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Hydrocephalus Consult Report – Published On-Line

March 4, 2014

Subject: Review of NPH Patient's Balance & Hydrocephalus Complaints.

Dear Physician:

I was contacted in January 2014 by your above-referenced patient for a review of his hydrocephalus complaints, hoping that my input might lead to a revision of his VP shunt system. My review is attached.

A review of his history revealed that he was first shunted in 2000, but with only a partial relief of his balance complaints. He describes how he felt better with a shunt set at 30mm of pressure, than after his revision in June 2010 to an ultra-low 10mm pressure valve. For some reason, neither his balance nor ventricular size improved after this revision, leading one to suspect an issue with this shunt or valve.

I reviewed his scans from May 2010 to November 2013, and I find good brain compliance for his age, mild to moderate extracranial CSF collections, and mild prominence of the cortical sulci. He reports that his balance is so poor that it has resulted in numerous falls, including a recent fall that led to a concussion. Evidence of "under-shunting" includes his improvement in balance an hour or so after arising in the morning, and ventricular size on CT that never decreased in size after his June 2010 revision to a lower pressure valve, and as one would expect with his brain compliance. If anything, there was a slight increase in size. I find his cognitive function per writing and speaking to be good for a man of his age. And his CT scans do not seem to display a marked level of brain atrophy.

There is a tiny suspicious radiopaque spot on his skull x-rays & CT scout films near the tip of his ventricular catheter, which could impact CSF outflow thru the catheter. His original ventricular catheter placement also was not ideal, but may have been revised. For your convenience, I have organized his key CT Comparative Images into a collage in the attached PDF document.

I would ask that you review the enclosed and evaluate him for possible revision to another ultra-low pressure valve. My findings are consistent with "unresolved hydrocephalus."

Very Truly,

Stephen M. Dolle
Neuroscientist & Advocate for Hydrocephalus

ABOUT ME: Worked w/ hydrocephalus 1975 to 1992 as a nuclear medicine technologist & imaging consultant; Experiences w/ onset of hydrocephalus since 1992; Author of FDA petitions & advocacy on CNS shunts; Pioneer of DiaCeph non-invasive method of shunt assessment; Patient consults since 2003.

sd/enclosures

STEPHEN M. DOLLE "Hydrocephalus Monitoring & Consults"
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March 4, 2014

Dear Patient:

The following is my "Report" from review of your hydrocephalus medical history, skull x-rays, and CT scans you provided me. I reviewed six (6) CT brain scans from May 31, 2010 to November 14, 2013. I was not able to correctly view the two scans on the 7/13/2010 CD. Along with this report, I prepared the attached "CT Comparison Images" PDF document from your scans, and I base much of my analysis and conclusions on these brain images. I have also written and attached a separate letter for your neurosurgeon.

My impression is that your balance complaints seem related to "under-shunting" of your hydrocephalus, and possibly to your June 2010 shunt revision. At issue, is your absence of relief in balance complaints, and change in ventricle size, after revision from a programmable valve set a 30mm to a fixed valve of 10mm pressure in June 2010. Based on the brain compliance I see in your scans, it seems reasonable to expect some decrease in ventricular size after revising to this lower pressure valve. But, in fact a slight increase occurred. Your ventricles did enlarge during your February 2012 ventricular catheter malfunction, which is a sign of good compliance. And you shared that your balance worsened after that June 2010 revision.

What is significant in my diagnosis of under-shunting, is that you describe balance complaints that are worse upon waking in the morning, but which improve a little once you are up and about. This interval improvement in balance after upright posture, in my experience, is consistent with "under-shunting" in normal pressure hydrocephalus. You also have attributed several falls now to your worse level of balance, including, a fall in January 2014 which resulted in your suffering a concussion.

To answer your questions regarding your neurosurgeon's comments about having too much fluid between your brain and skull, there normally is a tiny amount of CSF fluid that circulates in the space between the brain and skull. This tends to increase with age & brain atrophy, and also after shunting, particularly if the pressure in the brain is too low. Your CSF collections were at their worst on your June 9, 2010 CT scan, which was your smallest ventricles I viewed. And it was less in your February & March 2012 scans, when your ventricles enlarged during the shunt catheter failure. While this additional extracranial fluid can present problems, it apparently was not an issue for you earlier in your care and prior to May 2010.

