

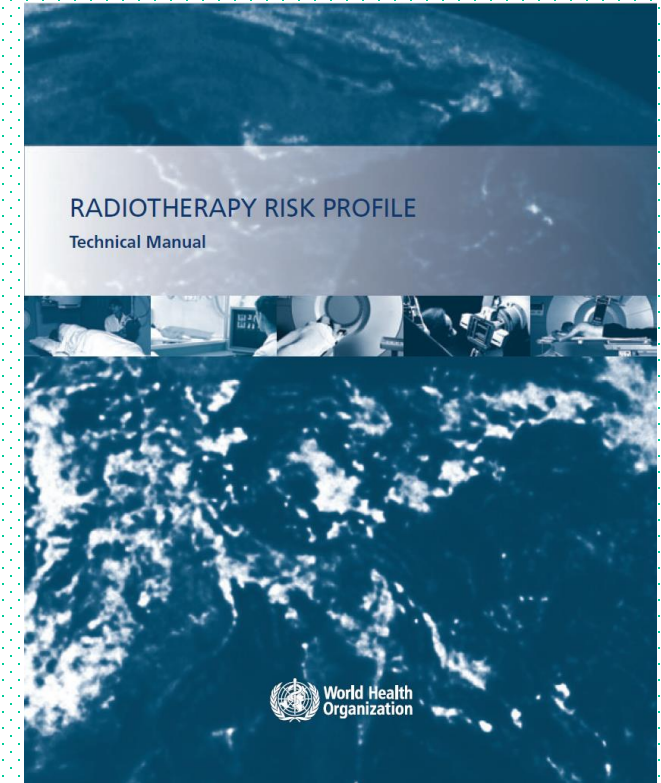
Accidents in Radiotherapy

Learning Examples

Radiotherapy Safety – is it Safe?

- Review of available literature showed that in the years 1976 to 2007, **3125 patients** were reported to be affected by radiotherapy incidents that led to **adverse events**.
- About **1% (N=38) of the affected patients died** due to radiation overdose toxicity. Only two reports estimated the number of deaths from under-dosage.
- In the years 1992 to 2007, more than **4500 near misses (N=4616)** were reported in the literature and publicly available databases.

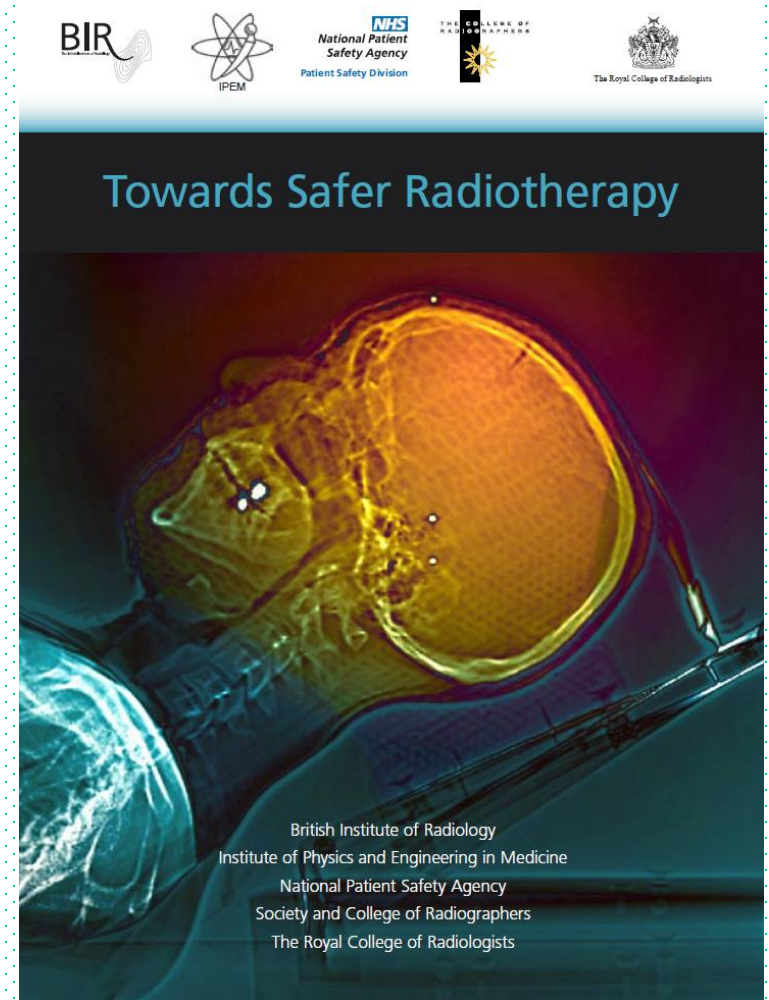
About 5.1 million Tx courses are given annually – data from UNSCEAR 2010



WHO – Radiotherapy risk profile

Radiotherapy Safety

- “Radiotherapy is generally safe. During the period May 2000 to August 2006, 181 incidents affecting 338 patients were reported in the UK ... an incidence of approximately **40 per 100,000 courses** of radiotherapy.
- Of these, 24 were likely to have a clinically significant adverse outcome, which equals to around **3 per 100,000 courses** of radiotherapy.”



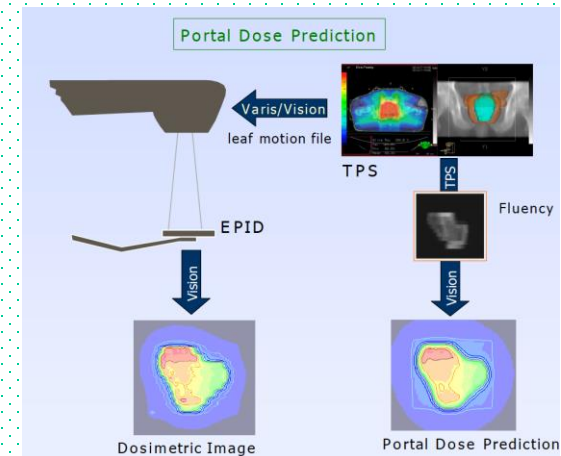
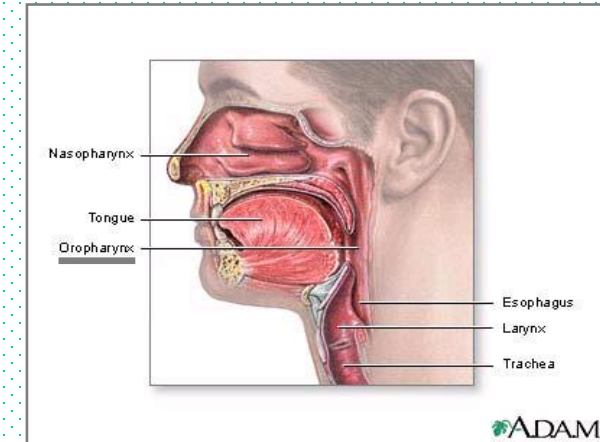
Missing or corrupt data at treatment delivery

New York City, NY,
USA



Radiotherapy Process Starts

- March 2005
- A patient is due to be treated with IMRT for head and neck cancer (oropharynx)
- March 4 – 7, 2005
 - An IMRT plan is prepared: A verification plan is created in the TPS and measurements by Portal Dosimetry (with an EPID*) confirms correctness.
- Tuesday - March 8, 2005
 - The patient begins an IMRT treatment.
 - The plan had passed the QC-process according to the local protocol
 - Verification images from the kV imaging system were checked
 - The treatment is delivered correctly.
- March the 9th, 10th and the 11th, fractions number 2, 3, and 4 are also delivered correctly.



