Ontario
Cancer Care Ontario
Action Cancer Ontario

PET Recommendation Report 8

PET Imaging in Testicular Cancer

P Chung and C Walker-Dilks

Report Date: January 19, 2009

PET Recommendation Report 8 is comprised of 2 sections and is available on the CCO Web site (https://www.cancercare.on.ca)
PEBC PET Recommendation Reports page at:
https://www.cancercare.on.ca/toolbox/qualityguidelines/other-reports/petrecs/

Section 1: Recommendations
Section 2: Evidentiary Base

For further information about this report, please contact:

Dr. Peter Chung,
Princess Margaret Hospital, 610 University Avenue,
Toronto, Ontario Canada M5G 2M9
Telephone: (416) 946-6522; Fax: (416) 946-4586; Email: peter.chung@rmp.uhn.on.ca

For information about the PEBC and the most current version of all reports,
please visit the CCO website at http://www.cancercare.on.ca/ or contact the PEBC office at:
Phone: 905-527-4322 ext. 42822 Fax: 905-526-6775 E-mail: ccopgi@mcmaster.ca

Citation (Vancouver Style): Chung P, Walker-Dilks C. PET Imaging in testicular cancer. Toronto (ON): Cancer Care Ontario; 2009 Jan 19 Program in Evidence-based Care PET Recommendation Report No.: 8.

cancer care ontario | action cancer ontario
program in evidence-based care | programme de soins fondé sur des preuves

Recommendation Report – PET #8: Section 1

PET Imaging in Testicular Cancer: Recommendations

P Chung and C Walker-Dilks

Report Date: January 19, 2009

QUESTIONS

- What benefit to clinical management does positron emission tomography (PET) or positron emission tomography/computed tomography (PET/CT) contribute to the diagnosis or staging of testicular cancer?
- What benefit to clinical management does PET or PET/CT contribute to the assessment of treatment response for testicular cancer?
- What benefit to clinical management does PET or PET/CT contribute when recurrence of testicular cancer is suspected but not proven?
- What benefit to clinical management does PET or PET/CT contribute to restaging at the time of documented recurrence for testicular cancer?
- What is the role of PET when a solitary metastasis is identified at the time of recurrence and a metastectomy is being contemplated?

TARGET POPULATION

Patients with testicular cancer.

INTENDED PURPOSE

- This recommendation report is primarily intended to guide the Ontario PET Steering Committee in their decision making concerning indications for the use of PET imaging.
- This recommendation report may also be useful in informing clinical decision making regarding the appropriate role of PET imaging and in guiding priorities for future PET imaging research.

RECOMMENDATIONS AND KEY EVIDENCE

These recommendations are based on an evidentiary foundation consisting of one recent high-quality systematic review from the U.S. Agency for Health Research and Quality (AHRQ) (1) that included primary study literature for the period from 2003 to March 2008.

Diagnosis/Staging

A recommendation cannot be made for or against the use of PET in the routine staging of patients with testicular cancer due to insufficient evidence.

Lassen et al (2) studied 46 patients with stage I nonseminomatous germ cell tumour (NSCGT). PET identified seven of 10 patients with relapse at the time of initial staging (sensitivity 70%) and had no false positive results (specificity 100%).
A U.K. study by Huddart et al (3) was excluded from the AHRQ report because it did not address any of the questions posed by the report, but the Genitourinary Disease Site Group (GU DSG) feels the study should be noted. The objective of the trial was to examine whether PET could identify patients without occult metastatic disease. This study included 116 patients with NSGCT and evidence of vascular invasion in the primary specimen. Patients had clinical stage I disease on the basis of clinical examination, chest x-ray, and CT scan, and negative postorchidectomy tumour markers. The study was designed to exclude a negative predictive value of less than 80% and a two-year relapse-free rate of 80% or less. The study was stopped prematurely prior to full accrual as the estimated one-year relapse-free rate was 65%, and even with no further relapses in patients accrued, the best achievable two-year relapse-free rate was estimated to be 70%. Of 88 patients with negative PET scans, 33 patients relapsed with an estimated one-year relapse-free rate of 63.3%.

Qualifying Statement

None.