I describe these extracranial CSF collections in my attached "CT Comparison Images" PDF document on a scale of 1 to 10, with 1 being the best, and 10 being the worst. At its worst, I notes your CSF collection as a "5" on your June 9, 2010 scan, and as a "3" on your November 14, 2013 scan.

Another issue in your CT scans of some concern to your neurosurgeon, is the presence of prominent cortical sulci on several of your scans. This prominence is generally regarded as an indicator of brain age and brain atrophy. However, on one of your CT scans from 2010, the report referred to it as "grossly within normal limits." I am not a radiologist, so I will defer to their judgment on this scan, and which I find similar to today. I did, however, create and assign values to my observations of this on the "CT Comparison Images" PDF document, with again a scale of 1 to 10, with 1 being the best, and 10 being the worst.

Here, I used both the axial and coronal views from your scans. But, the coronal view was not included with your May 31, 2010 & June 9, 2010 scans. At its worst, I listed your "Cortical Sulci Prominence" as a "5" on your February 13, 2012 scan, when your ventricles swelled due to the failed catheter. I note your lowest score of "2" on your May 31, 2010 scan. I gave a "3" to your last scan on November 14, 2013.

These small to moderate changes in extracranial fluid and cortical sulci, which are also a general benchmark of brain atrophy, are not usually associated with significant balance complaints. And it is stable on your last scan. The extracranial fluid apparently did not bother you earlier when your balance was better in May 2010. Your gross cognitive function, per our emails and phone calls, appears good for a man of your age. So, it seems more likely your balance complaints are related to under-shunting of your hydrocephalus. However, prior to consideration of shunt revision, there are several things that should be investigated.

The first is the possibility of a partially obstructed ventricular catheter. On several of your lateral skull & scout CT head x-rays beginning with the May 31, 2010 x-ray, there is a tiny opaque density at the tip of your ventricular catheter. It is hard to say what this is, but it could be a piece of broken catheter or valve, and could interfere with CSF drainage and your hydrocephalus. Also, when your ventricular catheter was first placed, it resulted in an opening or fenestration that penetrated through your left ventricle. It is possible there is suboptimal drainage from this placement, and it may have already been revised. There could also be an issue with your peritoneal catheter, which is common for NPH patients where you experience inadequate flow at the tip of the peritoneal catheter from surrounding bowel. You no doubt prefer very low pressure in your brain, which apparently was verified in your feeling "wonderful" following your initial 2000 shunt placement after additional CSF leaked out during the procedure.

Given the above, and that you tolerated the extracranial fluid collections prior to June 2010, I don't think a slight increase in these fluid collections will pose an issue for you, if revised again with a very low pressure shunt valve and your ventricles decreased in size. This might allow a more physiologic lowering of your intracranial pressure, ventricular size, and thereby improve your balance. Please also share the accompanying letter and images I have prepared for your neurosurgeon.

Very Truly,

Stephen M. Dolle
Inventor, DiaCeph Test for Hydrocephalus
Neuroscientist & Health Consultant
Advocate for Hydrocephalus

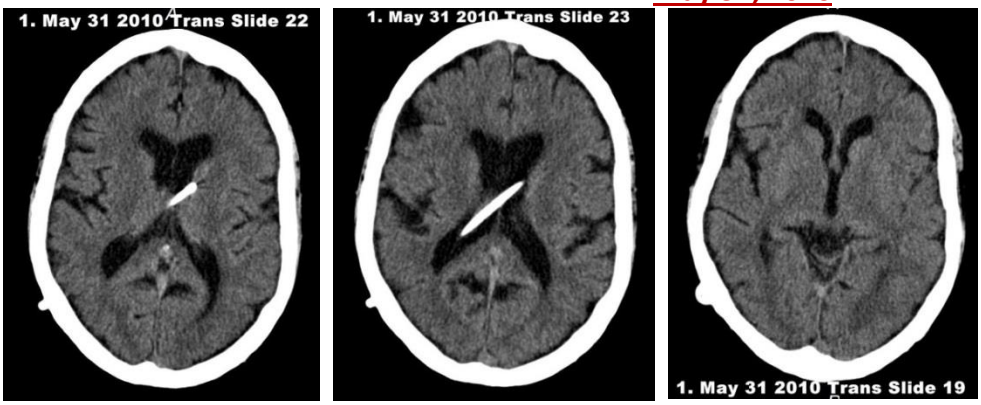
sd/enclosures
via email and U.S. mail

Stephen M. Dolle – Hydrocephalus Consult
Comparison CT Brain Images
On-Line Published Report