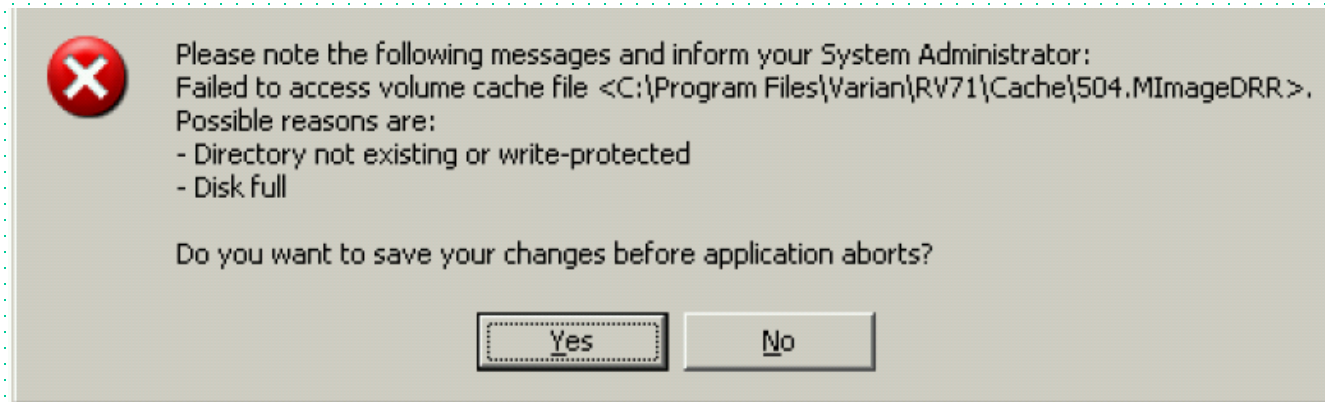
Picture from A van Esch

What Happens?

- Friday - March 11, 2005
 - The physician reviews the case after 4 treatments (either Friday or Monday morning)
 - Wants a modified dose distribution (The RO wanted the plan re-worked to give more protection to Mr. Jerome-Parks's teeth.)
- Monday - March 14, 2005
 - Tasked with carrying out the RO's new intention/plan was a medical physicist.
- On the morning of March 14, the medical physicist revised the treatment plan
 - Re-planning and re-optimization starts.
 - Fractionation is changed. Existing fluences are deleted and re-optimized. New optimal fluences are saved to database (DB).
 - Final calculations are started, where MLC motion control points for IMRT are generated.
- To this point – TPS plan is fine
- ... with the patient waiting in the wings...

Next

Shortly after 11 a.m., as the medical physicist was trying to save the work, the computer began seizing up, displaying an error message.

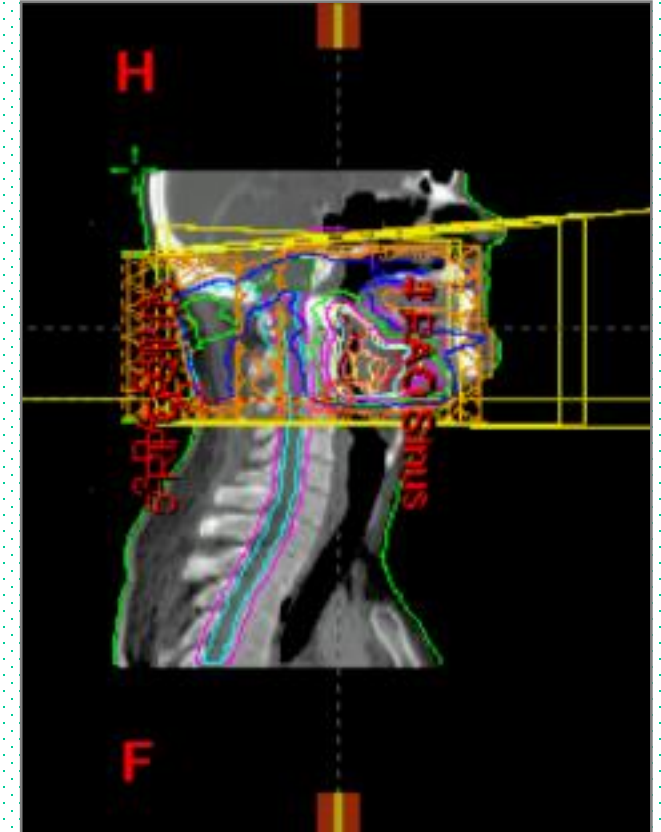


Continuation of the Process

- March 14, 2005, 11 a.m.
 - “Save all” is started. All new and modified data should be saved to the DB.
 - In this case, data to be saved included: (1) actual fluence data, (2) a DRR and (3) the MLC control points
- The actual fluence data is saved normally.
 - Next in line is the DRR. The “Save all” process continues with this; however, this is not completed.
 - Saving of MLC control point data would be after the DRR but this will not start because of the above problem
- The user then terminated the TPS software manually, probably with Ctrl-Alt-Del or Windows Task Manager
 - At manual termination, the DB performs a “roll-back” to return the data in the holding area (cache) to its last known valid state
 - The treatment plan now contains (1) actual fluence data; (2) not the full DRR; (3) no MLC control point data

Next Step Taken

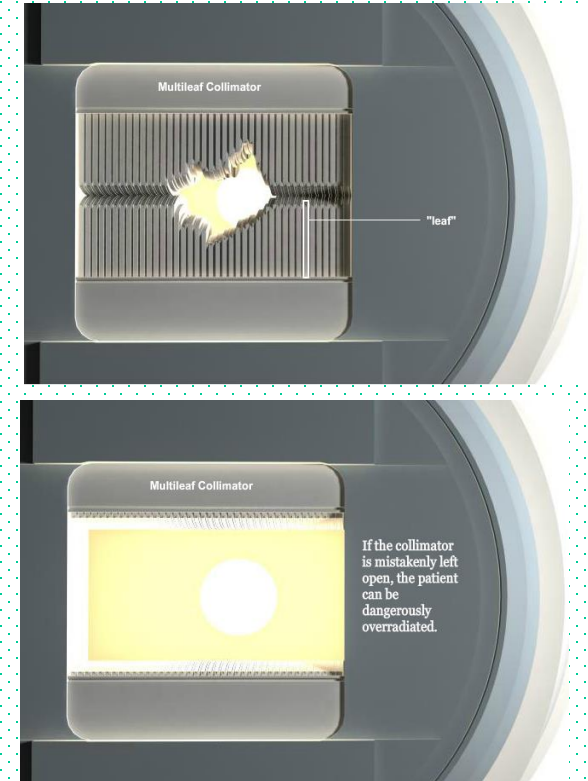
- March 14, 2005, 11 a.m.
 - Within 12 s, another workstation is used to open the patient's plan. The planner would have seen this.
 - Valid fluences are already saved. The calculation of the dose distribution is now done by the planner and saved.
 - MLC control point data are *missing but not required* for calculation of dose distribution – only fluence
 - No verification plan is generated or used - should be done according to local QA program
 - A second physicist should also review the plan
- It is approved by a RO at 12:24 PM
- Patient is still waiting for his treatment



Sagittal view with fields and dose distribution

Discovery of the Erroneous Plan

- Monday to Wednesday - March 14-16, 2005
 - The patient is treated an additional three fractions with the new plan
- Wednesday - March 16, at 6:29 pm a new verification plan is created and run on the treatment machine.
 - What the physicist saw was horrifying: the multileaf collimator (MLC), was wide open.
 - A little more than a half-hour later, the medical physicist tried again. Same result.
 - Finally, at 8:15 pm, The medical physicist ran a third test. It was consistent with the first two.
- A frightful mistake had been made: the patient's entire neck, from the base of his skull to his larynx, had been exposed.
- The patient received 13 Gy per fraction for three fractions, i.e. 39 Gy in 3 fractions
 - Plus the four correctly delivered fractions of 8 Gy in total to the tumour volume



Graphics from
New York Times

Why was it not Detected during Planning?



