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Hodgkin and Non Hodgkin Lymphomas: a new Role for Radiation Therapy?

Radiotherapy in non Hodgkin lymphoma: Radiotherapy:Volumes

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CLINICAL INVESTIGATION **Lymphoma**

STAGING AND MANAGEMENT OF LOCALIZED NON-HODGKIN'S LYMPHOMAS: VARIATIONS AMONG EXPERTS IN RADIATION ONCOLOGY

RICHARD W. TSANG, M.D., MARY K. GOSPODAROWICZ, M.D., AND BRIAN O'SULLIVAN, M.D.

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Int. J. Radiation Oncology Biol. Phys., Vol. 52, No. 3, pp. 643–651, 2002

Purpose: To examine the opinions of radiation oncology experts on the management of lymphomas with respect to staging procedures, treatment plan, radiation target volume, and dose prescription. Our aim was to identify the patterns of practice and areas of controversy that may need to be resolved and be amenable to prospective clinical trials.

Conclusions: This survey demonstrated a high degree of consensus regarding the overall management plan of localized lymphomas among the sampled expert radiation oncologists. However, the recommendations regarding the specifics of chemotherapy and RT remain variable. There is clearly no agreement on the most appropriate RT dose and volume. The large variation in the treatment of leptomeningeal relapse of diffuse large B-cell lymphoma suggests that the optimal treatment in this situation is poorly defined, and the clinical outcome with RT, as well as the rationale for decision making, should be examined in more detail.

CLINICAL INVESTIGATION Lymphoma

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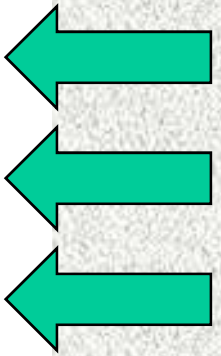
Table 4. RT target volume (Case 1–4)

	Number	Percent
Case 1 (Stage IA follicular, neck)		
Unilateral neck	18	66.7%
> unilateral neck, < mantle	6	22.2%
Mantle	2	7.4%
Total nodal	1	3.7%
Case 2 (Stage IA DLC, inguinal)		
Unilateral inguinal only	5	18.5%
Unilateral inguinal-pelvic	19	70.4%
Bilateral inguinal-pelvic	1	3.7%
Inverted Y	2	7.4%
Case 3 (Stage IAE gastric lymphoma)		
AP-PA opposed fields	14	51.9%
CT planning/multiple fields	11	40.7%
Not specified	2	7.4%
Case 4 (Stage IAE, bone lymphoma)		
Partial humerus	8	29.6%
Whole humerus	15	55.6%
Bone + axillary node	3*	11.1%
Not specified	1	3.7%

* Two physicians prescribed treatment to whole humerus.



“ The observations in our study suggest that the radiation target volume in lymphoma should be defined more rigorously”.

“The definitions of involved-field radiotherapy require revision and uniform application”

WHICH VOLUME?

Nodal lymphoma

Localized large cell lymphoma: is there any need for radiation therapy?

Daniel O. Persky and Thomas P. Miller

Current Opinion in Oncology 2009, 21:401–406

Table 1 Clinical trials in localized large cell lymphoma involving radiation therapy

Trial	Phase	Age (median)	Risk factors	Treatment arms	In-field relapse (%)	In-field cancers	*N*	PFS (years)	OS (years)
SWOG 8736	III	59	68% stage I, 3% bulky	CHOP × 3 + IFRT			200	76 (5)	82 (5)
				CHOP × 8			201	67 (5)[b]	74 (5)[b]
BCCA	[a]	64	61% stage I	CHOP (–like) + IFRT	18	6/40	308	81 (5)	80 (5)
ECOG 1484	III	59	32% stage I, 31% bulky	CHOP × 8 + IFRT (CR only)	18		79	73 (6)	87 (5)
				CHOP × 8 (CR only)			93	56 (6)	73 (5)
LNH 93-1	III	47	67% stage I, 11% bulky	CHOP × 3 + IFRT	28	1/9d	329	74 (5)	81 (5)
				ACVBP + consolidation			318	82 (5)[b]	90 (5)[b]
LNH 93-4	III	68	65% stage I, 8% bulky	CHOP × 4 + IFRT	34	3/20d	295	64 (5)	72 (5)
				CHOP × 8			278	81 (5)	83 (5)

CR; Complete Remission; IFRT; involved field radiation therapy; OS, overall survival; PFS, progression-free survival.
[a] BCCA is sequential experience, not a trial, and no patients with bulky disease were reported.
[b] Statistically significant ($P < 0.05$). In-field cancer rate is proportion of solid cancers occurring in the radiation field (d, only deaths from such cancers were reported in the study).

LOCALIZED NODAL DIFFUSE B NHL

WHICH VOLUME?

INVOLVED FIELD (IFRT)

Table 4. RT target volume (Case 1–4)

	Number	Percent
Case 1 (Stage IA follicular, neck)		
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LOCALIZED NODAL DIFFUSE B NHL

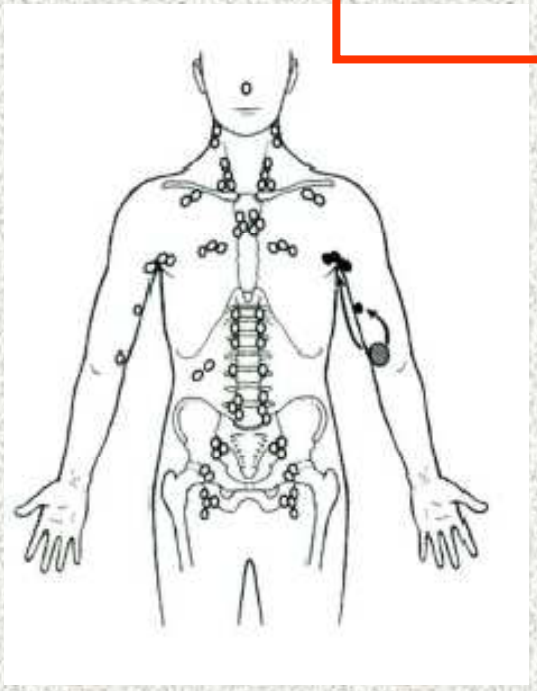
INVOLVED FIELD (IFRT)

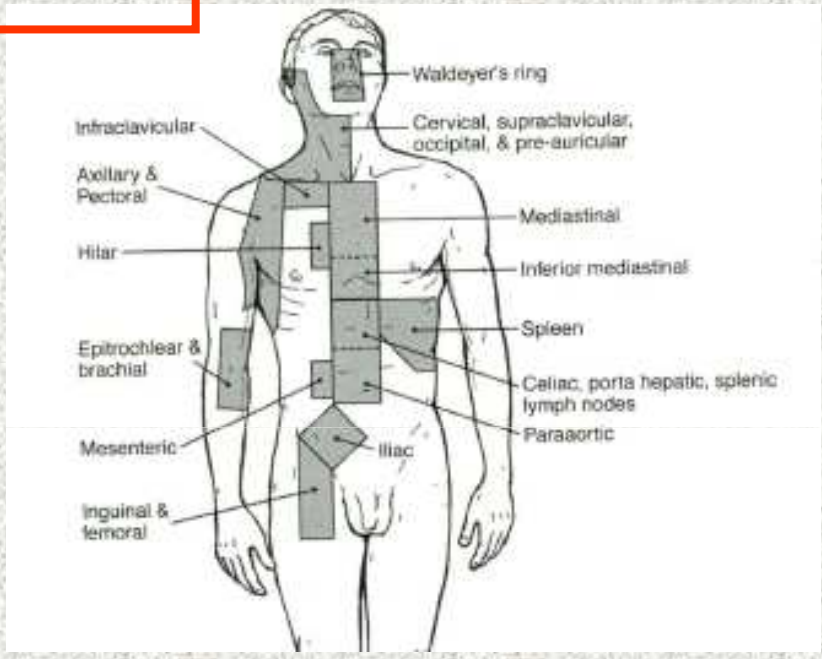
IFRT

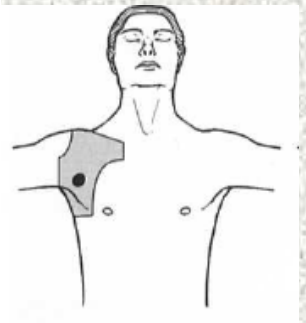
included all visible sites of disease determined before biopsy and treatment with chemotherapy and uninvolved lymph nodes of the same nodal region

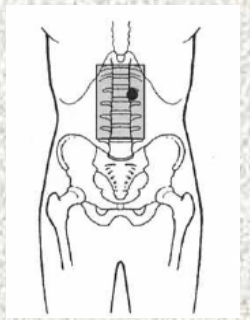
LOCALIZED NODAL DIFFUSE B NHL

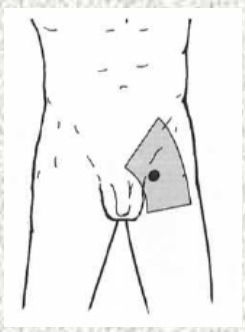
INVOLVED FIELD (IFRT)

