RT PACS

14Oct2017

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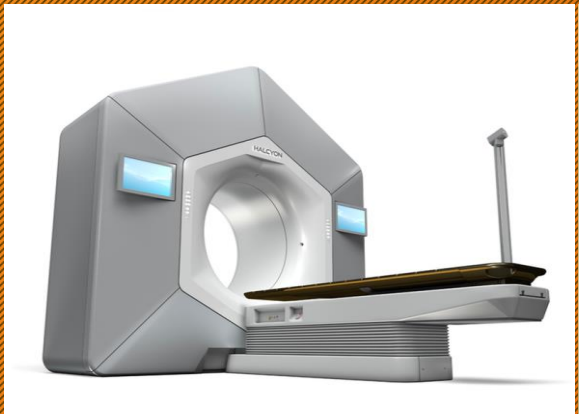
RT PACS

- Radiation Therapy (RT) is a treatment regime for cancer patients.
- Delivery 6 Mega Voltage (MV) X-ray beam for treatment purpose.
- Include treatment plans, verification of daily treatment positioning and monitor therapeutic dose delivered.

RT Machines

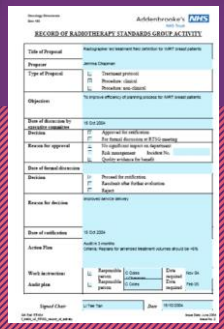
- Linear Accelerators



- Tomotherapy

- CyberKnife

