Chief of the Molecular Diagnostics Laboratory at the Barrow Neurological Institute. He is the former Executive Director of the Genetic Alliance Biobank. Dr. Johnson's lab offers CCM clinical genetic testing.

Latest Research

By: Connie Lee

In an important journal article, Duke University has published evidence showing that the CCM1 (KRIT1) and CCM2 (malcavernin) proteins are part of the same system. It appears that CCM2 influences where CCM1 is present in a cell. CCM1 can be found in both the nucleus and cytoplasm of a cell. CCM2 seems to anchor CCM1 in the cytoplasm while another protein (ICAP1) anchors CCM1 in the nucleus of the cell. When CCM2 mutates, CCM1 clusters in the nucleus of the cell and does not do its job in the cytoplasm. This is a breakdown of one step of the very complex system that is responsible for creating blood vessels. Finding out that CCM1 and CCM2 act in the same system is important for two reasons. First, it saves researchers from having to investigate an entirely new and different system for CCM2. This will save enormous amounts of time in putting the puzzle together. Second, learning how CCM1 and CCM2 are related gives a much deeper understanding of the system itself.*

In a joint German and Swiss study, researchers examined cavernous malformation tissue for 56 sporadic lesions. They were attempting to determine whether these lesions are static and non-developing, as was previously believed, or whether they are actively creating new endothelium. Their work indicated that cavernous malformations do create new endothelium tissue and that this is truer for lesions that are superficial in contrast to those that are deep in the brain. Also, there did not seem to be a male/female difference; this seems to indicate that hormones do not play a role in this process. Their work also appeared to indicate that the formation of new sporadic cavernous malformations, even without a history of radiation, is possible.**

*Zawistowski JS, Stalheim L, Uhlik MT, Abell AN, Ancrile BB, Johnson GL, Marchuk DA. CCM1 and CCM2 protein interactions in cell signaling: implications for cerebral cavernous malformations pathogenesis. Hum Mol Genet. 2005 Aug 2; [Epub ahead of print].

**Sure U, Freman S, Bozinov O, Benes L, Siegel AM, Bertalanffy H. Biological activity of adult cavernous malformations: a study of 56 patients. J Neurosurg. 2005 Feb;102(2):342-7.

Family Conference 2005: A Huge Success!

The 2nd Angioma Alliance Family Conference was held in Baltimore on June 24th and 25th. Fifty people from every part of the United States (and even Singapore) were there, learning from our speakers and getting to know each other. Highlights of the weekend included:

Dr. Clatterbuck explains the contents of a refrigerator while giving a tour of a lab as part of Angioma Alliance's Family Conference in June.

-Touring the research lab at Johns Hopkins with our wonderful tour guide, Dr. Richard Clatterbuck. We were amazed by the vast array of equipment and expertise that is involved in CCM research.

-Hearing the latest information about cavernous malformation diagnosis, treatment and research from our expert speakers. We all learned more than most doctors know.

-Meeting one another and sharing stories and support. For many, this was the most significant and moving part of the weekend.

Phillip DeMartino and Christine Kirsch talk during one of the breaks. For many attendees, meeting each other and sharing stories was the highlight of the weekend.

Stay tuned to future newsletters for information about next year's Family Conference.

Angioma Alliance Board of Directors Announcement

We are disappointed to announce that Krista Zug has resigned from our Board of Directors due to increased work commitments and health concerns. Krista has served on the board since January, 2003. Krista put many hours into our most recent Family Conference – it could not have happened without her. She has been a resource on disability issues and assistive technology, as well as a link to other disability-related organizations. We will miss her and wish her well.

Diagnostic Imaging III: Functional MRI and Other Techniques
By: Jack Hoch

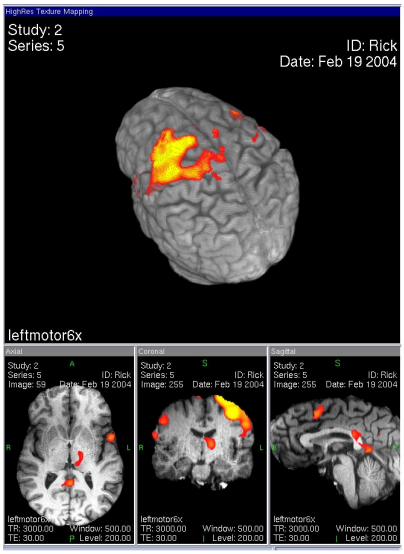
Introduction
This article is the third and final one in the diagnostic imaging primer series. Functional MRI receives the bulk of the attention. Other, lesser used procedures (for brain lesion patients), are touched upon, including a final summary with a look toward the future.