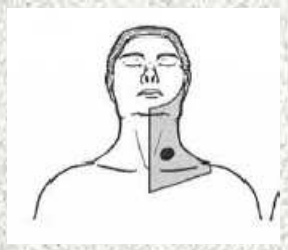






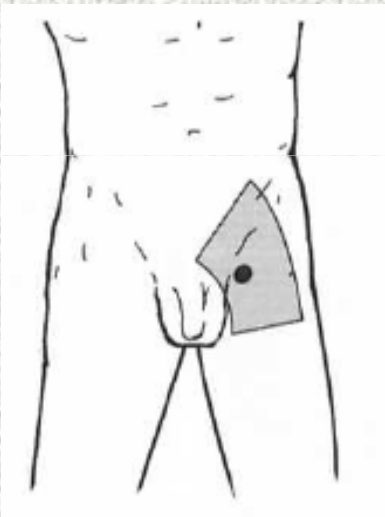


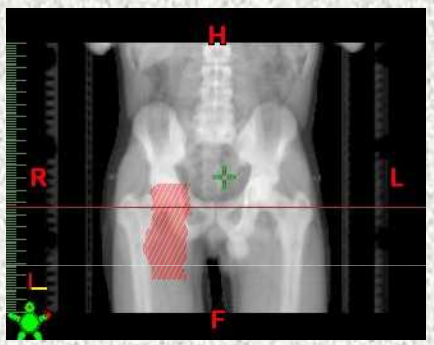


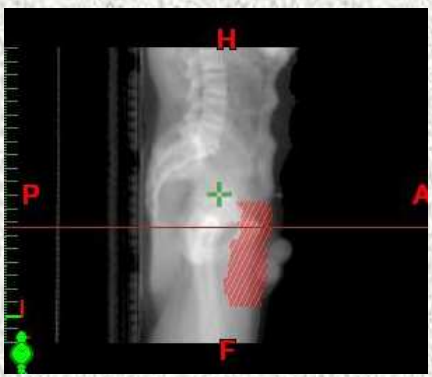


LOCALIZED NODAL DIFFUSE B NHL

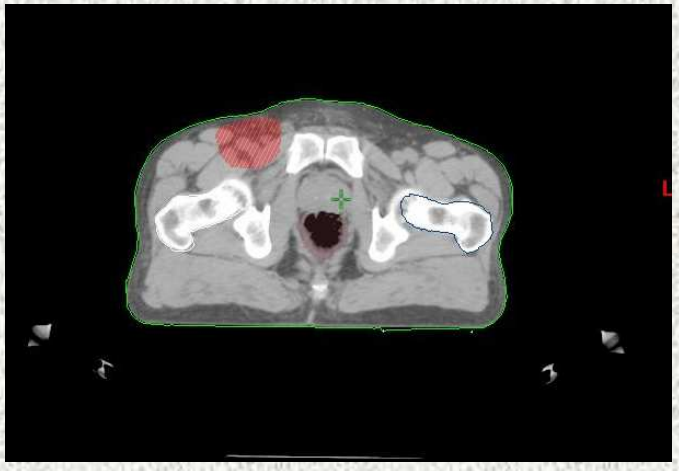
INVOLVED FIELD (IFRT)







3DCRT



LOCALIZED NODAL DIFFUSE B NHL

Radiotherapy in the Rituximab era

Trials incorporating anti-CD20

Author	patients	therapy	Radiation field	PFS	OS
Persky JCO 2008 SWOG 0014	60	R-CHOP x3 Rituximab x1	IFRT "only lymph node region(s) affected by disease	93% 2 yrs 88% 5 yrs	95% 2 yrs 92% 5 yrs
SWOG 8736	200	CHOPx3	IFRT "included all visible sites of disease determined before biopsy and treatment with CHOP	76% 5yrs	82% 5 yrs

ADVANCED DIFFUSE LARGE B CELL LYMPHOMAS

Radiotherapy has generally been used selectively for bulky sites/ residual masses

Bulky is an adverse prognostic factor

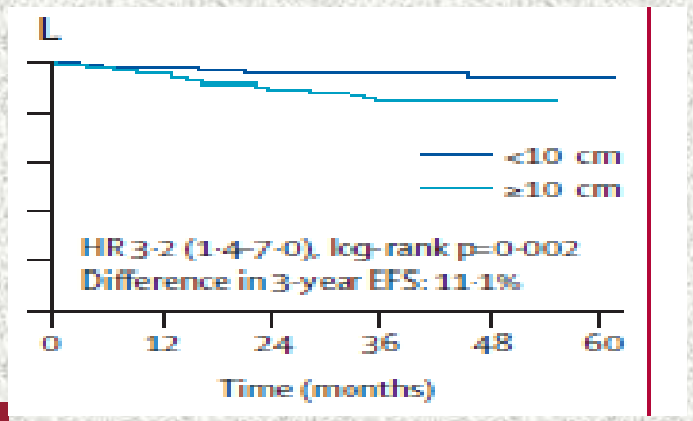
Wilder, Cancer 2001, Moser IntJRadBiolPh 2005

Bulky is defined at least > 5 cm

Wilder, Ferreri, Zinzani, Krol, Van der Maazen, Kamath

Bulky > 10 cm worse prognosis also in rituximab era

Pfreundschuh , Lancet Oncol 2008,MInt study



ADVANCED DIFFUSE LARGE B CELL LYMPHOMAS

BULKY LESIONS

Author	patients Stage Response	therapy	N° pts	Radiation field	DFS	OS 5 yrs
Aviles Int J rad 1994 randomized	88/218 III/IV CR	CEOP/Bleo-DAC RT CEOP/Bleo-DAC	43 45	IFRT with boost to region of bulky	72% 35% p<0.001	81% 55% p<0.001
Ferreri Oncology 2000 Not randomized	94 III/IV CR	CHOP-Like RT CHOP-Like	40 54	28/40 limited to bulky 12/40 EFRT (mantle, inverted Y, STNI)	41 mht 18 mth p=0.05	73% 57% p=0.05
Rube Ann Hematol 2001 Not randomized	153	CHOPx6 RT No bulk	84	Lymph nodes area of the initial bulk with a field size reduction to the post-chemotherapy tumor volume	74.1 77.3	
Schlembach RR 2000 Not randomized	59	CHOPx6 RT	28 31	Prechemotherapy volume	85 51	87 81
Aviles Lek Lymph 2004 randomized	341 IV	CHOP-B CHOP-B +RT	173 168	Were designed with the knowledge of the frequent widespread distribution of disease	55 82	66 87

ADVANCED DIFFUSE LARGE B CELL LYMPHOMAS

Residual mass

The presence of residual mass following chemotherapy is not infrequently associated with the presence of bulky disease at diagnosis

Author	patients stage	therapy	N° pts	Radiation field	DFS	OS 5 yrs
Aviles Med Oncol 2005	166 III/IV	CHOP RT CHOP	43 45	IFRT	86% 32% p<0.001	89% 68% p<0.001
Wilder Int J R 2001	44/294	CHOPx6 RT CHT	32 12	IFRT	67% 8% p<0.0001	70% 50% p=ns
Moser In J Rad Biol Ph 2006	238	RT CHT	114 68	IFRT		61% 32%

BULKY LESIONS IN RITUXIMAB ERA

Prognostic significance of maximum tumour (bulk) diameter in young patients with good-prognosis diffuse large-B-cell lymphoma treated with CHOP-like chemotherapy with or without rituximab: an exploratory analysis of the MabThera International Trial Group (MInT) study

Michael Pfreundschuh, Anthony D Ho, Eva Cavallin-Stahl, Max Wolf, Ruth Pettengell, Ingrid Vasovo, Andrew Belch, Jan Walewski, Pier-Luigi Zinzani, Walter Mingrone, Stein Kvaloy, Ofer Shpilberg, Ulrich Jaeger, Mads Hansen, Claudia Corrado, Adriana Scheliga, Markus Loeffler, Evelyn Kuhnt, for the MabThera International Trial (MInT) Group

Lancet Oncol 2008; 9: 435–44

for additional clinical studies. Only a randomised trial like the ongoing UNFOLDER (UNFavOrable young Low-risk patients treated with DEnsification of R-chemo regimens) study by the DSHNHL, which specifically addresses this question, will show whether the benefit of additional radiotherapy for these patients studied in the pre-rituximab era[4] can be confirmed if rituximab is part of the therapeutic approach.

BULKY LESIONS IN RITUXIMAB ERA

The role of radiotherapy to bulky disease in the rituximab era: results from two prospective trials of the german high-grade non-Hodgkin-lymphoma study group (DSHNHL) for elderly patients with DLBCL

Pfreundschuh, Blood 2008, abs 584

The patients with bulky disease in the R-CHOP-14-Rx trial assigned to receive additional radiotherapy to bulky disease had better 18-months EFS (68% vs 43%) and a 4% better OS (80% vs 76%) compared with R-CHOP-14-noRx.

In the rituximab era additional radiotherapy to bulky disease has no role for elderly patients in CR/CRU after completion of 6xCHOP-14, but appears to be beneficial for patients with bulky disease achieving PR

VALUE OF PET RESTAGING AFTER CHEMOTHERAPY FOR NON-HODGKIN'S LYMPHOMA: IMPLICATIONS FOR CONSOLIDATION RADIOTHERAPY

SHANNON T. KAHN, M.D., M.A.C.,* CHRISTOPHER FLOWERS, M.D.,† MARY JO LECHOWICZ, M.D.,†
KATHRYN HOLLENBACH, PH.D.,‡ AND PETER A. S. JOHNSTONE, M.D., F.A.C.R.*†

Int. J. Radiation Oncology Biol. Phys., Vol. 66, No. 4, pp. 961–965, 2006

Site of persistent disease (PET Pos and Neg)
No surrounding uninvolved nodal regions

The role of FDG-PET imaging and involved field radiotherapy in relapsed or refractory diffuse large B-cell lymphoma

BS Hoppe[1], CH Moskowitz[2], Z Zhang[3], JC Maragulia[2], RD Rice[2], AS Reiner[3], PA Hamlin[2], AD Zelenetz[2] and J Yahalom[1], the Lymphoma Disease Management Team