The sagittal view should have looked like the one to the right, with MLC
Dose distribution is identical

At Treatment R/V Screen

File Edit View Insert Task Workspace Parameters Tools Window Help

Information
 Course: 1 - Curative w/chemo Volume: BODY
 Plan: 1B Oropharynx Machine: Clinac_1

Field: New... Order...
 Views: ☒ Field Graphics ☒ Treatment Unit

Field Order/Type	5 / Treat	6 / Treat	7 / Treat	8 / Treat	9 / Treat
Field ID	3B PA Sinus	1B LPO	2B LAO Sinus	4B RAO Sinus	5B RPO Sinus
Field Name	AP Sinus	LPO	LPO Sinus	RAO Sinus	RPO Sinus
Technique	STATIC	STATIC	STATIC	STATIC	STATIC
Energy / Mode	6X	6X	6X	6X	6X
Dose Rate [MU / min]	300	300	300	300	300
MU	309	291	334	258	262
Time [min]	1.44	1.31	1.58	1.21	1.32
Tot. Table	IMRT_HN	IMRT_HN	IMRT_HN	IMRT_HN	IMRT_HN
SSD [cm]	91.2	90.7	94.2	94.4	90.7
Gantry/Source Rtn [Deg]	180.0	150.0	60.0	300.0	210.0
Coll Rtn [Deg]	90.0	90.0	90.0	90.0	90.0
Field X [cm]	11.0	11.3	11.3	11.3	10.9
X1 [cm]	+1.5	+1.5	+1.5	+1.5	+1.4
X2 [cm]	+9.5	+9.8	+9.8	+9.8	+9.5
Field Y [cm]	14.3	15.0	15.0	15.0	15.0
Y1 [cm]	+7.0	+6.5	+6.5	+6.5	+6.0
Y2 [cm]	+7.3	+6.5	+6.0	+6.5	+9.0
MLC	NONE	NONE	NONE	NONE	NONE
Dynamic Wedge					
Int Mount					
Acc Mount					
Comp Mount					
e - Aperture					
Coach Vrt [cm]					
Coach Lng [cm]					
Coach Lat [cm]					
Coach Rtn [Deg]	0.0	0.0	0.0	0.0	0.0
Imager Vrt [cm]					
Imager Lng [cm]					
Imager Lat [cm]					
Setup Note					

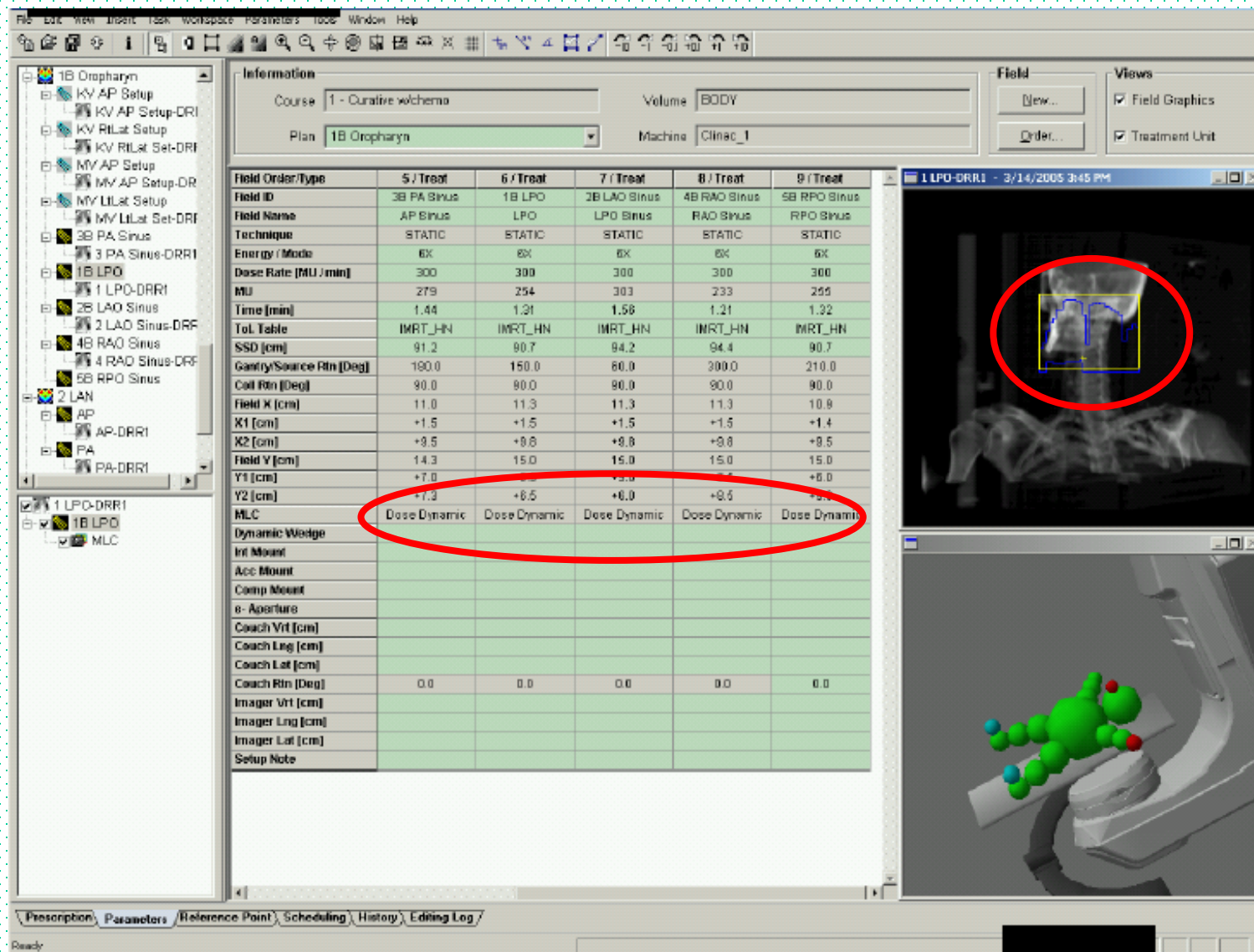
1 LPO-DRR1 - 3/14/2005 11:37 AM

1 LPO-DRR1
 1B LPO
 MLC

Prescription Parameters Reference Point Scheduling History Editing Log

Ready

At Treatment R/V Screen



Information

Course: 1 - Curative w/chemo Volume: BODY

Plan: 1B Oropharynx Machine: Clinic_1

Field: New... Order...