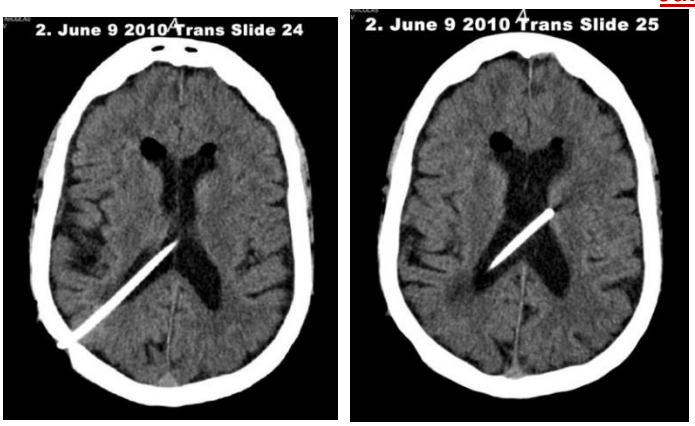
Prepared March 2, 2014 by Stephen Dolle
Authentication of Images verified by Stephen Dolle

FIGURE 1: Comparison of CT Brain Images from May 31, 2010 – Nov. 14, 2013

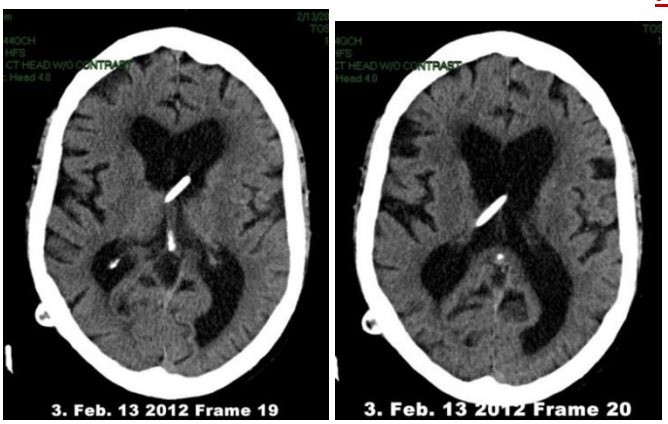
May 31, 2010



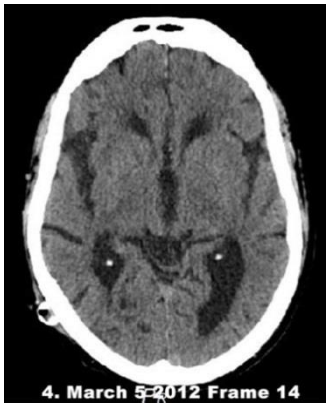
June 9, 2010

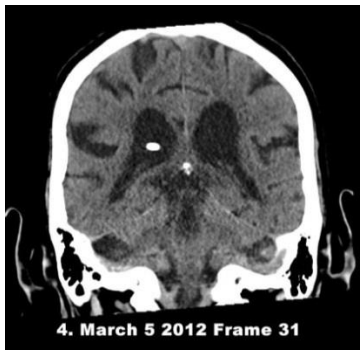