Assessment of Treatment Response

PET is recommended for the assessment of treatment response in patients with seminoma and residual masses after chemotherapy.
PET is not recommended for the assessment of treatment response in patients with nonseminoma.
Hinz et al (4) examined fluorodeoxyglucose (FDG)-PET for predicting visible residual tumour in 20 patients with seminoma following chemotherapy for advanced disease. PET had sensitivity of 100% and specificity of 47% in detecting residual tumour. Becherer et al (5) evaluated PET in 48 patients with metastatic seminoma and CT-documented mass after chemotherapy. PET had sensitivity and specificity of 80% and 100%, respectively, compared with CT sensitivity and specificity both 73%. Karapetis et al (6) reviewed 15 patients with advanced testicular germ cell tumour who had at least one postchemotherapy PET scan. A first PET scan had 100% sensitivity and 72% specificity. PET led to a change in management in only one patient (from observation to surgical excision of residual mass).

Qualifying statement

- In NSGCTs, PET does not reliably distinguish mature teratoma from benign residual mass, and thus resection of residual masses is required.

Recurrence/Restaging

A recommendation cannot be made for or against the routine use of PET for evaluation of recurrence due to insufficient evidence.
In Karapetis et al (6), three of the 15 patients developed relapsed germ cell tumour after chemotherapy. Initial PET scans were normal in two patients and equivocal in one. Repeat scans done at the time of clear disease relapse confirmed positive serum tumour marker. In Becherer et al (5), PET correctly identified relapse in 2 of 5 patients who had received high-dose salvage therapy.

Qualifying Statement

None.

Funding

The PEBC is a provincial initiative of Cancer Care Ontario supported by the Ontario Ministry of Health and Long-Term Care through Cancer Care Ontario. All work produced by the PEBC is editorially independent from its funding source.

Contact Information

For further information about this report, please contact:

Dr. Peter Chung, Princess Margaret Hospital, 610 University Avenue, Toronto, Ontario Canada M5G 2M9, telephone (416) 946-6522, fax (416) 946-4586, email peter.chung@rmp.uhn.on.ca

For information about the PEBC and the most current version of all reports, please visit the CCO Web site at http://www.cancercare.on.ca/ or contact the PEBC office at:
Phone: 905-525-9140, ext. 22055 Fax: 905-522-7681

REFERENCES

1. McEwan AJ, Gulenchyn K, Ospina M, Horton J, Seida J, Vandermeer B, et al. Positron emission tomography for nine cancers (bladder, brain, cervical, kidney, ovarian, pancreatic, prostate, small cell lung, testicular). Rockville, Maryland: Agency for Healthcare Research and Quality; August 2008. Draft.
2. Lassen U, Daugaard G, Eigtved A, Højgaard L, Damgaard K, Rørth M. Whole-body FDG-PET in patients with stage I non-seminomatous germ cell tumours. Eur J Nucl Med Mol Imaging 2003;30(3):396-402.
3. Huddart RA, O'Doherty MJ, Padhani A, Rustin GJ, Mead GM, Joffe JK, et al. 18fluorodeoxyglucose positron emission tomography in the prediction of relapse in patients with high-risk, clinical stage I nonseminomatous germ cell tumors: preliminary report of MRC Trial TE22--the NCRI Testis Tumour Clinical Study Group. J Clin Oncol. 2007 Jul 20;25(21):3090-5.
4. Hinz S, Schrader M, Kempkensteffen C, Bares R, Brenner W, Krege S, et al. The role of positron emission tomography in the evaluation of residual masses after chemotherapy for advanced stage seminoma. J Urol 2008;179(3):936-40.
5. Becherer A, De Santis M, Karanikas G, Szabó M, Bokemeyer C, Dohmen BM, et al. FDG PET is superior to CT in the prediction of viable tumour in post-chemotherapy seminoma residuals. Eur J Radiol 2005;54(2):284-8.
6. Karapetis CS, Strickland AH, Yip D, Steer C, Harper PG. Use of fluorodeoxyglucose positron emission tomography scans in patients with advanced germ cell tumour following chemotherapy: single-centre experience with long-term follow up. Intern Med J 2003;33(9-10):427-35.

cancer care ontario | action cancer ontario
program in evidence-based care | programme de soins fondé sur des preuves

Recommendation Report – PET #8: Section 2

PET Imaging in Testicular Cancer: Evidentiary Base and Consensus Process

P Chung and C Walker-Dilks

Report Date: January 19, 2009

QUESTIONS

- What benefit to clinical management does positron emission tomography (PET) or positron emission tomography/computed tomography (PET/CT) contribute to the diagnosis or staging of testicular cancer?
- What benefit to clinical management does PET or PET/CT contribute to the assessment of treatment response for testicular cancer?
- What benefit to clinical management does PET or PET/CT contribute when recurrence of testicular cancer is suspected but not proven?
- What benefit to clinical management does PET or PET/CT contribute to restaging at the time of documented recurrence for testicular cancer?
- What is the role of PET when a solitary metastasis is identified at the time of recurrence and a metastectomy is being contemplated?