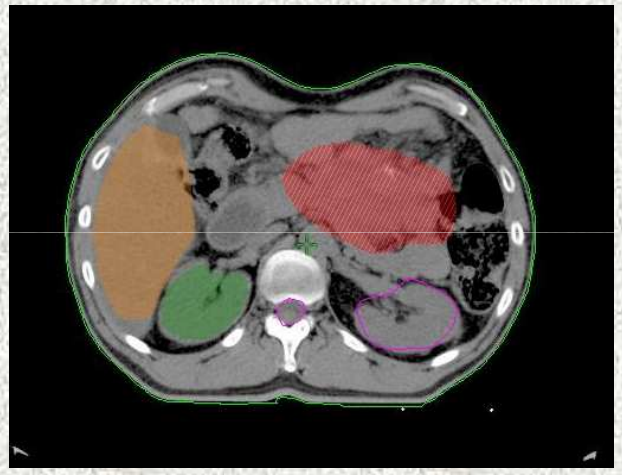
[1]*Department of Radiation Oncology, Memorial Sloan-Kettering Cancer Center, New York, NY, USA;* [2]*Department of Medicine, Memorial Sloan-Kettering Cancer Center, New York, NY, USA and* [3]*Department of Epidemiology and Biostatistics, Memorial Sloan-Kettering Cancer Center, New York, NY, USA*

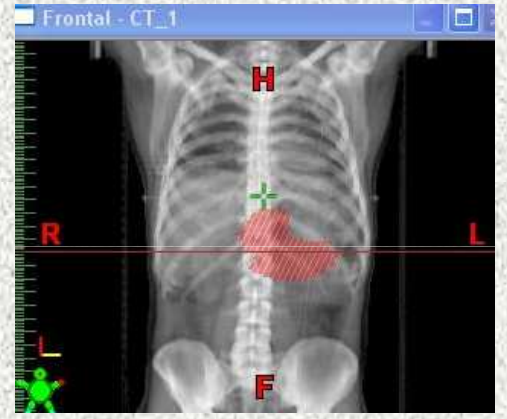
Bone Marrow Transplantation (2009) 43, 941–948

to the FDG-avid sites of disease before undergoing HDT/ASCT

ADVANCED DIFFUSE LARGE B CELL LYMPHOMAS

bulky sites/ residual masses

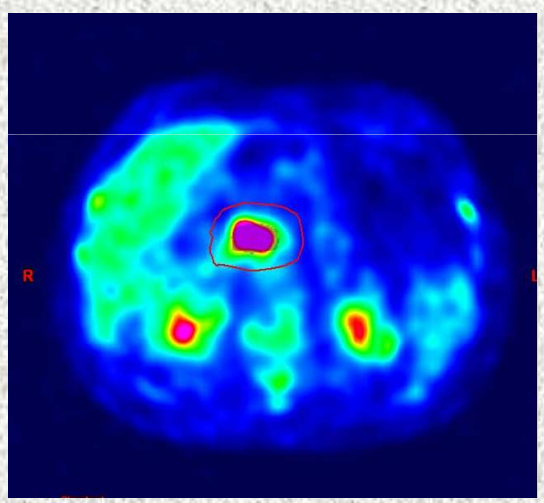


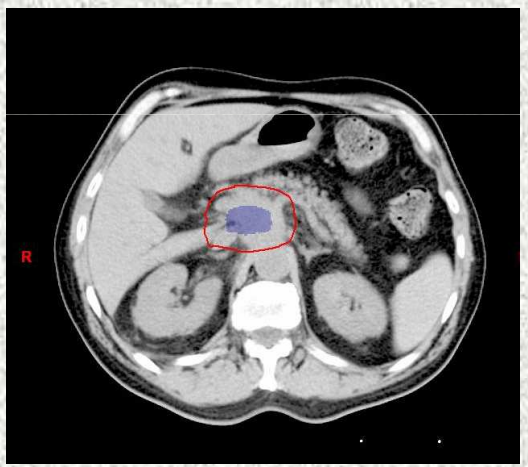


GTV: residual disease
CTV: GTV + 2-3 cm of margin

ADVANCED DIFFUSE LARGE B CELL LYMPHOMAS

bulky sites/ residual masses
PET era





GTV: residual PET positive disease
CTV: GTV + 2-3 cm of margin

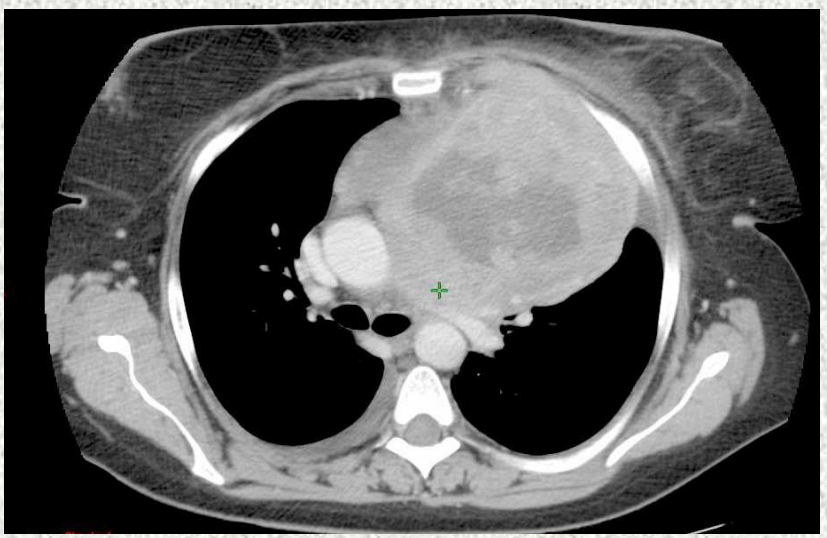
WHICH VOLUME?

Primary mediastinal B cell lymphoma

Primary mediastinal B cell lymphoma

Well defined clinical and hystological entity

Very large mediastinal bulky disease at the onset

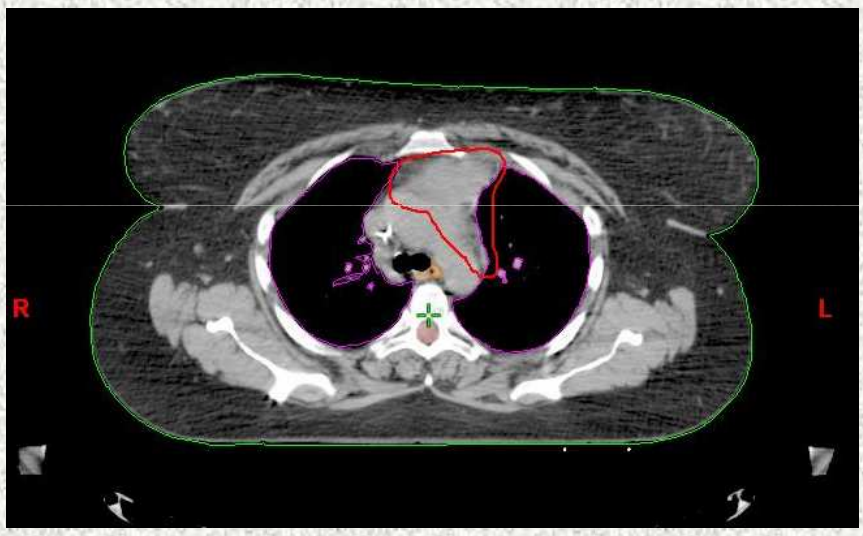


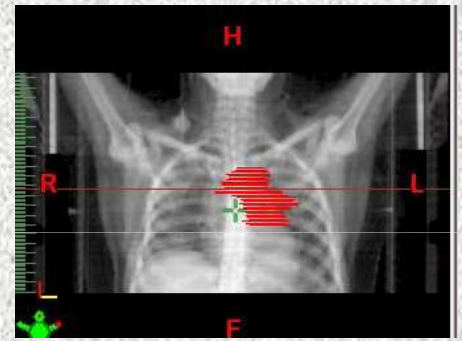
PRIMARY MEDIASTINAL B CELL LYMPHOMA

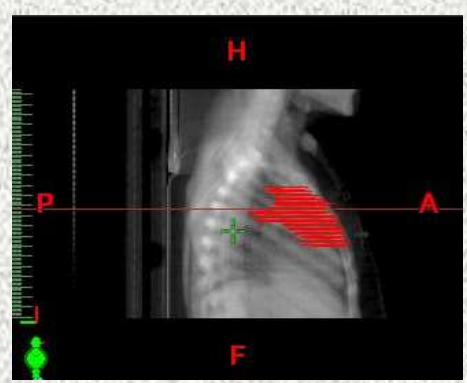
author	patients	treatment	Radiation volume	Os (%) 5 yrs	DFS (%) 5 yrs
Zinzani Hematologica 2002	426	CHOP/MACOP-B HD-ASCT plus RT	The original sites of involvement	71 10 yrs	67 10 yrs
Todeschini BJC 2004	138	CHOP MACOP-B VACOP-B plus RT	Whole original disease		81
Mazzarotto IntJRadBiolPh 2007	53	MACOP-B VACOP-B plus RT	Mediastinum +- supraclavear ln	86.6	93.4
De Sanctis IntJRadBiolPh 2008	92	MACOP-B plus RT	Only the residual disease	87	81

PRIMARY MEDIASTINAL B CELL LYMPHOMA

Only residual disease post chemotherapy







GTV: residual disease
CTV: GTV + 1-2 cm of margin

WHICH VOLUME?

Extranodal lymphoma

EXTRANODAL NHL

"Although not considered in any prognostic system, the site of origin of non-Hodgkin's lymphoma probably affects the biologic characteristics of the tumor and the outcome of treatment"

Nancy L. Harris

PRIMARY HEAD AND NECK LYMPHOMA

RT EFRT alone → CT and RT EFRT

doubling survival

Standard treatment based on the currently available evidence suggests the use of combined multi-agent CT followed by

adjuvant radiotherapy to the

primary site and bilateral neck nodes

PRIMARY HEAD AND NECK LYMPHOMA

WHICH VOLUME?