Feb. 13, 2012

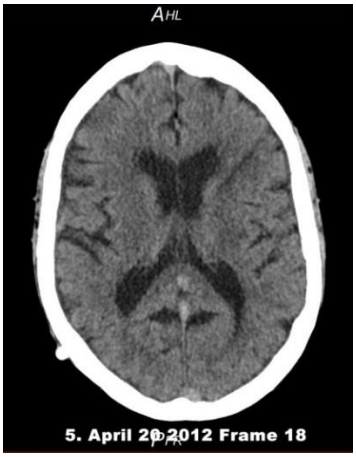


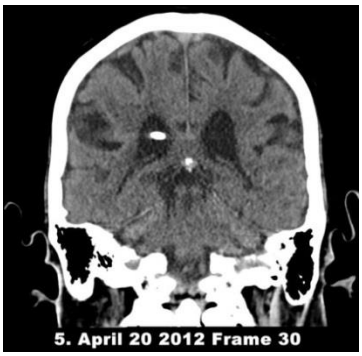
March 5, 2012



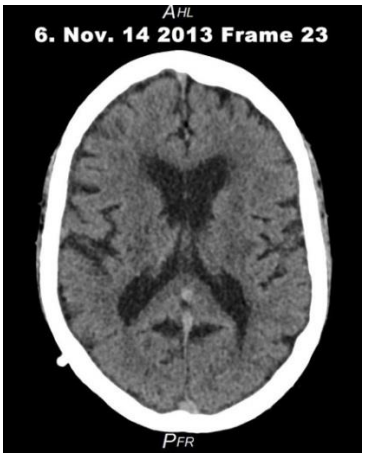


April 20, 2012





Nov. 14, 2013



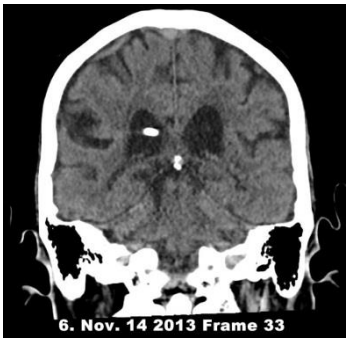
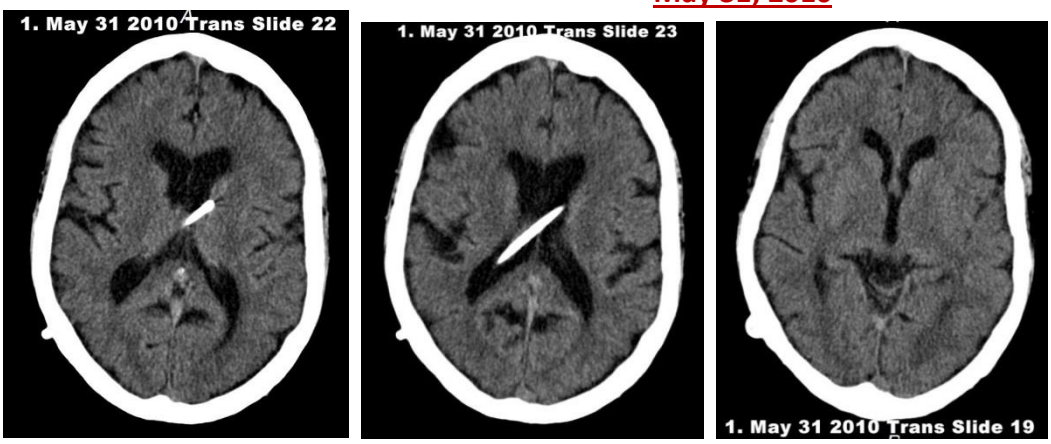


FIGURE 2: Comparison of May 31, 2010 (baseline study) to last scan on Nov. 14, 2013