Views: ☒ Field Graphics ☒ Treatment Unit

Field Order/Type	5 / Treat	6 / Treat	7 / Treat	8 / Treat	9 / Treat
Field ID	3B PA Sinus	1B LPO	2B LPO Sinus	4B RAO Sinus	5B RPO Sinus
Field Name	AP Sinus	LPO	LPO Sinus	RAO Sinus	RPO Sinus
Technique	STATIC	STATIC	STATIC	STATIC	STATIC
Energy / Mode	6X	6X	6X	6X	6X
Dose Rate [MU / min]	300	300	300	300	300
MU	279	254	303	233	255
Time [min]	1.44	1.31	1.58	1.21	1.32
Tot. Table	IMRT_HN	IMRT_HN	IMRT_HN	IMRT_HN	IMRT_HN
SSD [cm]	91.2	90.7	94.2	94.4	90.7
Gantry/Source Rtn [Deg]	180.0	150.0	60.0	300.0	210.0
Coll Rtn [Deg]	90.0	90.0	90.0	90.0	90.0
Field X [cm]	11.0	11.3	11.3	11.3	10.8
X1 [cm]	+1.5	+1.5	+1.5	+1.5	+1.4
X2 [cm]	+9.5	+9.8	+9.8	+9.8	+9.5
Field Y [cm]	14.3	15.0	15.0	15.0	15.0
Y1 [cm]	+7.0	+9.0	+9.0	+9.0	+6.0
Y2 [cm]	+7.3	+6.5	+6.0	+9.5	+9.5
MLC	Dose Dynamic	Dose Dynamic	Dose Dynamic	Dose Dynamic	Dose Dynamic
Dynamic Wedge					
Int Mount					
Acc Mount					
Comp Mount					
6 - Aperture					
Coach Vrt [cm]					
Coach Lng [cm]					
Coach Lat [cm]					
Coach Rtn [Deg]	0.0	0.0	0.0	0.0	0.0
Imager Vrt [cm]					
Imager Lng [cm]					
Imager Lat [cm]					
Setup Note					

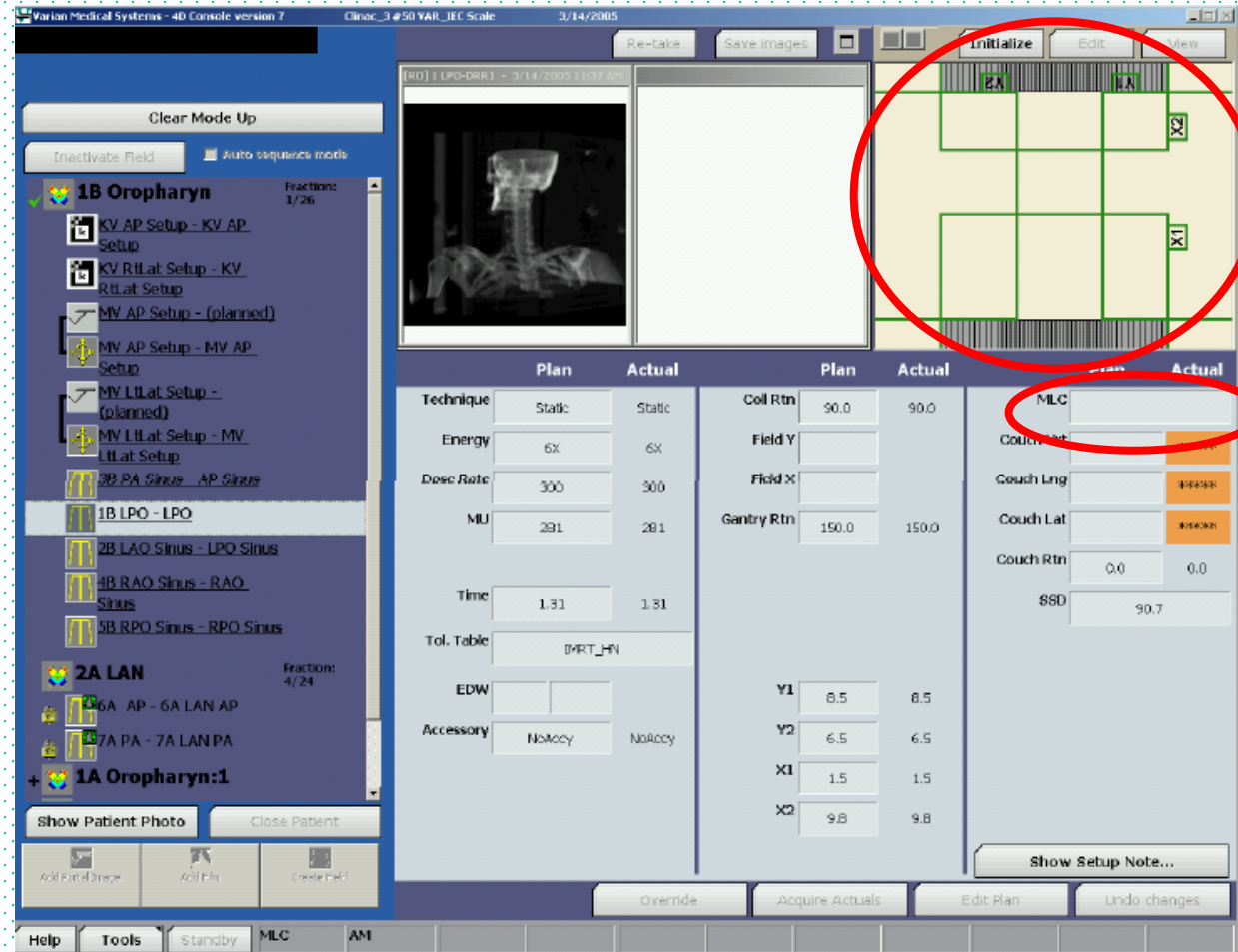
Prescription Parameters Reference Point Scheduling History Editing Log

Should have been noted at verification/QA

At Treatment Console Screen

March 14, 2005, 1 p.m.

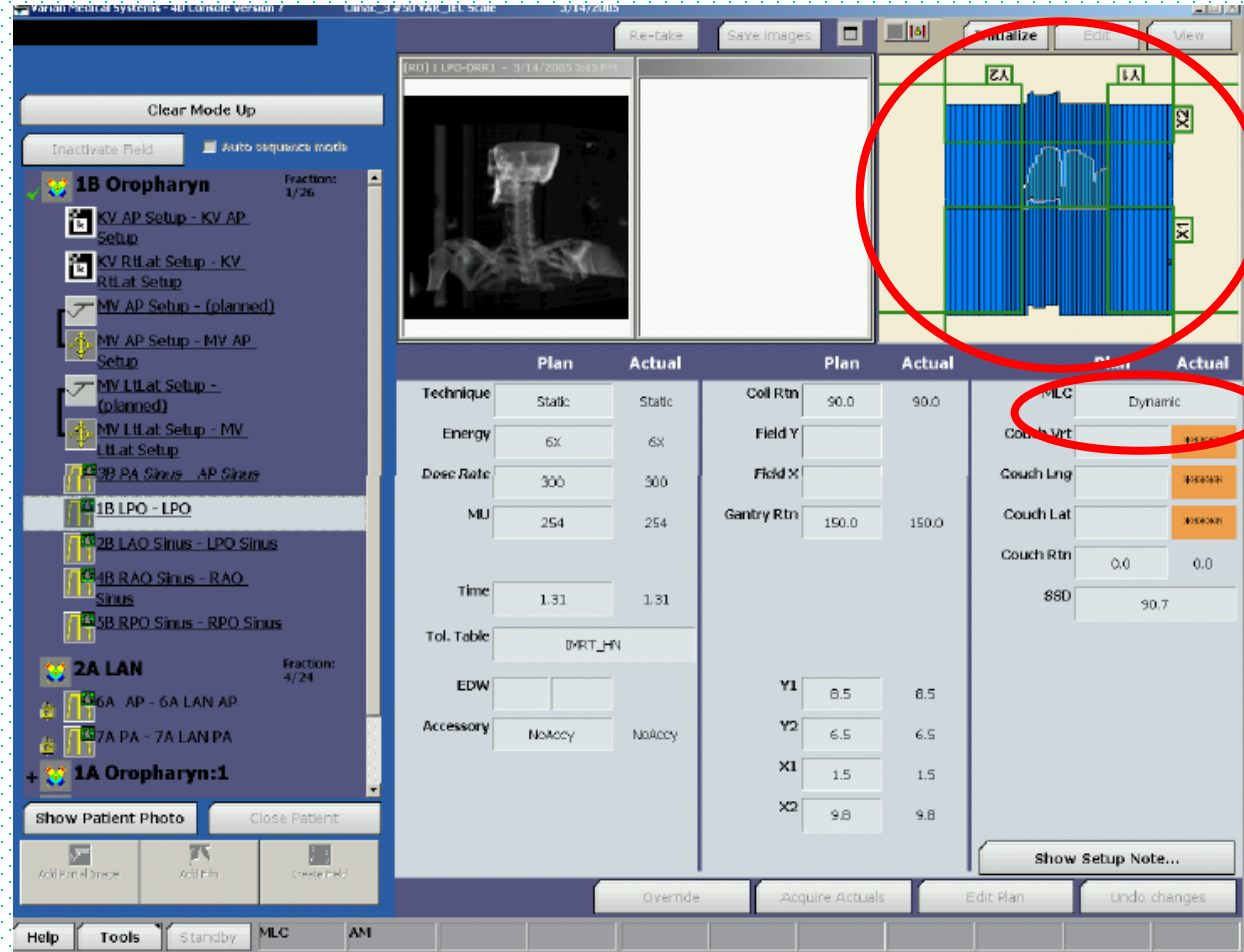
The patient is treated. The console screen would have indicated that MLC is not being used during treatment