2 opposed lateral field comprising of whole of WR with adjacent base of skull, preauricular, sub-mandibular, upper and posterior cervical nodes ***Jacobs IntJRadBiolPhy 1985; 11: 357-364***

Whole WR with cervical lymph nodes including occipital and submental lymph nodes. Three-field tecnique with bilateral portal for the primary and upper neck and a junction matched direct anterior lower neck field. For bulky lower neck or axillary or mediastinal nodes a mantle o mini-mantle field were selected ***Ezzat Head and neck2001; 23: 547-558***

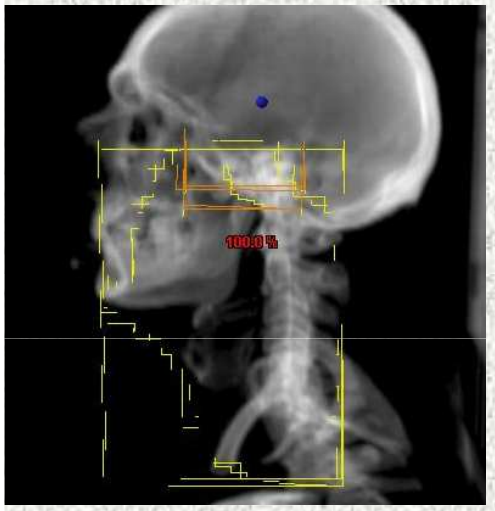
Bilateral neck fields including supraclavicular region

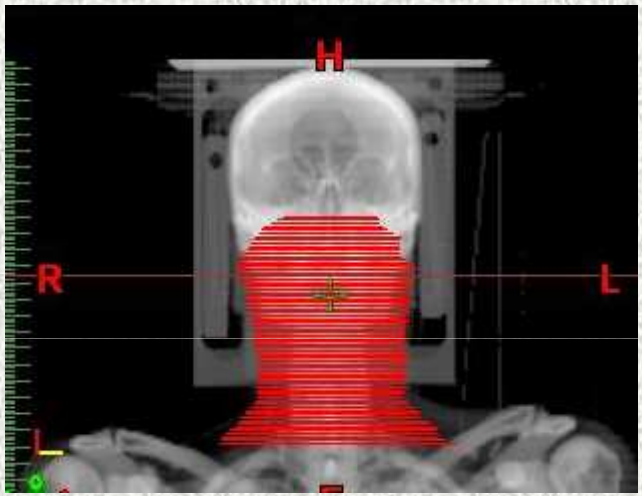
Hayabuchi, IntJRadBiolPhy 2003, 55: 44-50

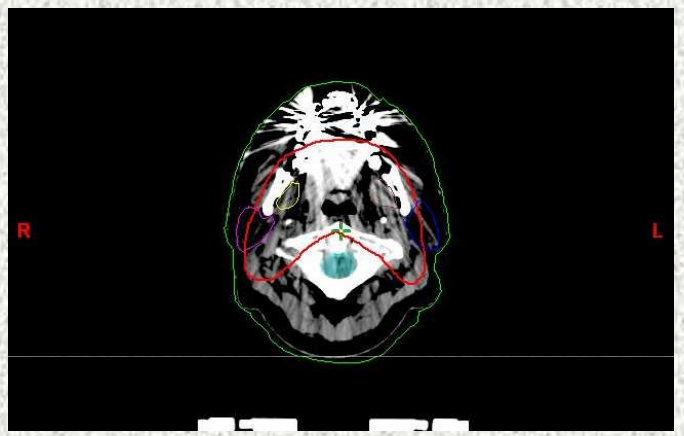
Entire WR and the lymphatic drainage area (bilateral level Ib to level V neck nodes ***Laskar Leuk Lymph 2008, 49(12):2263-2271***

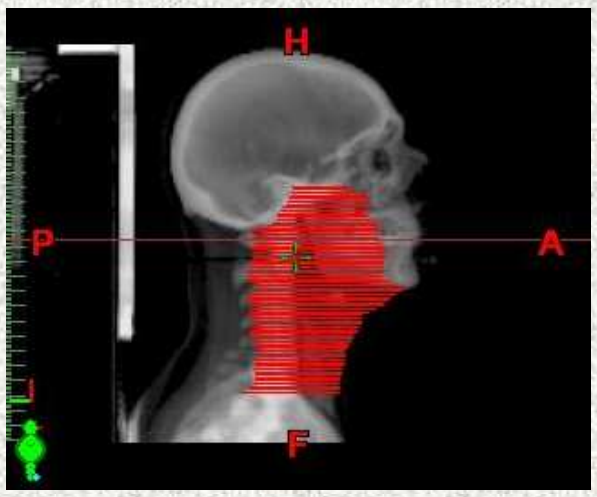
PRIMARY HEAD AND NECK LYMPHOMA

WHICH VOLUME?









CTV Whole Waldeyer Ring and the bilateral neck nodes

PRIMARY HEAD AND NECK LYMPHOMA

WHICH VOLUME?

Involved lesion radiation therapy

CLINICAL INVESTIGATION

INVOLVED-LESION RADIATION THERAPY AFTER CHEMOTHERAPY IN LIMITED-STAGE HEAD-AND-NECK DIFFUSE LARGE B CELL LYMPHOMA

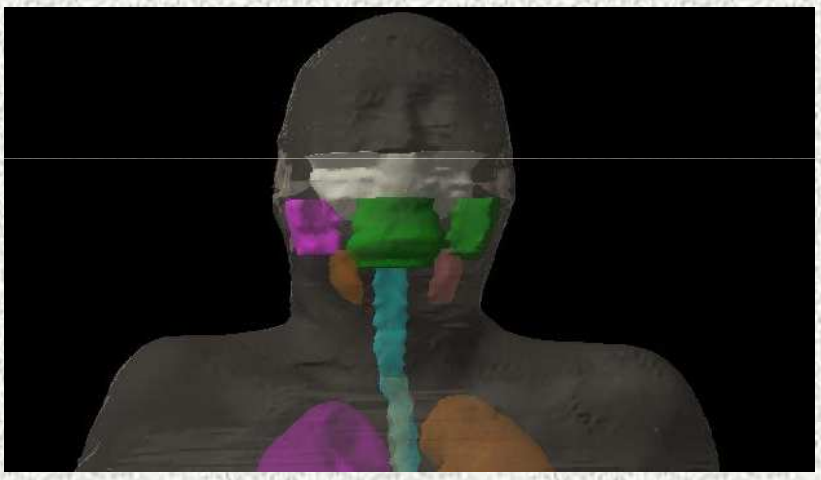
JEONG IL YU, M.D.,* HEERIM NAM, M.D., M.M.S.,* YONG CHAN AHN, M.D., PH.D.,*
WON SEOG KIM, M.D., PH.D.,† KEUNCHIL PARK, M.D., PH.D.,† AND SEOK JIN KIM, M.D., PH.D.†

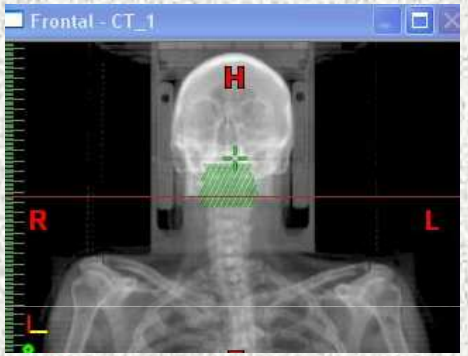
*Department of Radiation Oncology and †Division of Hematology–Oncology, Department of Internal Medicine, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, Korea

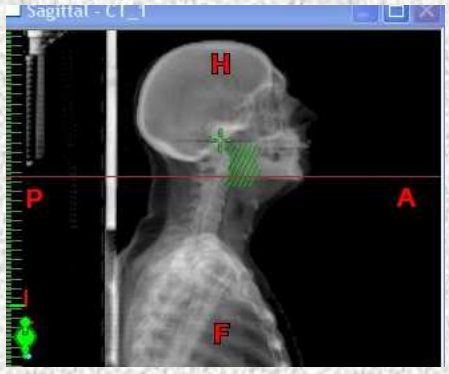
GTV: pre-chemotherapy gross volume
CTV: GTV with 1 cm of margin and was restricted by post chemotherapy anatomic limits

Il Yu, IntJRadBiolPhys, 2010

Involved lesion radiation therapy







PRIMARY HEAD AND NECK LYMPHOMA

local field

author	patients	Fup months	therapy	Relapse inF	extraF	distant	Moucosite (G3)
IL Yu IntJRBP 2010	91	63	R-CHOPx4+RT	3	1	9	1 pt

Comparable results to those of historical trials. Thus, using a small radiation target volume might decrease long-term RT complications without compromising outcomes

Il Yu,IntJRadBiolPhys 2010

PRIMARY HEAD AND NECK LYMPHOMA

PET-TAILORED RT VOLUME?

Fluorine-18 Fluorodeoxyglucose PET/CT Patterns of Extranodal Involvement in Patients with Non-Hodgkin Lymphoma and Hodgkin's Disease

Einat Even-Sapir, MD, PhD[a,*], Genady Lievshitz, MD[a], Chava Perry, MD[b], Yair Herishanu, MD[b], Hedva Lerman, MD[a], Ur Metser, MD[a]

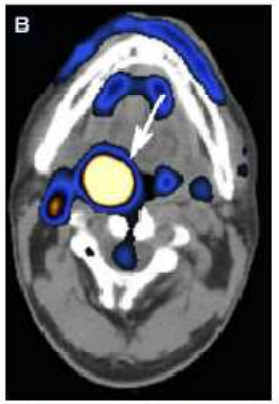


Fig. 6. Head and neck lymphoma. CT (*A*) and fused PET/CT (*B*) images indicate the presence of increased ^{18}F-FDG uptake in the right aspect of the oropharynx (*arrow in B*).