INTRODUCTION

The Ontario PET Steering Committee made a special request to the Clinical Council of Cancer Care Ontario to co-lead the development of guidance regarding the clinical uses of PET imaging. The Program in Evidence-based Care (PEBC), working together with PEBC Cancer Disease Site Groups (DSGs), synthesized the clinical research and drafted recommendations for 10 disease sites. Recommendations for the use of PET in colorectal cancer, esophageal cancer, head and neck cancer, and melanoma were reviewed at a consensus meeting on 19 September 2008, and recommendations for the use of PET in brain, ovarian, cervical, testicular, small-cell lung, and pancreatic cancer were reviewed at a consensus meeting on 25 November 2008.

METHODS

Overview

In order to develop the recommendations and achieve consensus, a three-step methodology was undertaken.

Step 1 – Systematic review. A systematic review of the published literature was undertaken (see details below). This was conducted by one clinical lead author, nominated by the PEBC Genitourinary (GU) DSG and a PEBC methodologist. The

systematic review served as the evidentiary foundation for a set of draft recommendations developed by this team.

Step 2 – Consensus by the PEBC GU DSG. The draft recommendations were refined during a DSG teleconference. The GU DSG is comprised of medical and radiation oncologists and urologists and supported by a PEBC research methodologist.

Step 3 – Provincial PET imaging consensus meeting. The draft recommendations were vetted at a larger provincial PET imaging consensus meeting co-hosted by Cancer Care Ontario and the Provincial PET Steering Committee. The meeting was facilitated and supported by members of the PEBC team. Participants included representatives of the PEBC DSGs, other clinical experts in the areas of nuclear and diagnostic medicine, members of the Cancer Care Ontario clinical leadership team, and representatives from the Ontario PET Steering Committee and the Ontario Health Technology Assessment Committee.

The systematic review and companion recommendations are intended to promote evidence-based decisions in Ontario, Canada. The PEBC is supported by the Ontario Ministry of Health and Long-Term Care through Cancer Care Ontario. All work produced by the PEBC is editorially independent from its funding source.

SYSTEMATIC REVIEW

Literature Search

The PEBC was aware of a technology assessment being produced by the University of Alberta Evidence-based Practice Center for the U.S. Agency for Healthcare Research and Quality (AHRQ) evaluating the use of PET imaging in nine cancers (1) (referred to as the AHRQ review from this point forward). This review updated a previous AHRQ report produced by Duke University in 2004 (2). The Alberta update included individual primary studies dating from 2003 to March 2008 on six of the 10 cancer sites targeted by this project. Because the AHRQ review sufficiently covered the questions and methodologies of interest to this recommendation report, a draft of the AHRQ review was made available to the PEBC, and its results were used for the evidentiary base.

Study Selection Criteria

All primary studies in the AHRQ review that addressed the questions of interest in this recommendation report (diagnosis, staging, treatment response, recurrence, and restaging) were included.

The inclusion criteria for primary studies included in the AHRQ review were:

- prospective or retrospective clinical study evaluating the use of FDG PET or FDG PET/CT in primary cancer;
- study not duplicated or superseded by a later study with the same purpose from the same institution;
- study reported numeric data on at least one objective outcome of interest for the key questions of the technology assessment (diagnostic performance, treatment decisions and management strategy, changes in therapy, patient-centred outcomes, and economic outcomes);
- study included ≥ 12 patients with the cancer of interest;
- study used a suitable reference standard (pathological confirmation and clinical follow-up) when appropriate.

Synthesizing the Evidence

In some cases where sufficient evidence existed, meta-analyses were included with pooled likelihood ratios. The AHRQ review included evidence tables that summarized the characteristics and results of each study according to the outcomes the study addressed. For diagnostic performance, the evidence tables recorded details on the source of the publication and the evidence grade, study design, patient characteristics, PET technical characteristics, criteria for interpretation, and results. In addition to the diagnostic performance of PET, the AHRQ review also sought to evaluate PET in terms of its impact on physician decision making approaches to diagnosis and management (referred to as diagnostic thinking) and its impact as part of a management strategy to improve patient-centred outcomes (referred to as management strategy). Full text and data extractions of the studies were provided to the clinical lead author to aid in the formulation of the recommendations. Telephone conferences and email correspondence between the clinical lead and the PEBC methodologist took place to clarify details and answer questions.