Functional MRI (fMRI)

Functional MRI is a recently developed, and still advancing, procedure allowing the non-invasive measurement of blood flow in the brain. Images can be taken rapid-fire, allowing an almost movie-like synthesis of image frames so that doctors can identify currently active brain regions. This imaging and identification is usually done in conjunction with a patient task-oriented test. By assigning a task (playing a game, moving an arm or leg, etc.) to a patient and then immediately taking pictures of the brain, changes in blood flow rate and distribution can be measured. In this way, exact regions of the brain can be mapped as to function.

The key assumption here is that the flow of oxygenated blood, which fMRI indirectly measures, is directly related to the task demands and area of the brain requiring this enhanced flow. Except for the "tasks", the fMRI procedure itself is very similar to a regular MRI, especially considering that one's head must remain immobilized during the imaging process.

fMRI is useful as a mapping tool prior to surgery. The surgeon can use the following fMRI procedures to differentiate between important tissue (speech center, motor area, etc.) and tissue which is not as eloquent. This can make all of the difference in surgical success rate for those operations requiring a very low margin of error.



This scan of the brain, using fMRI, was borrowed from the website of the Center for Functional MRI, Radiology Department, at the University of California, San Diego,

Types of fMRI
fMRI comes in different flavors, and the "flavor of the day" is dependent upon the particular aspect of the patient's case the attending physician wishes to study. Ideally, the following fMRI techniques involve measuring cerebral blood flow while performing a before and after mental state test of a patient. Hopefully all other variables during this test are kept constant. The four main fMRI types in use today are: bold, perfusion, diffusion-weighted, and MRI spectroscopy.

Bold-fMRI
Bold-fMRI depicts oxygenated blood in the brain as bright areas on the film. The assumption is that blood content high in oxygen is being delivered to those areas of the brain in use or needing it most at that given time. By giving a patient a singular and simple task (holding an object), the doctor can see the areas of the brain that are activated during the task. Images are rapidly taken before and during the task so that they may be contrasted with each other. Bold-fMRI is optimal for studying functions that can be quickly turned on and off like language, vision, movement, hearing, and memory.

Perfusion-fMRI
Like Bold-fMRI, Perfusion-fMRI attempts to measure blood flow in the brain. It differs in that it does not measure blood oxygenation.

There are two types of Perfusion-fMRI: intravenous bolus tracking and arterial spin-labeling. The former uses an injection of a tracer substance such as gadolinium to depict relative blood flow. Gadolinium is the same contrast agent used during many standard MRI procedures. The tracer, or "bolus" is then mapped as it courses through the cerebral bloodstream in the area of the brain being studied. More than one bolus can be administered in a session. Unfortunately, this is somewhat invasive (gadolinium injection) and is also limited by the ability of one's kidneys to process and eliminate the tracer substance without damage due to toxicity.

Arterial spin-labeling, on the other hand, is non-invasive and can be repeated as many times as necessary, plus, it can measure absolute blood flow. Absolute blood flow allows a series of images focusing on the same area to be taken during a specific fMRI session.

Diagnostic Imaging III: Functional MRI and Other Techniques (Continued from Page 8)

The biggest drawback is that this method is very slow, and individual images ("slices") can only be generated every few minutes. This contrasts with Bold-fMRI, which is rapid-fire. The longer the time between slices, the greater the chance of the patient's mental state changing in a non-controlled fashion, thereby introducing unwanted variables into the procedure.

Diffusion-weighted Imaging

This procedure measures the relative mobility of water molecules in the brain. The natural, random motion of water molecules (for those of us who remember their days in physics class--Brownian motion) can be factored out such that abnormal movement of these molecules can be measured. For instance, during a de-myelinizing disease process such as multiple sclerosis, water molecules would more readily diffuse across the boundary of the myelin sheath since it is no longer intact. Most lesions and strokes cause disruption of the brain's white matter such that diffusion-weighted imaging can hone in on these areas.

MRI Spectroscopy (MRIS)

While your basic MRI shows relative differences between areas of the brain, MRI Spectroscopy allows for detailed chemical information about specific composition of individual brain areas. For instance, MRIS can tell the difference between a tumor, and dead tissue. Use and refinement of this technique continues to evolve and will most likely play a greater role in future diagnostic procedures.

Author Jack Hoch is a member of the Angioma Alliance Board of Directors. Jack is dedicated to staying on the leading edge of cavernous malformation research. He assists in interpreting medical journal research reports and consulting on technical website issues.