CAN BE USEFUL TO REDUCE THE RADIATION VOLUME?

PRIMARY GASTRIC LYMPHOMA

Role of radiotherapy in the treatment of lymphomas of the gastrointestinal tract

Berthe M.P. Aleman, MD, PhD, Radiation Oncologist (Staff Position) at Specialised Cancer Institute [a,*], Rick L.M. Haas, MD, PhD, Radiation Oncologist (Staff Position) at Specialised Cancer Institute [a], Richard W.M. van der Maazen, MD, PhD, Radiation Oncologist (Staff Position) at University Hospital [b,1]

Best Practice & Research Clinical Gastroenterology 24 (2010) 27–34

Practice points

- Eradication of *H. pylori* is the standard first-line treatment for localised low-grade gastric MALT lymphoma confined to the (sub) mucosa.
- Radiotherapy is recommended in case of insufficient effect of *H. pylori* eradication, after recurrence after *H. pylori* eradication or in case of the absence of *H. pylori* infection in patients with low grade gastric MALT lymphoma stage I or II_1.
- In case radiotherapy is indicated the target volume consists of the entire stomach, the pathological lymph nodes (if present) and electively the perigastric lymph nodes.
- A radiation dose of 30–40 Gy in fractions of 2 Gy is recommended.
- Modern radiation techniques enable adequate sparing of kidneys and other normal tissues.
- During follow-up depending on the irradiated volumes and dose special attention is needed for possible damage normal tissues.
- The treatment of choice for gastric DLBCL is a combination of rituximab plus anthracycline based chemotherapy
- The role of gastrectomy is limited due to the similar effectiveness of organ-preserving chemotherapy treatment, alone or in combination with radiation.

PRIMARY GASTRIC LYMPHOMA

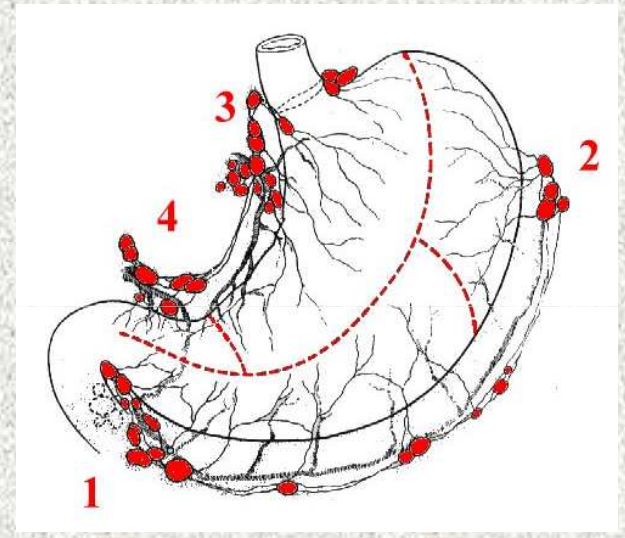
WHICH VOLUME?

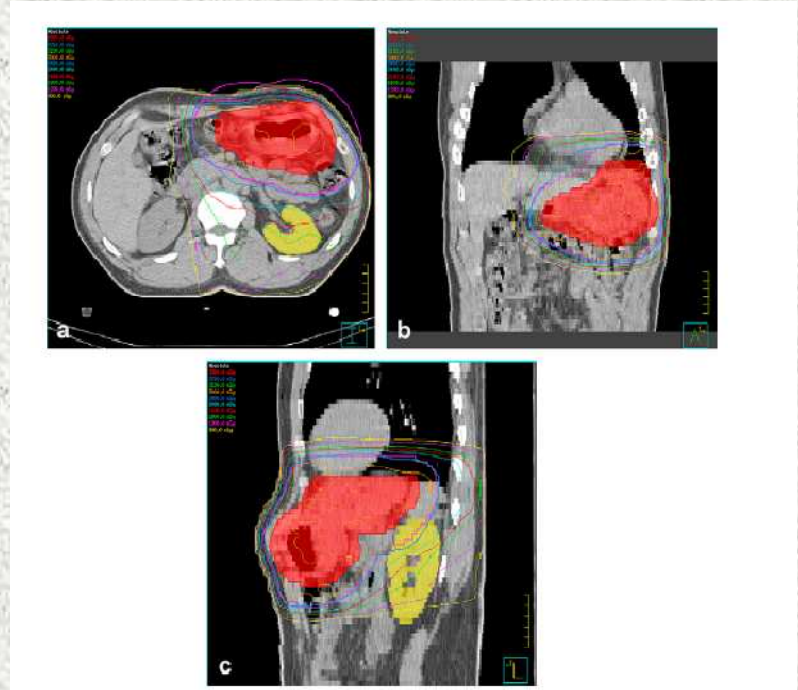
Netherlands Cancer Institute

- **24 pts LNH**
- **stage I**
- **Exclusive radiotherapy**
  WART 20 Gy (1,3 Gy/fr) in to 3 wks
  boost 20 Gy (2 Gy/fr) in to 2 wks
  stomach e Ln paraaortic (L2-L3)
- **DFS 4-yrs 83% median follow-up 48 mesi**

Burgers, 1988

PRIMARY GASTRIC MALT LYMPHOMA

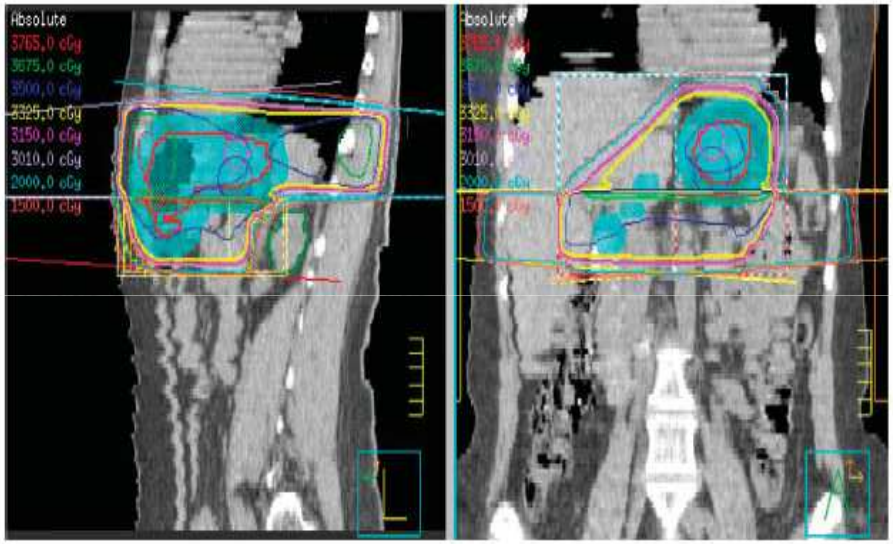




Stage IE

GTV: stomach and perigastric lymph nodes.
CTV: GTV plus 1-2 cm of margin

PRIMARY GASTRIC MALT LYMPHOMA



STAGE IIE

GTV: stomach and perigastric lymph nodes plus primary involved lymph nodes (perihepatic, peripancreatic and/or lomboaortic

CTV: GTV plus 1-2 cm of margin

PRIMARY BONE LYMPHOMA

CLINICAL INVESTIGATION Lymphoma

STAGING AND MANAGEMENT OF LOCALIZED NON-HODGKIN'S LYMPHOMAS: VARIATIONS AMONG EXPERTS IN RADIATION ONCOLOGY

RICHARD W. TSANG, M.D., MARY K. GOSPODAROWICZ, M.D., AND BRIAN O'SULLIVAN, M.D.

Department of Radiation Oncology, Princess Margaret Hospital/Ontario Cancer Institute, University Health Network, University of Toronto, Toronto, Ontario, Canada

Table 4. RT target volume (Case 1–4)

	Number	Percent
Case 1 (Stage IA follicular, neck)		
Unilateral neck	18	66.7%
> unilateral neck, < mantle	6	22.2%
Mantle	2	7.4%
Total nodal	1	3.7%
Case 2 (Stage IA DLC, inguinal)		
Unilateral inguinal only	5	18.5%
Unilateral inguinal-pelvic	19	70.4%
Bilateral inguinal-pelvic	1	3.7%
Inverted Y	2	7.4%
Case 3 (Stage IAE gastric lymphoma)		
AP-PA opposed fields	14	51.9%
CT planning/multiple fields	11	40.7%
Not specified	2	7.4%
Case 4 (Stage IAE, bone lymphoma)		
Partial humerus	8	29.6%
Whole humerus	15	55.6%
Bone + axillary node	3*	11.1%
Not specified	1	3.7%

*Two physicians prescribed treatment to whole humerus.

<1% of all NHL and 7% of all bone tumors

Most PBLs are primary bone diffuse large B-cell lymphomas (PBDLBCL) with a rare occurrence of follicular, marginal zone, anaplastic large cell, Hodgkin, and T-cell lymphomas.