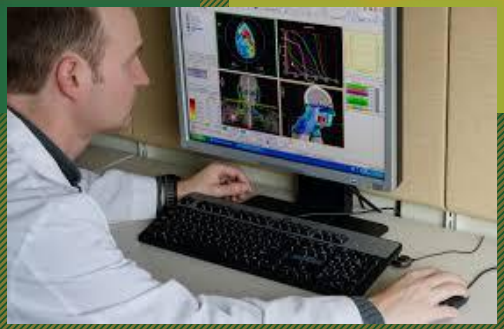
PLANNING & TREATMENT WORKFLOW



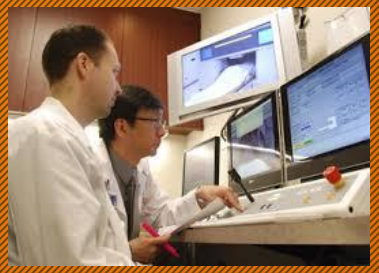
Referrals
Oncologist

Immobilization
Radiation Therapist

Localization
Radiation Therapist



Individualized plans
Oncologist
Medical Physicist
Radiation Therapist



Treatment
Radiation Therapist

Image verification
Radiation Therapist

Positioning
Radiation Therapist

Dosimetric checks
Medical Physicist

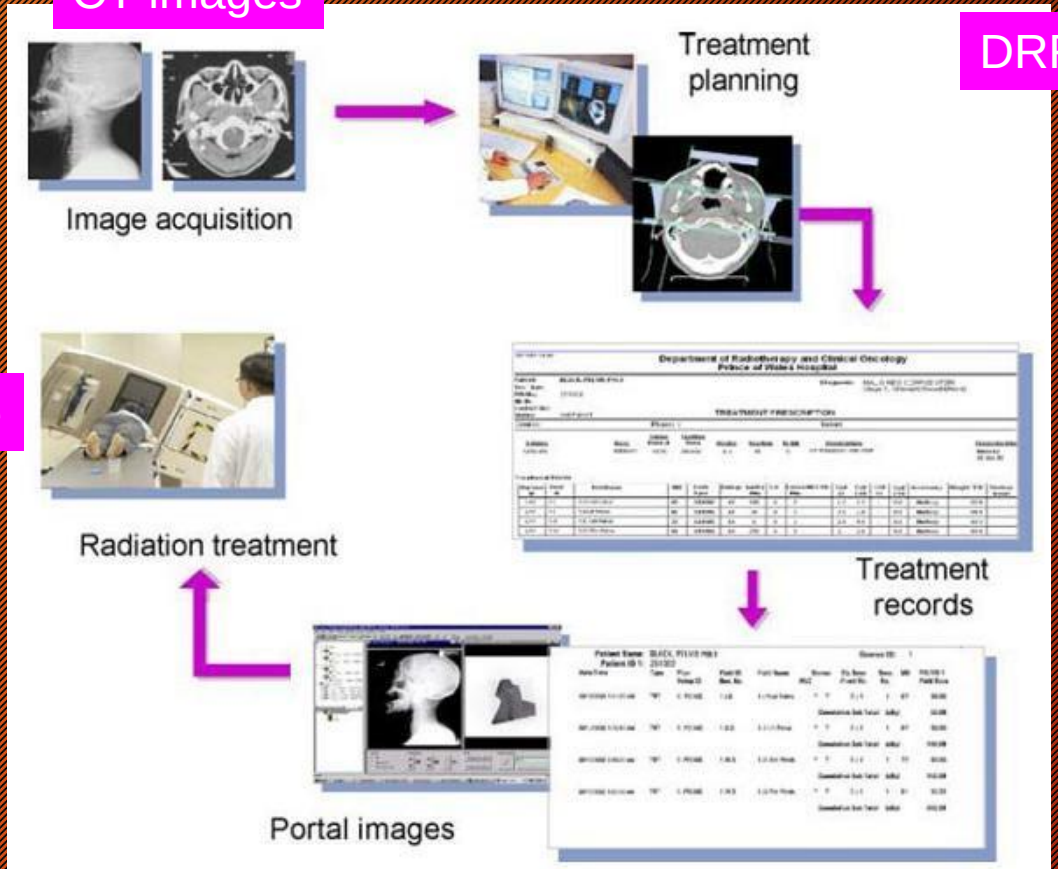
RT PACS

MRI, PET, CT images

Structures contoured