Other Diagnostic Tools – PET, SPECT, MEG, EEG, Ultrasound

There are a host of other image-oriented tools that doctors employ to diagnose suspected problems in the brain. Positron Emission Tomography (PET) and Single Photon Emission Computed Tomography (SPECT) have been around for awhile. Their greatest attribute, relative to cavernous malformation (CCM) patients, is diagnosing/localizing epilepsy centers in the brain. Both of these procedures image the brain similar to fMRI, but PET and SPECT involve slower image acquisition times, are more costly, and include ionizing radiation as a byproduct of their use. Given these limitations, fMRI is almost always preferable. MEG and EEG measure the electrical activity of the brain. EEG requires long preparation time, especially in the placement of electrodes on the patient. MEG, while quicker, requires more expensive equipment.Ultrasound uses inaudible (to the human ear) sound waves to image a particular area. Most are familiar with its use during mid-term pregnancy to predetermine the gender of the fetus and ensure normal gestation. Currently, ultrasound doesn't have much practical application in the diagnostic process of potential CCM patients.

Summary and The Future

MRI and fMRI will continue to be the imaging procedures of choice for the foreseeable future. While other "boutique" imaging procedures exist, most are so specialized that they are either very costly or are not applicable to CCM patients. Others require significant invasiveness, such as a craniotomy, in order to be useful.

Probably the biggest near term impact in the MRI world will be an increase in magnetic field strength. Currently, the standard field strength is 1.5 T (Tesla). Newer machines will easily double that and may possibly reach 7 or 8 T once it is determined that these higher field strengths are safe for humans. Quicker MRI procedures and much higher image resolutions will be the result.

Further in the future, more molecular oriented imaging systems will be developed. If one "follows the money" in the medical research world, studies involving sub-cellular molecular structures and processes are getting their share of the funding. One day we may have readily available patient diagnostics that can show doctors changes on the molecular level. To put it another way, the imaging difference is similar to a satellite photographing the earth and viewing detail at city level versus using a different satellite to peer into a window and read the contents of a post-it note on someone's desk.

Technology is blazing the way for new and exciting developments in diagnostic imaging. The rapid pace of development is good news for those patients harboring brain lesions. Diagnosis is usually quicker and more accurate than in years past. The days of mistaking CCM for other diseases such as multiple sclerosis are fading fast, thank goodness. Even so, deployment of new imaging systems must pass stringent safety tests that can delay their clinical use. Just as important, medical professionals must be trained to use the new systems and properly interpret their output.

Parts I and II of this research series can be found in the March 2005 and May 2005 issues of the Angioma Alliance Newsletter.

Please visit www.angiomaalliance.org.

Editor-Cristina DeSalvo

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VOLUNTEER INFORMATION

Angioma Alliance is always in need of volunteers. Whatever your skills and time commitment, we can use your help! Contact Angioma Alliance at the telephone number or e-mail address above to learn how you can contribute. Together, we can make a difference.

Who We Are...

Angioma Alliance is a non-profit, international, volunteer-run health organization created by people affected by cerebral cavernous malformations (CCM). Our mission is to improve the quality of life for those affected by CCM through education, support, and promotion of research. We are monitored closely in our educational efforts by a scientific advisory board comprised of leading cerebrovascular neurosurgeons, neurogeneticists, and neurologists.

How You Can Help...

You may send donations via regular mail

or you may use the "Make a Donation" link on our homepage.

Public awareness will lead to increased research funding and improved quality of life for those affected by CCM. Our CCM pins (right) are a popular fashion accessory AND a great way to increase awareness of CCM. We are offering the pin to thank you for any donation of $10 or more. Each pin comes with 5 information cards. Show your support with this popular accessory!

NOW HERE...
ANGIOMA ALLIANCE WRISTBANDS.
GET YOURS TODAY

Like the wristbands associated with so many other causes, we now have our own. Our wristband is red and imprinted with the words ANGIOMA ALLIANCE. If you have been looking for just the right cause to wear a wristband or if you want to add to your collection, this is the time to order. Angioma Alliance wristbands are $5 each including shipping. You can order by sending a check made out to Angioma Alliance to: Angioma Alliance, 107 Quaker Meeting House Road, Williamsburg, VA 23188, or by using Paypal via the Angioma Alliance Wristband link on the website.

Getting our Kids Together: A New Effort

We are exploring ways to get families with affected kids together in order to introduce them to others with the illness. If you have an affected child between the ages of 2-12, please contact us at info@angiomaalliance.org if you would be interested in meeting families in similar situations. We hope to utilize existing programs that help children and families with chronic illnesses to develop a very inexpensive or free solution (including travel). We are imagining a 3- to 6-day stay at a camp or hotel in the US, and we would like to determine how many families are interested before we approach other programs. Also, we would be thrilled to hear from you if you are interested in helping plan this event. Let's help our kids discover that they are not the only ones!