PRIMARY BONE LYMPHOMA

TARGET VOLUME:

Long bone:

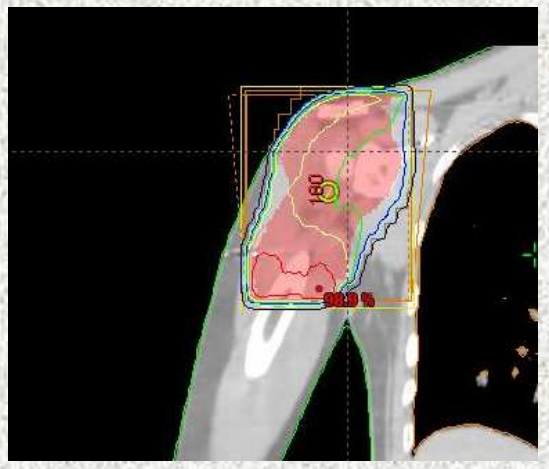
GTV:primary

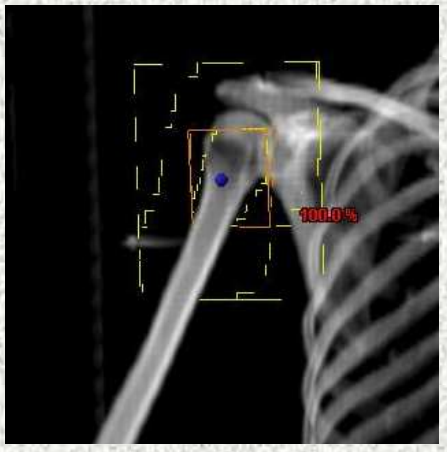
CTV: GTVplus 5 cm margin

Short bone:

GTV:primary

CTV : GTV plus all the bone





PRIMARY TESTICULAR LYMPHOMA

1-2% of all NHL and 1-7% of all testicular tumors

Patterns of Outcome and Prognostic Factors in Primary Large-Cell Lymphoma of the Testis in a Survey by the International Extranodal Lymphoma Study Group

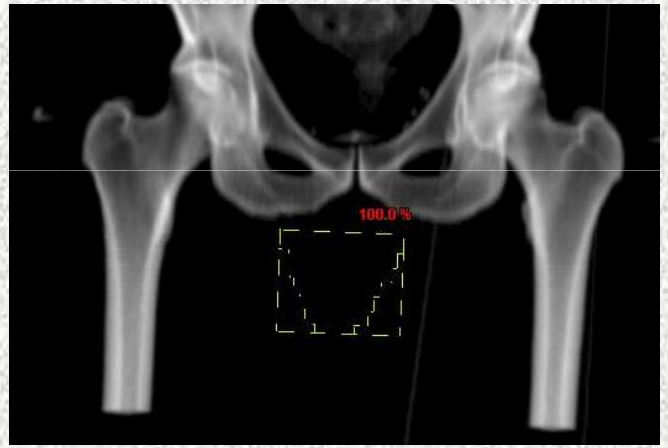
By E. Zucca, A. Conconi, T.I. Mughal, A.H. Sands, J.F. Seymour, U. Vitolo, E. Kluza, M. Ozdoblin, G.M. Mead, M.A. Glanni, S. Cortelazzo, A.J.M. Ferrer, A. Ambrosetti, M. Martelli, C. Thieblemont H. Gomez Moreno, G. Pinotti, G. Martinelli, R. Morzana, S. Girbardi, M. Provencio M. Balzarotti, F. Lavedar, G. Olivan, V. Colleo, P. Roy, F. Cavalli, and M.K. Gospodarowicz

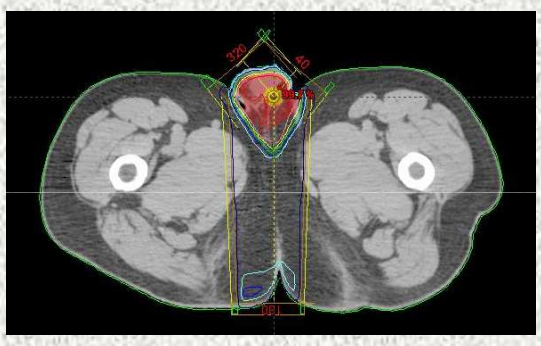
J Clin Oncol 21:20-27. © 2003

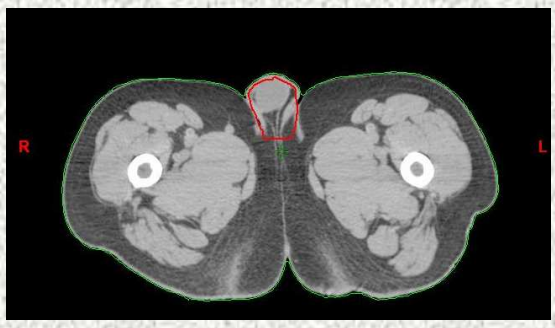
Conclusion: **Testicular DLCL is characterized by a particularly high risk of extranodal relapse even in cases with localized disease at diagnosis. Anthracycline-based chemotherapy, CNS prophylaxis, and contralateral testicular irradiation seem to improve the outcome. Their efficacy is under evaluation in a prospective clinical trial.**

PRIMARY TESTICULAR LYMPHOMA

TARGET VOLUME:controlateral testicle







No prophylactic nodal irradiation

PRIMARY BREAST LYMPHOMA

Primary diffuse large B-cell lymphoma of the breast: prognostic factors and outcomes of a study by the International Extranodal Lymphoma Study Group

G. Ryan[1]*, G. Martinelli[2], M. Kuper-Hommel[3], R. Tsang[4], G. Pruneri[2], K. Yuen[1], D. Roos[5], A. Lennard[6], L. Devizzi[7], S. Crabb[8], D. Hossfeld[9], G. Pratt[10], M. Dell'Olio[11], S. P. Choo[12], R. G. Bociek[13], J. Radford[14], S. Lade[1], A. M. Gianni[5], E. Zucca[15], F. Cavalli[15] & J. F. Seymour[1]

<1% of all NHL

Annals of Oncology 19: 233–241, 2008

Background: Primary diffuse large B-cell lymphoma (DLBCL) of breast is rare. We aimed to define clinical features, prognostic factors, patterns of failure, and treatment outcomes.

Patients and methods: A retrospective international study of 204 eligible patients presenting to the International Extranodal Lymphoma Study Group-affiliated institutions from 1980 to 2003.

Results: Median age was 64 years, with 95% of patients presenting with unilateral disease. Median overall survival (OS) was 8.0 years, and median progression-free survival 5.5 years. In multifactor analysis, favourable International Prognostic Index score, anthracycline-containing chemotherapy, and radiotherapy (RT) were significantly associated with longer OS (each $P \leq 0.03$). There was no benefit from mastectomy, as opposed to biopsy or lumpectomy only. At a median follow-up time of 5.5 years, 37% of patients had progressed—16% in the same or contralateral breast, 5% in the central nervous system, and 14% in other extranodal sites.

Conclusions: The combination of limited surgery, anthracycline-containing chemotherapy, and involved-field RT produced the best outcome in the pre-rituximab era. A prospective trial on the basis of these results should be pursued to confirm these observations and to determine whether the impact of rituximab on the patterns of relapse and outcome parallels that of DLBCL presenting at other sites.

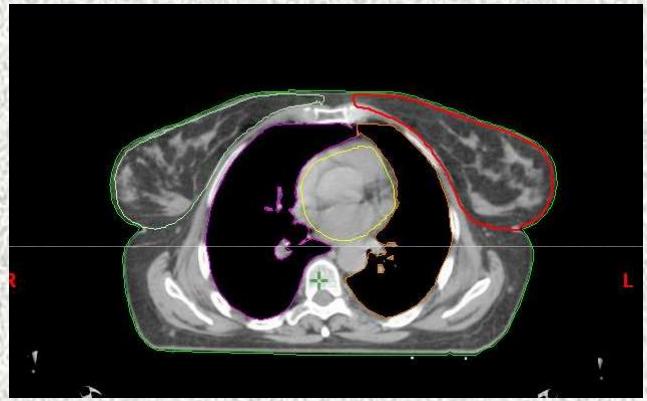
Primary diffuse large B-cell lymphoma of the breast: prognostic factors and outcomes of a study by the International Extranodal Lymphoma Study Group

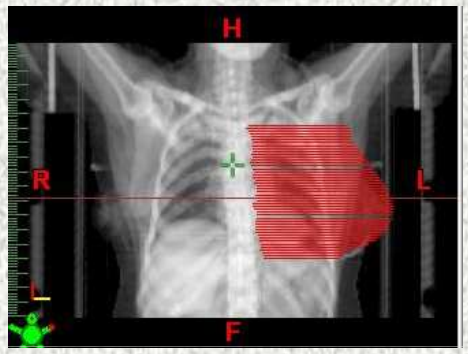
G. Ryan[1]*, G. Martinelli[2], M. Kuper-Hommel[3], R. Tsang[4], G. Pruneri[2], K. Yuen[1], D. Roos[5], A. Lennard[6], L. Devizzi[7], S. Crabb[8], D. Hossfeld[9], G. Pratt[10], M. Dell'Olio[11], S. P. Choo[12], R. G. Bociek[13], J. Radford[14], S. Lade[1], A. M. Gianni[5], E. Zucca[15], F. Cavalli[15] & J. F. Seymour[1]

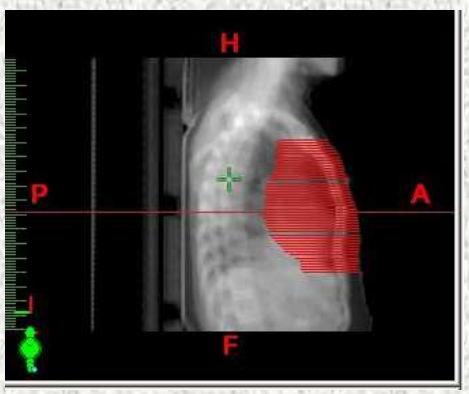
Annals of Oncology 19: 233–241, 2008

RT			
Fields (n = 130)	Initially involved breast only	65	50
	Initially involved breast and regional lymph nodes	45	35
	Ipsilateral axillary nodes only	2	2
	Chest wall only	2	2
	Both breasts ± regional nodes (bilateral presentation)	5	4
	RT fields unknown	11	8