DRR images

CT images

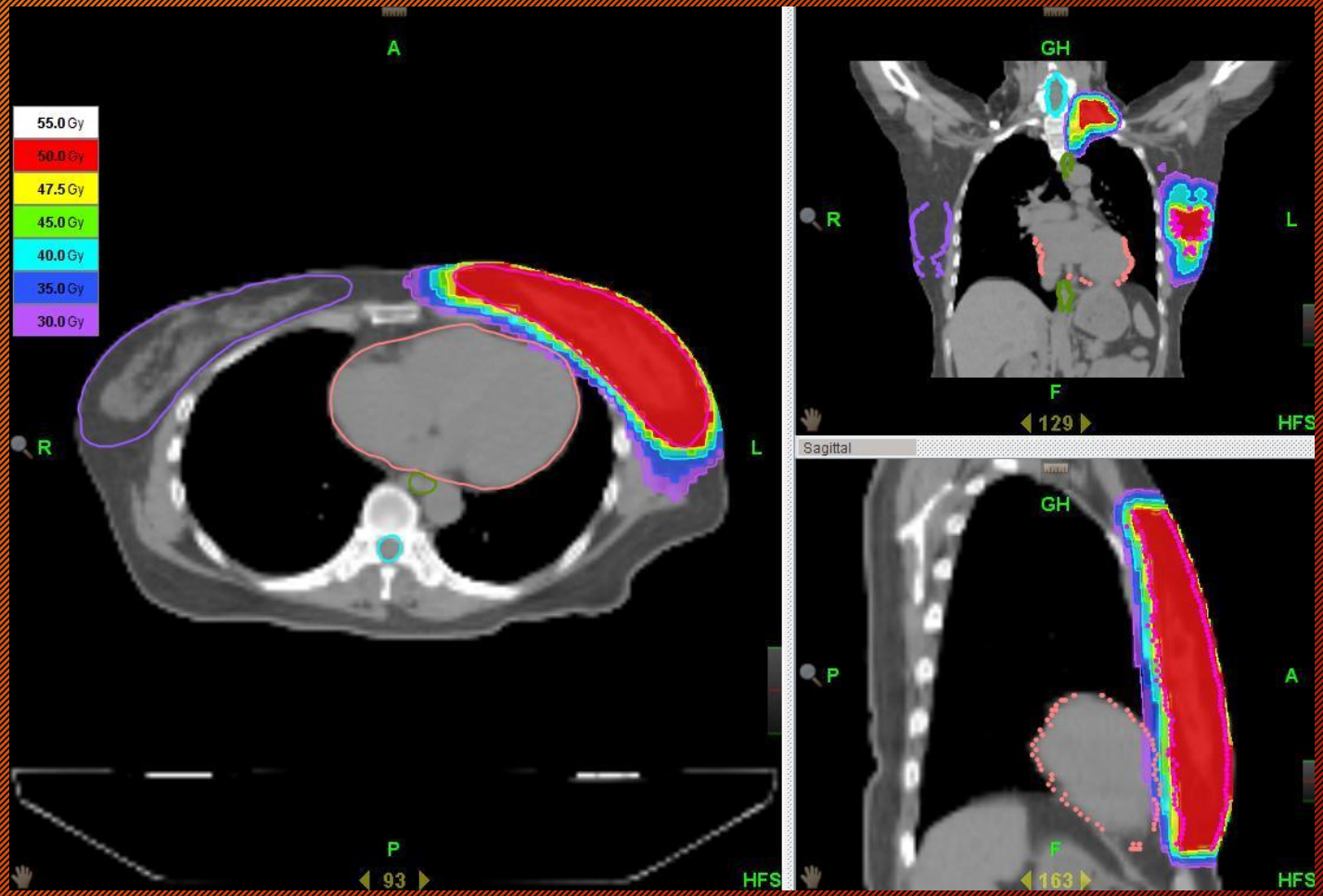


RT Dose

Plans

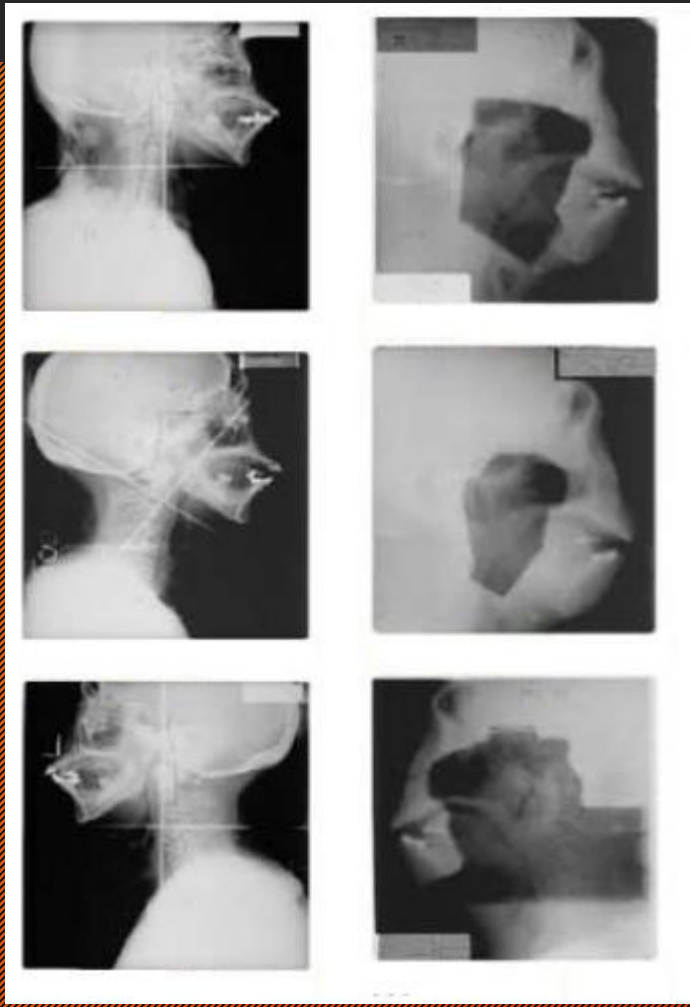
Verification images

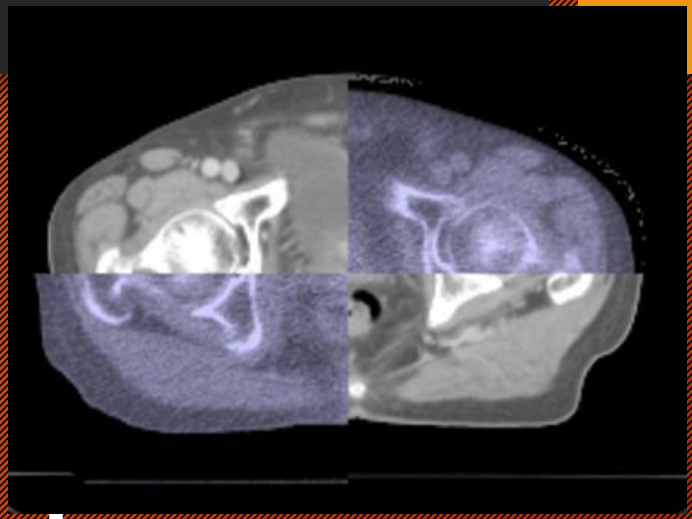
RT PACS – Treatment Plan (Breast)



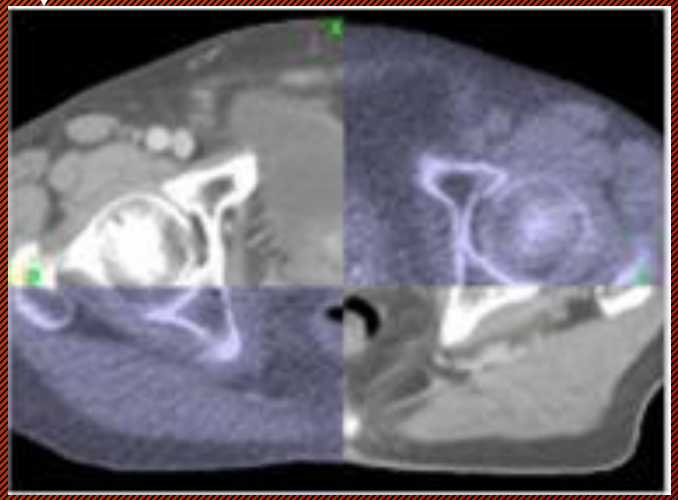
RT PACS – Treatment Plan (Head and Neck)

RT PACS – Treatment Verification





- Automatic couch shift



Object	Description
Spatial registration	Stores the relation between the frames of reference of two image sets (image registration)
RTSTRUCT	Structures contoured on images. Enclosed the target volume or critical organs to be avoided. Contains no pixel (image) data.
RTPLAN	Rx delivery details and geometry. Contains no pixel (image) data.

Object	Description
RTDOSE	Dose delivered by a specified plan.
RTIMAGE	Planar simulator images, digitally reconstructed radiographs (DRR) of portal images acquired during treatment. It contains more geometric information .
RTRECORD	Record of single session or summary of Rx.