May 31, 2010



Nov. 14, 2013

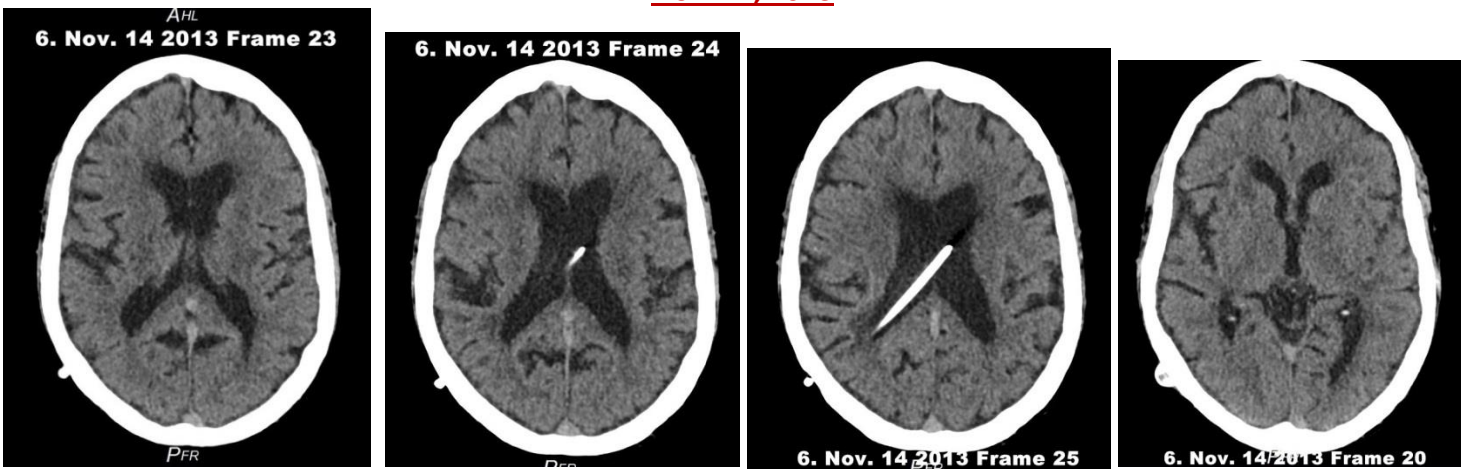


FIGURE 3: Comparison of Extracranial CSF & Cortical Sulci Prominence May 31, 2010 to Nov. 14, 2013

Extracranial CSF: 4 of 10
Cortical Sulci: 2 of 10

Extracranial CSF: 5 of 10
Cortical Sulci: 3 of 10

Extracranial CSF: 3 of 10
Cortical Sulci: 5 of 10

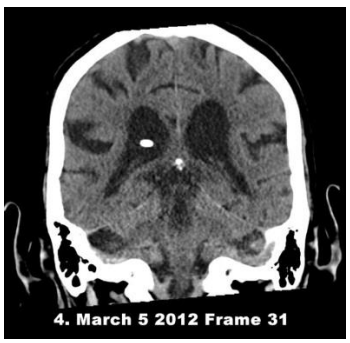
Extracranial CSF: 2 of 10
Cortical Sulci: 4 of 10

Extracranial CSF: 3 of 10
Cortical Sulci: 2 of 10

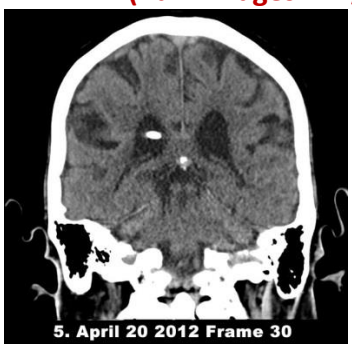
Extracranial CSF: 3 of 10
Cortical Sulci: 3 of 10

FIGURE 4: Comparison of Cortical Sulci Prominence in Coronal Views Feb. 13, 2012 to Nov. 14, 2013

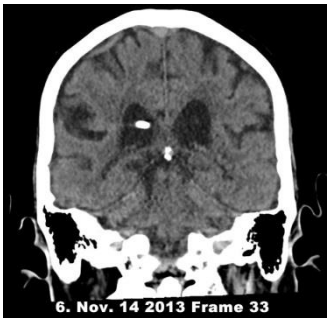
(Raw Images – w/o contrast changes)



Cortical Sulci: 4 of 10

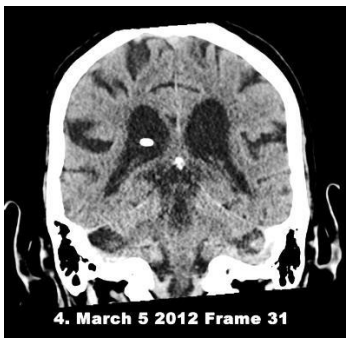


Cortical Sulci: 3 of 10

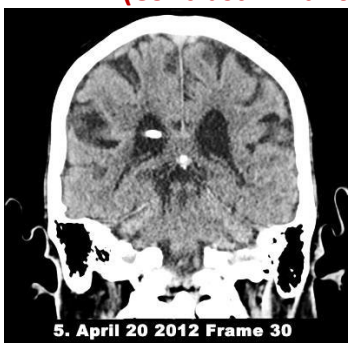


Cortical Sulci: 3 of 10

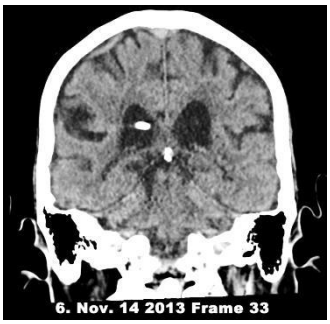
(Contrast Enhanced-Averaged Images)



Cortical Sulci: 5 of 10



Cortical Sulci: 4 of 10



Cortical Sulci: 3 of 10

Thank you

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