PRIMARY BREAST LYMPHOMA







CTV: whole breast

No prophylactic nodal irradiation

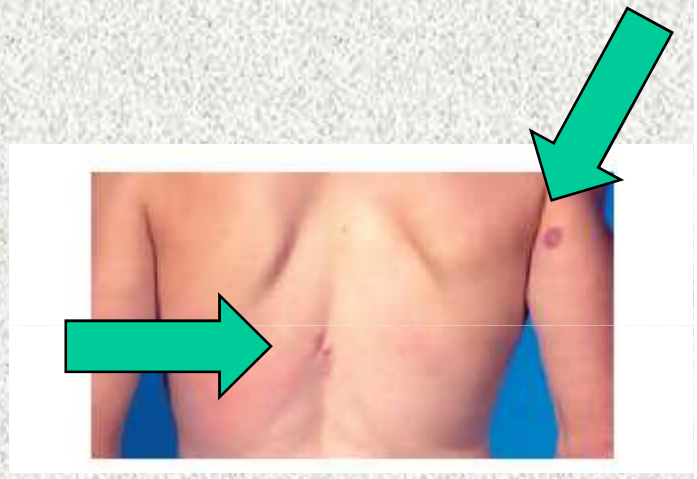
PRIMARY CUTANEOUS LYMPHOMA

Follicular or MALT lymphoma

European Organization for Research and Treatment of Cancer and International Society for Cutaneous Lymphoma consensus recommendations for the management of cutaneous B-cell lymphomas

Nancy J. Senff,[1] Ewart M. Noordijk,[2] Youn H. Kim,[3] Martine Bagot,[4] Emilio Berti,[5] Lorenzo Cerroni,[6] Reinhard Dummer,[7] Madeleine Duvic,[8] Richard T. Hoppe,[9] Nicola Pimpinelli,[10] Steven T. Rosen,[11] Maarten H. Vermeer,[1] Sean Whittaker,[12] and Rein Willemze[1]

BLOOD, 1 SEPTEMBER 2008 - VOLUME 112, NUMBER 5



TARGET VOLUME

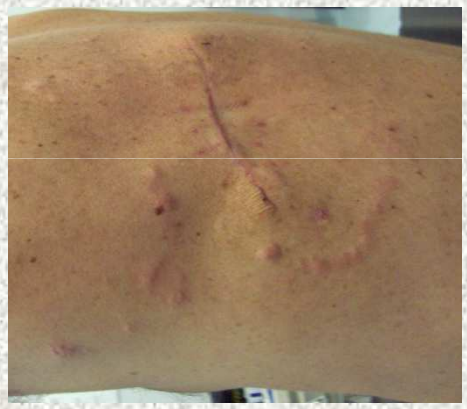
bolus

Lesion or surgical scar with 2-3 cm of margin

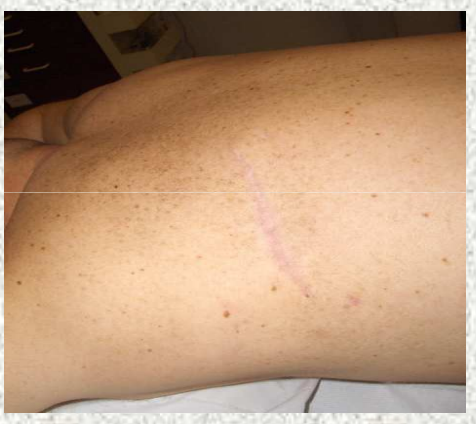
PRIMARY CUTANEOUS LYMPHOMA

Diffuse large B cell lymphoma

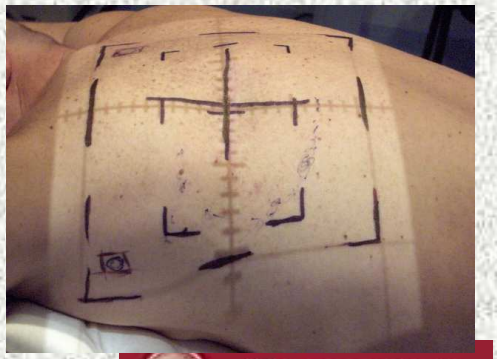
Pre chemotherapy



Post chemotherapy



Target volume



MALT lymphoma

Favorable outcomes of radiotherapy for early-stage mucosa-associated lymphoid tissue lymphoma

Natsuo Tomita*, Takeshi Kodaira, Hiroyuki Tachibana, Tatsuya Nakamura, Nobutaka Mizoguchi, Akinori Takada

Radiotherapy and Oncology 90 (2009) 231–235

"RT VOLUMES"

GTV consisted of the primary tumor

CTV: GTV with at least a 2 cm of margin for lymphoma of the parotid gland, thyroid, other areas of head and neck, lung, thymus and uterus.

Prophylactic irradiation of the lymph nodes was not performed

Early-stage MALT lymphoma

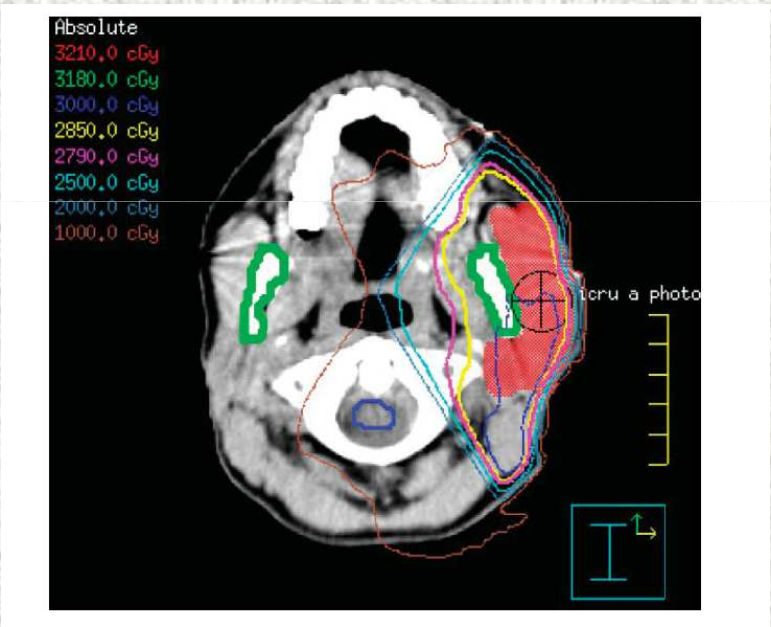
Parotid gland

stage IE

- **Whole parotid (with deep lobe)**

stage IIE

- **also omolateral cervical nodes**



Early-stage MALT lymphoma

ORBITAL LYMPHOMA: IS IT NECESSARY TO TREAT THE ENTIRE ORBIT?

M. RAPHAEL PFEFFER, M.B., B.S.,* TATIANA RABIN, M.D.,* LEV TSVANG, M.SC.,*
JANNA GOFFMAN, M.SC.,* NAHUM ROSEN, M.D.,† AND ZVI SYMON, M.D.*

Int. J. Radiation Oncology Biol. Phys., Vol. 60, No. 2, pp. 527–530, 2004

Purpose: Conformal radiotherapy (RT) has been used for all patients with orbital lymphoma treated at our institution since 1997. We retrospectively reviewed the charts of 23 consecutive patients to test the hypothesis that partial orbit RT is effective and less toxic than whole orbit RT.

Methods and Materials: Twelve patients with limited lesions were treated to partial orbital volumes and 11 patients (1 with bilateral disease) with more extensive lesions received whole orbit RT. The dose was 20–30 Gy (median, 25.2 Gy) for 19 patients with low-grade lymphoma and 24–40 Gy (median, 39.6 Gy) for 5 patients with intermediate- to high-grade lymphoma. The follow-up was 12–68 months (median, 34 months).

Results: All patients had a complete response to RT. Intraorbital recurrence developed in previously uninvolved areas not included in the initial target volume in 4 patients (33%) treated with partial orbit RT. All were salvaged by repeat RT or surgery. No patient treated with whole orbit RT developed intraorbital recurrence. The acute and long-term toxicity was similar in both groups. All but 1 patient retained good vision.

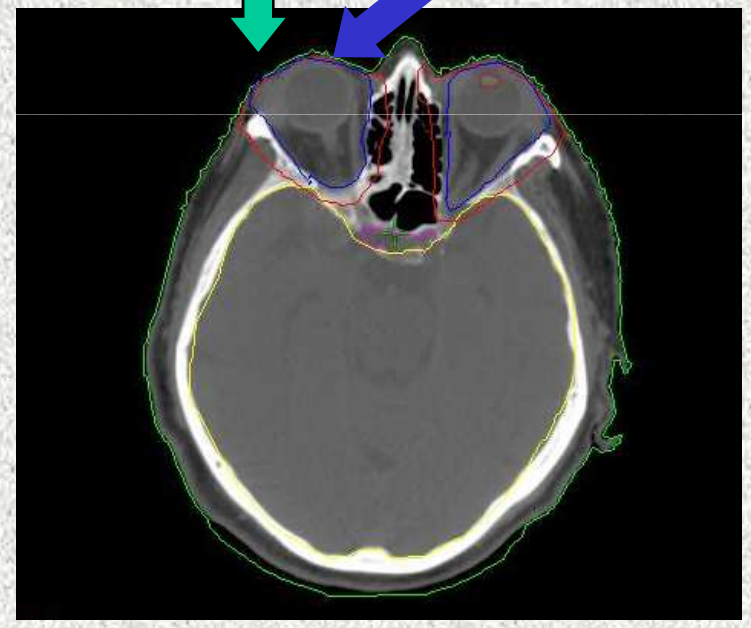
Conclusion: Patients with orbital lymphoma should be treated to the entire orbit. An effective dose of RT for low-grade lesions is 25 Gy, which results in minimal morbidity even when delivered to the entire orbit.