Patient name	Chan Mei Mei																
Patient ID	A123456																
Sex	Female																
Age	45																
Telephone	987654																
Address	10 Peter street, Hong Kong																
Course	1																
Region	Breast Axilla																
	1 Aug 02	2 Aug 02	3 Aug 02	4 Aug 02	5 Aug 02	6 Aug 02	7 Aug 02	8 Aug 02	9 Aug 02	10 Aug 02	11 Aug 02	12 Aug 02	13 Aug 02	14 Aug 02	15 Aug 02	16 Aug 02	17 Aug 02
DICOM image																	
CT/CT sim	x																
MR																	
RT Image																	
Simulation image		x															
DRR																	
Portal image							x										
Treatment plan (RT Structure Set, RT Plan, RT Dose)					x												
RT Beams Record					x												
No. of treatment							1	2	3			4	5	6	7	8	
Brachy Record																	
Treatment Status									Continue RT							Continue RT	
Treatment comment																	
Treatment Summary Record	x	x			x		x	x	x			x	x	x	x	x	

RT PACS

Storage

- CT reference data set: 50-75MB each
- CBCT (Elekta): 80MB each
- CBCT (Varian/Siemens): 35MB each
- EPID: 0.3 - 3MB
- OBI: 1.5 – 3MB
- DRR 6MB
- Patient setup photo: 0.1 – 0.8 MB
- Treatment Plan: 0.02-0.5MB
- Total disk space for 3 yrs of growth (1200patients annually): 2 TB

Microsoft Excel - LSR99001a.xls

File Edit View Insert Format Tools Data Window Help

Type a question for help

Arial 11 85%

Favorites Go C:\Documents and Settings\rt\Desktop\WorkingLocal\Elekta\LSR99

F56 fx MB

	A	B	C	D	E	F	G
1	See Example Sheet for instructions	Type in the	BLUE CELLS		Calculated		Last Update 10/17/2011
2	Data Source	Estimated # of Patients Year 1	# Per Patient	Site Image Size (KB)	Total Data Size (MB)	Impac Size Estimate	Notes / Anticipated Frequency
3	**Future Cone Beam Storage** - these images are stored as BLOBS in the MOSAIQ SQL database until MOSAIQ v2.10 and above. In MOSAIQ v2.10 and above these images are moved out of the database to the external data share.						
4	CT Reference Data Set	2400	1	75000	175781	50-75 MB each	1 – 2 per patient
5	CBCT Elekta					80 MB each	
6	Brain	0	0	80000	0		1 - 3 per week
7	Head/Neck	0	0	80000	0		3 - 5 per week
8	Lung	0	0	80000	0		1 - 3 per week
9	Pelvis	0	0	80000	0		3 - 5 per week
10	CBCT Varian / Siemens					35 MB each	
11	Brain	113	2	35000	7725		1 - 3 per week
12	Head/Neck	144	7	35000	34453		3 - 5 per week
13	Lung	204	7	35000	48809		1 - 3 per week
14	Pelvis	336	7	35000	80391		3 - 5 per week
15							
16	Total Future Cone Beam Storage	☐ AVS Files Enabled (MOSAIQ 2.2+ only)			347158	MB	AVS Files Increase CBCT related performance, but approx double storage requirements.
17							
18	**Future External Image Storage** - these images are stored outside of the database in the external data share.						
19	EPID	312	2	3000	1828	300 k-3 MB	Avg of 3 per patient per week, excluding the IMRT OBI patients.
20	OBI	1200	48	3000	168750	1.5 MB – 3 MB	2 per IMRT patient per day, every day
21	Kodak CR	0	0	1000	0	300k-1 MB	Avg 2.5 per patient per week
22	Accelatronics/Orex CR	0	0	3500	0	700 k-3.5 MB	Avg 2.5 per patient per week
23	Fugi CR	0	0	4000	0	4 MB	Avg 2.5 per patient per week
24	DRR	1200	3	4000	14063	300 k-750 k with some hi-res up to 4 MB	Avg 3 per patient. Probably 80% of patients.
25	Acuity DRR	312	2	6000	3656	As big as 6 MB	
26	Digital Radiograph	0	0	800	0	300 k-800k	
27	Vidar scanned image	0	0	1000	0	750 k-1.25 MB	
28							
29	Total Future External Image Storage				188297	MB	
30							
31	**Future External Documents Storage** - these scanned images and text documents are stored outside of the database in the external data share.						
32	Patient Setup/ID Photos from digital camera	2400	2	500	2344	100-800 k depending on camera resolution	Elekta recommends lowest mega-pixel resolution to reduce image size as much as appropriate.
33	Treatment Plans exported as PDF files	2400	1	500	1523	20 -500 k	Exported from ADAC, CMS, or Elekta as PDF files and imported into eSCAN.
34	eSCAN – Text documents	2400	10	100	2344	100K	IMPAC recommends black/white, Group 3/4 compressed TIF, 200 DPI. Higher resolution or color/grayscale will greatly increase file size.
35	eSCAN – Graphics	2400	10	300	7031	300k	
36	eSCAN - PDF	2400	10	100	2344	Variable 100kb - 4MB	Standard MS-Word Document
37	eSCRIBE	2400	1	80	244	80-100k	
38	Structured Noting (PhastNote)	2400	5	30	352	30-80k	Rich-Text Document
39							
40	Total Future External Document Storage				16181	MB	