At Treatment Console Screen

March 14, 2005, 1 p.m.

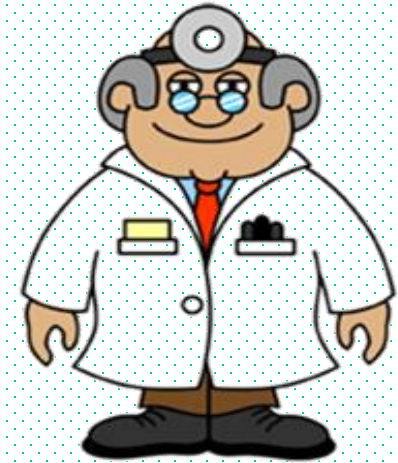
The patient is treated. The console screen would have indicated that MLC is not being used during treatment



Should have been be noted at verification/QA

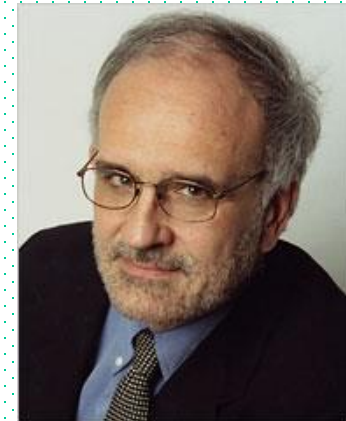
Patient Informed

- Early the next afternoon i.e. Thursday 17 March, as Mr. Jerome-Parks and his wife were waiting with friends for his fourth modified treatment,
- The radiation oncologist unexpectedly appeared.
- There was something he had to tell them.
- For privacy, he took Mr. Jerome-Parks and his wife to a lounge on the 16th floor, where he explained that there would be no more radiation.
- Mr. Jerome-Parks had been seriously overdosed, they were told, and because of the mistake, his prognosis was dreadful.



How was this Disseminated to the Public?

- A journalist at New York Times was interested if accidents in medicine (radiological medicine)
- Stated to look through public information from the Department of Health in New York State
 - All incident should be reported to them in the state of New York
- He found these and more...
- Published a sequence of articles in NYT.
- He was Walt Bogdanich



All Holders of Therapeutic Radiation Linacs

25 March 2005 - DoH

All Users of Varian treatment system must alert to the existence of a system flaw with the potential of leading to a very high overdose.

A dose calculation revealed that the patient received three fractionated treatments in the range of 13-14 Gy per treatment to a volume between the base of the skull and the larynx. Total dose received was approximately 39 Gy.

NEW YORK CITY DEPARTMENT OF HEALTH AND MENTAL HYGIENE
OFFICE OF RADIOLOGICAL HEALTH
2 LAFAYETTE ST, 11TH FLOOR

NEW YORK, NY 10007

March 25, 2005

ORH INFORMATION NOTICE 2005-01

Addressees

All Holders of Therapeutic Radiation LINAC Unit Certified Registrations

Purpose

We are issuing this Information Notice to inform certified registrants operating therapeutic radiation LINAC units of a significant misadministration which occurred during treatment utilizing the Varian VARIS oncology information system. The exact cause of the occurrence is still under investigation by Varian, but the circumstances of the event are serious enough to warrant early notification. All Users of Varian treatment systems must be alert to the existence of a system flaw with the potential of leading to a very high overdose.

Description of Circumstances

On March 14, 15 and 16, 2005, a patient received fractionated treatments for base of the tongue cancer. Normal review protocols were followed. The Prescribed dose per fraction was 2 Gray, using a 5-field IMRT technique. A revised treatment plan was developed by a physicist and approved by a physician to reduce dose to the teeth. Analysis revealed that the dynamic multileaf collimators were wrongly in the open position during the three treatments. A dose calculation revealed that the patient received three fractionated treatments in the range of 13-14 Gy per treatment to a volume between the base of the skull and the larynx. Total dose received was approximately 39-42 Gy.

Preliminary information indicates that a software error resulted in corruption of the MLC data used for this patient's treatment. Although the dynamic MLC files were missing at the time of treatment, they are shown connected to the treatment fields in the Varian VARIS patient management software. Also, the Treatment Field Setup Report showed that the MLC was present in the treatment fields when in fact it was not. When the User tried to access the MLC file the Varian software crashed each time.

Varian notified the FDA on March 22, 2005. It is understood that Varian will submit a Medical Device Report to FDA when they have completed their investigation.

https://www.health.ny.gov/environmental/radiological/radon/radioactive_material_licensing/docs/berp2005_2.pdf

All Holders of Therapeutic Radiation Linacs

25 March 2005



All Users of Varian treatment system utilizing the multifield IMRT technique must be aware of this defect...

https://www.health.ny.gov/environmental/radiological/radon/radioactive_material_licensing/docs/berp2005_2.pdf

Page 3 of 2

March 25, 2005

ORH INFORMATION NOTICE 2005-01 (cont'd)

Effects of Misadministration

The report of misadministration lists possible sequelae in 2 phases. These include a number of serious effects, although the report does not predict the likelihood or severity of each of the possible problems.

Action

Although treatment plans are entered which should cause multileaf collimators to be in place, the VARIS system may not properly actuate collimators. This has resulted in a serious radiation overexposure. All Users of Varian treatment systems utilizing the multifield IMRT technique must be aware of this defect with the multileaf collimators, and must be certain that their systems are not affected by this problem before scheduling further treatments.

Page 2 of 2

All Holders of Therapeutic Radiation Linacs

6 April 2005

Preliminary information indicates that an error with the Varian VARIS software may have resulted in corruption of the multi-leaf collimator data used for the patient's treatment. Each facility should also review the procedures that are utilized for verification that the radiation field is of the appropriate size and shape during the delivery of each IMRT fraction.



DOH STATE OF NEW YORK
DEPARTMENT OF HEALTH
Flanigan Square, 547 River Street, Troy, New York 12180-2216
Antonia C. Novello, M.D., M.P.H., Dr.P.H.
Commissioner
Dennis P. Whalen
Executive Deputy Commissioner

April 6, 2005

RE: LINAC/IMRT Significant Misadministration – Software Error Suspected (Notice No. BERP 2005-1)

Dear Linear Accelerator Registrant:

The New York City Department of Health and Mental Hygiene, Office of Radiological Health issued a notice to its registrants in regard to a significant misadministration which occurred in its jurisdiction. A copy of that notice is attached.