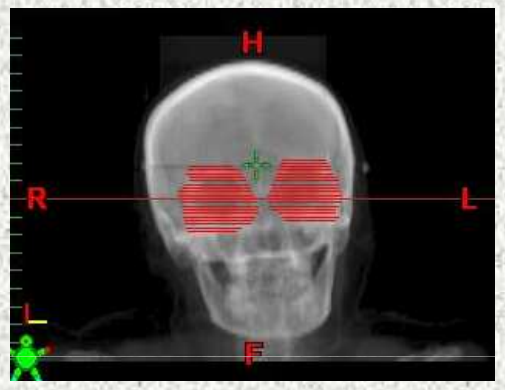
Early-stage MALT lymphoma

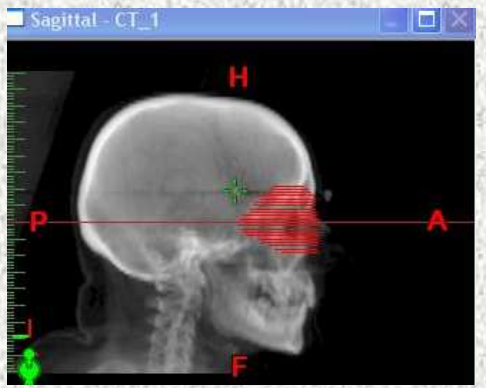
Orbital lymphoma

Lacrimal gland

conjunctive





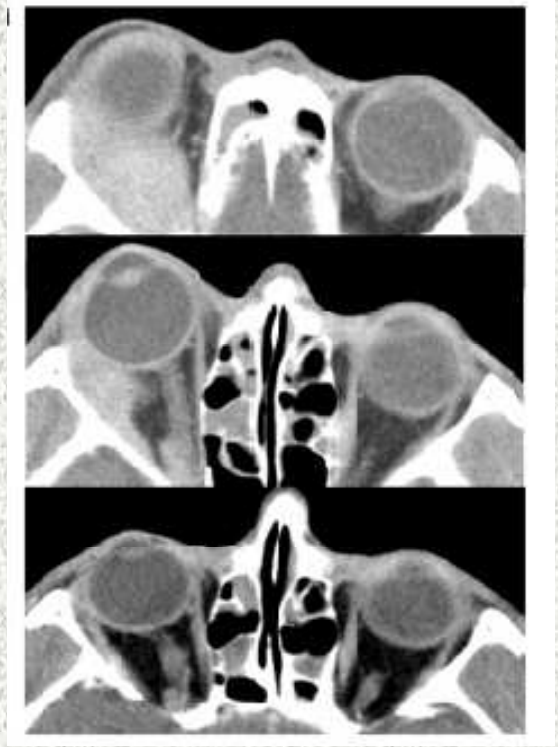


Prognostic significance of anatomic subsites: Results of radiation therapy for 66 patients with localized orbital marginal zone B cell lymphoma

Heerim Nam[a], Yong Chan Ahn[a,*], Yoon-Duck Kim[b], Younghyeh Ko[c], Won Seog Kim[d]

[a] Department of Radiation Oncology, Sungkyunkwan University School of Medicine, Seoul, South Korea
[b] Department of Ophthalmology, Sungkyunkwan University School of Medicine, Seoul, South Korea
[c] Department of Pathology, Sungkyunkwan University School of Medicine, Seoul, South Korea
[d] Division of Hematology–Oncology, Department of Internal Medicine, Sungkyunkwan University School of Medicine, Seoul, South Korea

Radiotherapy and Oncology 90 (2009) 236–241



Conclusions:
We propose that except for tumor with conjunctival location, partial orbital irradiation might be considered after careful examination and meticulous review of imaging studies

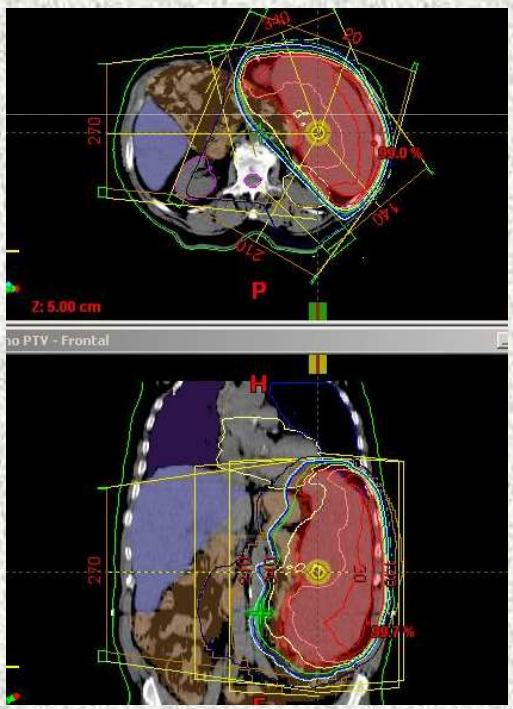
NON HODGKIN' LYMPHOMA RADIATION VOLUME

ADAPTIVE RADIATION THERAPY 4D CRT

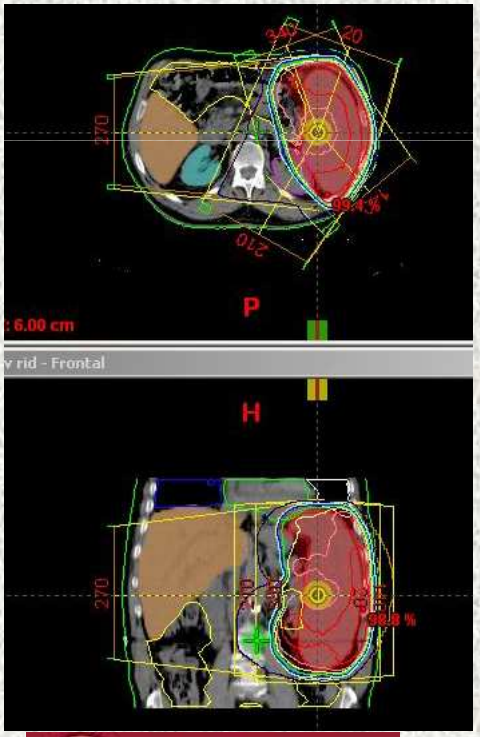
4D CRT

SPLENIC LYMPHOMA

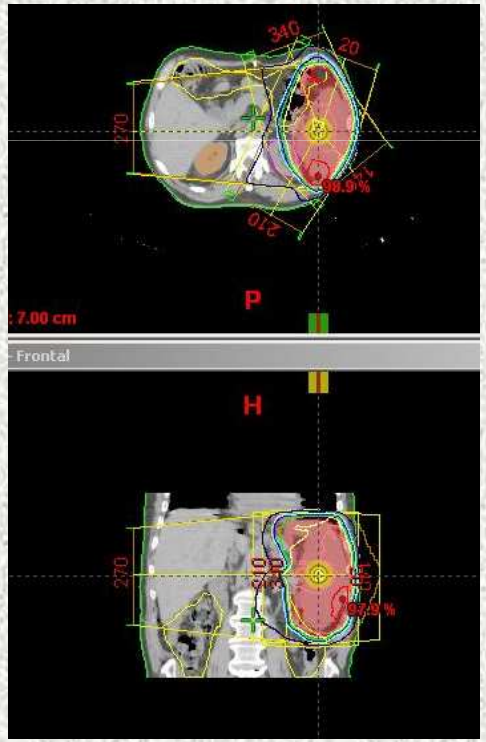
Target volume
cc 3730



Target volume
cc 2635 (2 Gy)



Target volume
Cc 1800 (4.4 Gy)



WHICH VOLUME?

Nodal lymphoma

LOCALIZED

INVOLVED FIELD (IFRT):
pre chemotherapy nodal site(s) of involvement plus uninvolved lymph nodes of the same nodal region

ADVANCED Bulky/residual disease

post chemotherapy site(s) of residual disease only

WHICH VOLUME?

Primary mediastinal B cell lymphoma

post chemotherapy site of residual disease only

WHICH VOLUME?

Extranodal lymphoma

extranodal (plus nodes if initially involved) site of involvement only

WHICH VOLUME IN NON HODGKIN'S LYMPHOMA?

RITUXIMAB era

PET era

TAILORED- RADIOTHERAPY (for indication and volume)

QUALITY OF RADIOTHERAPY REPORTING IN RANDOMIZED CONTROLLED TRIALS OF HODGKIN'S LYMPHOMA AND NON-HODGKIN'S LYMPHOMA: A SYSTEMATIC REVIEW

JUSTIN E. BEKELMAN, M.D.,* AND JOACHIM YAHALOM, M.D.*

*Department of Radiation Oncology, Memorial Sloan-Kettering Cancer Center, New York, NY

Int. J. Radiation Oncology Biol. Phys., Vol. 73, No. 2, pp. 402–408, 2009

"Target volume definition was considered adequate if the report included a description of the lymph node stations or anatomic boundaries used in designing the radiation fields."

Table 2. Radiotherapy reporting quality ($n = 61$)

Measures of radiotherapy reporting	Adequacy of reporting	
	n	%
1. Target volume description	23	38
2. Radiation dose specification	54	89
3. Fractionation specification	39	64
4. Radiation prescription point specification	13	21
5. Quality assurance process use	12	20
6. Quality assurance process adherence reporting*	7	11

* Reporting of major or minor deviations.

Only 38% of 61 reports described the target volume
Only 8% of the 48 reports involving IFRT adequately described the target volume

QUALITY OF RADIOTHERAPY REPORTING IN RANDOMIZED CONTROLLED TRIALS OF HODGKIN'S LYMPHOMA AND NON-HODGKIN'S LYMPHOMA: A SYSTEMATIC REVIEW

JUSTIN E. BEKELMAN, M.D.,* AND JOACHIM YAHALOM, M.D.*

*Department of Radiation Oncology, Memorial Sloan-Kettering Cancer Center, New York, NY

"despite the need for improvement in reporting of RT in RCTs , a consensus regarding reporting guidelines specific to trials involving RT has not been estabilished"

Thank you
for your attention

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