Actual Calculations / Example

Ready

EN NUM

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Microsoft Excel - LSR99001a.xls

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F56 MB

	A	B	C	D	E	F	G
41							
42	Current MOSAIQ Data (enter value in GB)		0		0	MB	Current amount of data in the MOSAIQ_DATA directory
43	Current CBCT in SQL DB (enter value in KB)		138240000		135000	MB	Amount of CBCT data currently in the MOSAIQ SQL DB and being migrated to MOSAIQ_DATA. This value is in KB and can be obtained by executing the following SQL query against the MOSAIQ DB. The value in KB you want is the RESERVED column. SP_SPACEUSED
44							
45	Total Of Current MOSAIQ Data + Current CBCT				135000	MB	
46		Total Storage Year 1					
47		Future Cone Beam			347,158	MB	
48		Future External Images			188,297	MB	
49		Future External Documents			16,181	MB	
50		Current MOSAIQ Data / CBC			135,000	MB	
51		Total MB Year # 1			686,636	MB	This is the amount of disk space required as part of an upgrade to MOSAIQ v2.10 or higher + additional storage Year # 1.
52							
53		Total Storage Year 2					
54		Increase In Patient Load			12	%	This value should be given as a percentage and is the increase in patient load between Year # 1 and Year # 2. (Average increase is 10% - 15%)
55		Total data increase			66,196	MB	Additional patient load storage requirement.
56		Total MB Of Storage Year #			617,833	MB	Total disk space requirement Year # 2.
57							
58		Total Storage Year 3					
59		Increase In Patient Load			12	%	This value should be given as a percentage and is the increase in patient load between Year # 2 and Year # 3. (Average increase is 10% - 15%)
60		Total data increase			74,140	MB	Additional patient load storage requirement.
61		Total MB Of Storage Year #			691,973	MB	Total disk space requirement for Year # 3.
62							
63	MOSAIQ	TOTALS:			1,996,442	MB	Total disk space requirement for 3 years worth of growth in MB.
64					1,949.65	GB	Total disk space requirement for 3 years worth of growth in GB.
65	CE 0086				1.9	TB	Total disk space requirement for 3 years worth of growth in TB.
66							
67							

Manufacturer
Elekta Business Area Software Systems
IMPAC Medical Systems, Inc.
100 Mathilda Place
5th Floor
Sunnyvale, CA 94086
USA

Actual Calculations / Example

Ready

NUM

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Bibliography

- Shakeshaft J, PACS in Radiotherapy. RAD Magazine, 433, 13-14.
- Law MYY, A model of DICOM-based electronic patient record in radiation therapy. Computerized Medical Imaging and Graphics 29(2005) 125-136.

THANK YOU!

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