Preliminary information indicates that an error with the Varian VARIS software may have resulted in corruption of the multi-leaf collimator data used for the patient's treatment. Each facility should also review the procedures that are utilized for verification that the radiation field is of the appropriate size and shape during the delivery of each IMRT fraction.

Please review the notice and implement any actions that may be prudent. This notice is being sent to you for informational purposes, therefore, a response is not required. However, if you have experienced a similar software problem, regardless if it involved a patient, please contact this office.

If you have any questions or comments, please call John O'Connell, Janaki Krishnamoorthy, Ph.D., or me at (518) 402-7590, e-mail us at berp@health.state.ny.us or write to:

New York State Department of Health
Bureau of Environmental Radiation Protection
Radioactive Materials Section
547 River Street, Flanigan Square – Room 530
Troy, New York 12180-2216

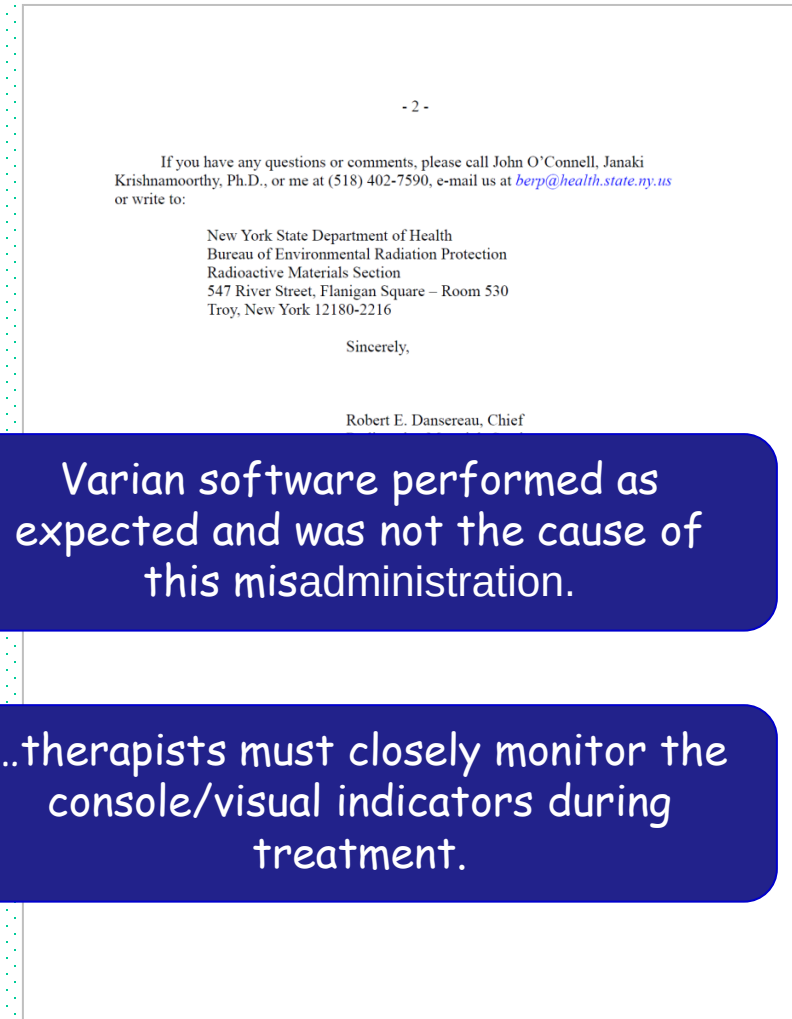
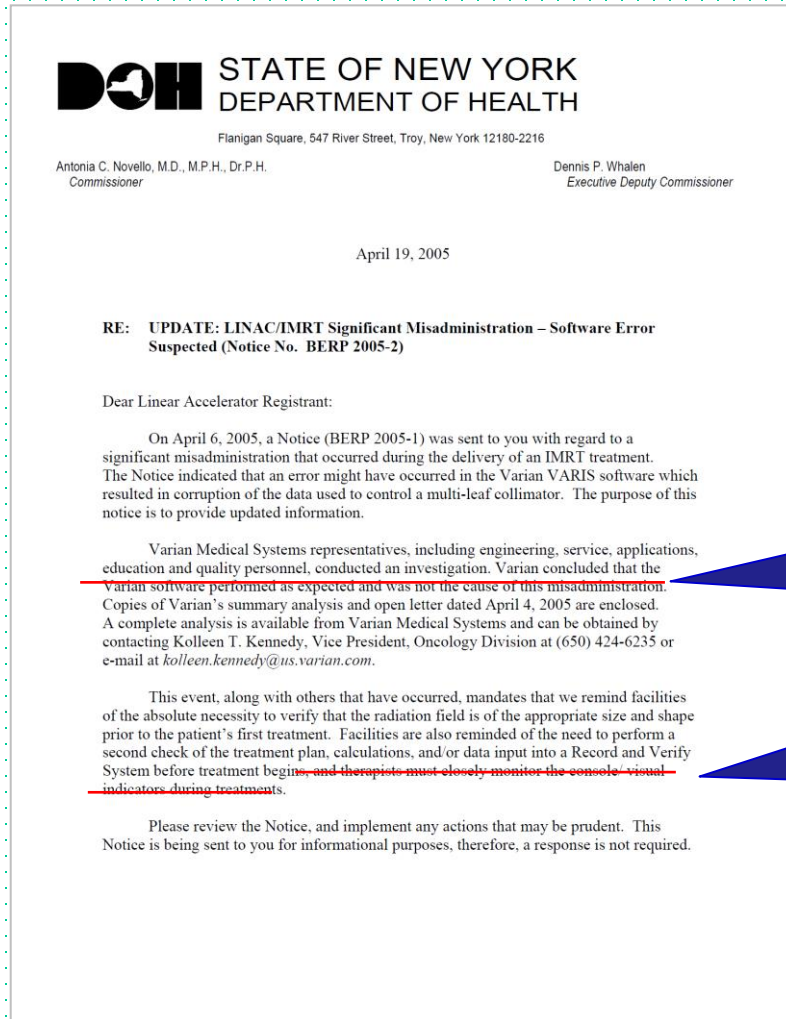
Sincerely,

Robert E. Dansereau, Chief
Radioactive Materials Section
Bureau of Environmental Radiation Protection

https://www.health.ny.gov/environmental/radiological/radon/radioactive_material_licensing/docs/berp2005_1.pdf

All Holders of Therapeutic Radiation Linacs

25 March 2005 19 April 2005



https://www.health.ny.gov/environmental/radiological/radon/radioactive_material_licensing/docs/berp2005_2.pdf

Jan 2010 The New York Times

- Several articles in NYT early 2010
- Lot's of fuss in the community
- Hearing in US
- Meetings etc...



THE RADIATION BOOM

Radiation Offers New Cures, and Ways to Do Harm

By WALT BOGDANICH
Published: January 23, 2010

As Scott Jerome-Parks lay dying, he clung to this wish: that his fatal radiation overdose — which left him deaf, struggling to see, unable to swallow, burned, with his teeth falling out, with [ulcers](#) in his mouth and throat, nauseated, in severe pain and finally unable to breathe — be studied and talked about publicly so that others might not have to live his nightmare.

[Enlarge This Image](#)



For his last Christmas, Scott Jerome-Parks rested his feet in buckets of sand his friends had sent from a childhood beach. [More Photos »](#)

Sensing death was near, Mr. Jerome-Parks summoned his family for a final Christmas. His friends sent two buckets of sand from the beach where they had played as children so he could touch it, feel it and remember better days.

Mr. Jerome-Parks died several weeks later in 2007. He was 43.

A New York City hospital treating him for tongue [cancer](#) had failed to detect a computer error that directed a linear accelerator to blast his brain stem and neck with errant beams of radiation. Not once, but on three consecutive days.

☒ SIGN IN TO RECOMMEND

TWITTER

SIGN IN TO E-MAIL

PRINT

REPRINTS

SHARE



Energy and Commerce - Subcommittee on Health held a hearing entitled "Medical Radiation: An Overview of the Issues" on Friday, February 26, 2010 to Promote the use of Radiation in Medicine



Panel I

Mr. James Parks
Dr. Rebecca Smith-Bindman M.D.
Mr. Eric E. Klein Ph.D.
Ms. Cynthia H. McCollough Ph.D.
Ms. Suzanne Lindley

Panel II

Mr. Michael G. Herman Ph.D.
Ms. Sandra Hayden B.S.
Dr. E. Stephan Amis Jr.
Dr. Tim Williams
Mr. David N. Fisher
Mr. Kenneth Mizrach



Chairman Mr Pallone, NJ

Available at: <http://www.youtube.com/watch?v=NcqRgVqeQSg>
http://www.youtube.com/watch?v=L_IzTqhghMs

Lessons to Learn

- Do what you should be doing according to your QA program – do not override barriers
 - The error could have been found through verification plan (normal QA procedure at the facility) or independent review or...
- Be alert when computer crashes or freezes, when the data worked on is safety critical
- Education and Training
- Work with awareness at treatment unit, and keep an eye out for unexpected behaviour of machine

February 2007

Sensing that death was near, Mr. Scott Jerome-Parks and his wife summoned his family for a final Christmas together.

Friends sent buckets of sand from the beach in Gulfport, Miss., where they had played together, so that he could sink his feet in it and remember happy times. Two month later in Febr. 2007 he died from his injuries.



The New York Times



It was important to Scott Jerome-Parks that his fatal radiation overdose be studied and talked about publicly, so that others could learn from his misfortune. He died in February 2007. He was 43 years old.

The New York Times

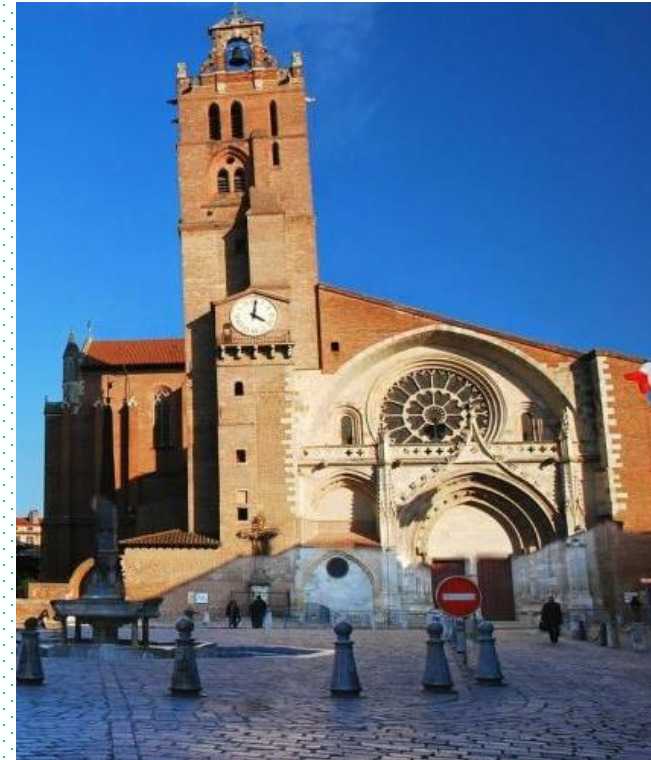
References

- [Treatment Facility] Incident Evaluation Summary, CP-2005-049 VMS. 1-12 (2005)
- ORH Information Notice 2005-01. Office of Radiological Health, NYC Department of Health and Mental Hygien (2005)
- New York Times series of articles by Walt Bogdanich 2010

Menu

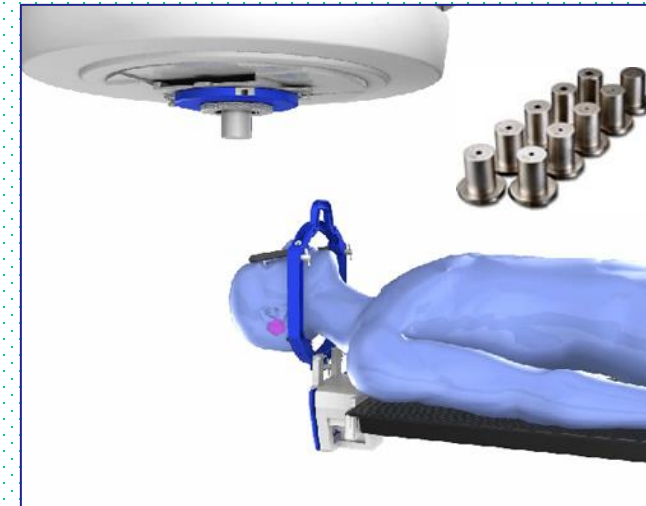
Erroneous Commissioning of a Linear Accelerator for Stereotactic Treatments

France



Inappropriate Calibration

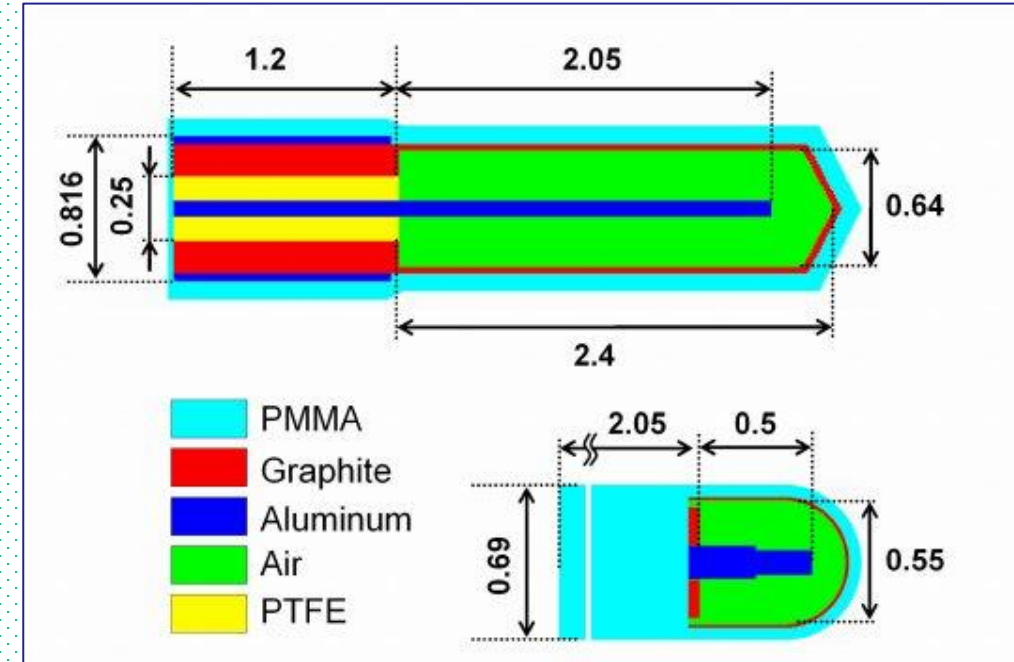
- Reported 2007 at Hôpital de Rangueil in Toulouse, France
- In April 2006, the physicist in the clinic commissioned the new BrainLAB Novalis stereotactic unit
 - This unit can operate with microMLC's (3 mm leaf-width) or conical standard collimators



For illustration only

Background

- Very small fields can be defined with the microMLC's
 - High dose to a 6 x 6 mm² field is within capability
 - The TPS requires percent depth doses, beam profiles and relative scatter factors down to this field size
 - Care must be taken when measuring small fields!
- Different measuring devices were used by the physicist
 - A measuring device not suitable for calibrating the smallest microbeams was used
 - “...an ionisation chamber of inappropriate dimensions...” according to Nuclear Safety Authority (ASN) inspectors
- The incorrect data was entered into the TPS
 - All patients treated with micro MLC were planned based on this incorrect data
 - Patients treated with conical collimator were not affected



On top – Farmer chamber 0.6 cc
Bottom – Pin-point chamber
Measures in cm

Discovery and Impact of the Accident

- BrainLAB* discovered that the measurement files did not match up with those at other comparable centres, during a worldwide intercomparison study aiming for a golden standard beam data
- Treatment based on the incorrect data went on for a year (Apr'06 – Apr'07)
- All patients treated with microMLC were affected (145 of 172 stereotactic patients)
- The dosimetric impact was evaluated as small in most cases, with 6 patients identified for whom over 5% of the volume of healthy organs may have been affected by dose exceeding limits/tolerances

Discovery and Impact of the Accident

- BrainLAB* discovered that the measurement files did not match up with those at other comparable centres, during a worldwide intercomparison study
- Treatment based on measurements for a year (Apr'06 – Apr'07)
- All patients treated for local measurements or implementation (45 of 172 stereotactic patients)
- The dosimetric impact was evaluated as small in most cases, with 6 patients identified for whom over 5% of the volume of healthy organs may have been affected by dose exceeding limits

*It should be noted that the company does not validate or hold any responsibility for local measurements or implementation

Lessons to Learn

- Ensure that staff
 - Understand the properties and limitations of the equipment they are using
 - “know and understand your dosimetry system completely, including its limitations, before applying it to a particular validation task” – was pointed out by John Schreiner*
- Include in the Quality Assurance Program
 - Intercomparison with other hospitals, i.e. independent check of new equipment by independent group (using independent equipment) before equipment is clinically used

References

- Report concerning the radiotherapy incident at the university hospital centre (CHU) in Toulouse – Rangueil Hospital. ASN – Autorité de Sûreté Nucléaire (2007)



CoxHEALTH

CoxHealth Issues Statement on Increased Radiation for Patients

By KSPR News
Story Created: Feb 24, 2010 at 4:29 PM CST
(Story Updated: Feb 24, 2010 at 6:47 PM CST)
CoxHealth Issued this news release:

TOOLS

EMAIL THIS ARTICLE	PRINT THIS ARTICLE
YOUNEWS™	DIGG THIS!
SAVE TO DELICIOUS	POST TO FACEBOOK
SHARE ON TWITTER	Close

They are not alone
Small field dosimetry have
some risks

Menu

**Non-updated data
route
or
Erroneous use of
treatment planning
and oncology
information systems**



Glasgow UK

Incorrect Manual Parameter Transfer

- Introduced a new common R/V system for linacs in 2005
- This allowed automatic transfer of TPS data to the R/V and available for treatment at the linac
 - Previously this was done manually
- Previously all plans were calculated for 1 Gy as prescribed dose
 - The MUs were scaled to correct dose manually
- Now all plans could be made for the correct prescribed dose

Overview of Process

Table from: "Report of an investigation by the Inspector appointed by the Scottish Ministers for The Ionising Radiation (Medical Exposures) Regulations 2000"

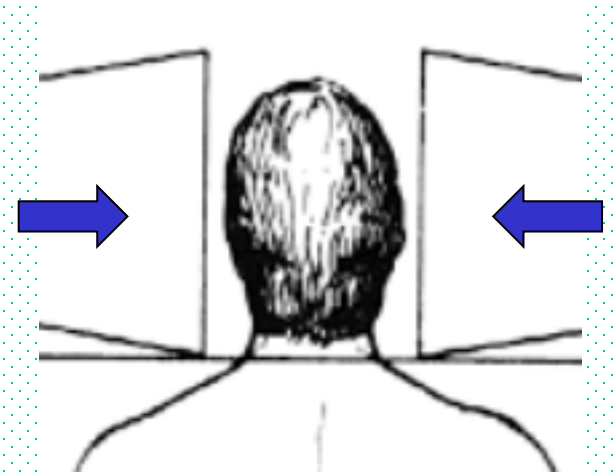
- 15 years old girl, started her whole Central Nervous System (CNS) treatment
- The treatment plan was divided into head-fields and lower and upper spine-fields
- HOWEVER - Whole CNS plans still went by the "old system", where TPS calculates MU for 1 Gy with subsequent upscaling for dose per fx
- A "medulla planning form" was used, which is passed to RTTs for final MU calculations
- The "Planner X" used the new method and let the TPS calculate the MU for the full dose per fx – not for 1 Gy as before
- Since the dose per fx to the head was 1.67 Gy, the MU's entered in the form were 67% too high for each of the two cranial fields
- Passed second check and the MU was multiplied with 1.67 => dose 2.92 Gy/fx

MEDULLA PLANNING FORM			FM.14.014	
TWO SPINE FIELDS				
Name:		Site:		
B.O.C. No:		Unit:		
Radiotherapist:		Date:		
Physics:				
Setup	Head fields isocentric; asymmetric jaws; customised shielding trays. Physics to move junction after every fractions (see over).			
Site	Head (a)		Upper Spine (b)	Lower Spine (c)
Description	Right Lateral	Left Lateral	Posterior	Post / Sup
Field Size (approx for first fractions)				
Jaw Settings	X ₁ Y ₁ X ₂ Y ₂	X ₁ Y ₁ X ₂ Y ₂		
F.S.D.	ISOCENTRIC		100 cm	100 cm
Gantry Angle	90°	270°	0°	(i.e.° to sup)
Collimators	° (i.e.° Sup End Post)	° (i.e.° Sup End Post)	90°	90°
Floor Rotation	0°	0°	270°	270°
Beam Modifier	Shielding block tray code =	Shielding block tray code =	Wax compensator (a). tray code 17	Wax compensator (b). tray code 17
Beam Weight (%)	100% (a)	100% (a)	100% (b)	100% (c)
Output (MU/100cGy)				
Dose Information	T.A.D. mid brain = 100%		spinal cord:%	spinal cord:%
	Normalisation = %		max subcut:%	max subcut:%
File Name: FM14014	Page Number: 1 of: 1		Date: 11.8.98	
Issue Number: 1	Authorised By:		Issued By:	

Output
(MU/100cGy)

Discovery of Accident

- “Planner X” calculated another plan of the same kind and made the same mistake
- This time, the error was discovered by a senior checker (1st of Feb ‘06)
- The same day, the error in calculations was also identified for the previous patient
- The total dose from the Right and Left Lateral head fields was 55.5 Gy (19×2.92 Gy)
- Patient died nine months after the accident
- Probably due to recurring disease



Lessons to learn

- Ensure that all staff
 - Are properly trained in safety critical procedures
 - Are included in training programmes and has supervision as necessary, and that records of training are kept up-to-date
 - The experienced planner supervised and checked the plan (i.e. checking her/him self)
 - Understand their responsibilities
- Include in the Quality Assurance Program
 - Formal procedures for verifying the risks following the introduction of new technologies and procedures
 - Independent MU checking of ALL treatment plans
- Review staffing levels and competencies

Menu

This is the end of this lecture