CONSENSUS

DSG Consensus Process

The clinical lead author wrote summaries of the key evidence, draft recommendations, and qualifying statements for the questions pertaining to diagnosis/staging, assessment of treatment response, and recurrence/restaging. The ensuing documents were circulated to all members of the GU DSG and discussed during a teleconference. The recommendations that were generated during this process are referred to below as the DRAFT DSG Recommendations. The intent of these recommendations was to guide discussion at the consensus meeting.

Provincial Consensus Process

The consensus meeting on 25 November 2008 was conducted as follows:

- Presentations by each of the clinical lead authors on the DRAFT DSG recommendations and supporting evidence were made to the meeting participants.
- The recommendations were refined by the large group and in some cases a revised recommendation was proposed resulting in a FINAL recommendation.
- The participants voted on the FINAL recommendations to indicate their extent of agreement on a scale from 1 to 7 (1 indicating strong agreement, 5 indicating no agreement or disagreement, and 7 indicating strong disagreement).

RESULTS

Literature Search Results

The AHRQ review results for testicular cancer included four primary studies. Data from the evidence tables are summarized in Appendix 1. In addition to data for diagnostic performance, summaries of results for diagnostic thinking and management strategy are also presented where they apply. The key evidence is described below in an abbreviated fashion.

Key Evidence

Diagnosis/Staging

- Lassen et al (3) studied 46 patients with stage I nonseminomatous germ cell tumour (NSCGT). PET identified seven of 10 patients with relapse at the time of initial staging (sensitivity 70%) and had no false positive results (specificity 100%).
- A UK study by Huddart et al (4) was excluded from the AHRQ report because it did not address any of the questions posed by the report, but the GU DSG feels the report should be noted. The objective of the trial was to examine whether PET could identify patients

without occult metastatic disease. This study included 116 patients with NSGCT and evidence of vascular invasion in the primary specimen. Patients had clinical stage I disease on the basis of clinical examination, chest x-ray, and CT scan, and negative postorchidectomy tumour markers. The study was designed to exclude a negative predictive value of less than 80% and a two-year relapse-free rate of 80% or less. The study was stopped prematurely prior to full accrual as the estimated one-year relapse-free rate was 65% and even with no further relapses in patients accrued, the best achievable two-year relapse-free rate was estimated to be 70%. Of 88 patients with negative PET scans, 33 patients relapsed with an estimated one-year relapse-free rate of 63.3%.

Assessment of Treatment Response

- Hinz et al (5) examined FDG-PET for predicting visible residual tumour in 20 patients with seminoma following chemotherapy for advanced disease. PET had sensitivity of 100% and specificity of 47% in detecting residual tumour.
- Becherer et al (6) evaluated PET in 48 patients with metastatic seminoma and CT-documented mass after chemotherapy. PET had sensitivity and specificity of 80% and 100%, respectively, compared with CT sensitivity and specificity both 73%.
- Karapetis et al (7) reviewed 15 patients with advanced testicular germ cell tumour who had at least one postchemotherapy PET scan. A first PET scan had 100% sensitivity and 72% specificity. PET led to a change in management in only one patient (from observation to surgical excision of residual mass).

Recurrence/Restaging

- In Karapetis et al (7), three of the 15 patients developed relapsed germ cell tumour after chemotherapy. Initial PET scans were normal in two patients and equivocal in one. Repeat scans done at the time of clear disease relapse confirmed a positive serum tumour marker. In Becherer et al (6), PET correctly identified relapse in two of five patients who had received high-dose salvage therapy.

RECOMMENDATIONS
DIAGNOSIS/STAGING
Clinical Question
What benefit to clinical management does PET or PET/CT contribute to the diagnosis or staging of testicular cancer?

DRAFT DSG Recommendation

A recommendation cannot be made for or against the use of PET in the routine staging of patients with testicular cancer due to insufficient evidence.

Provincial Consensus Meeting Deliberations

No major issues were raised during discussion of this recommendation.

FINAL Recommendation Put to Vote

A recommendation cannot be made for or against the use of PET in the routine staging of patients with testicular cancer due to insufficient evidence.

	1 - Strongly Agree			4 - Neither Agree nor Disagree			7 - Strongly Disagree	N/A
	1	2	3	4	5	6	7	
Total	6	10	3	2				

Votes = 21

Qualifying Statement

None.

ASSESSMENT OF TREATMENT RESPONSE

Clinical Question

What benefit to clinical management does PET or PET/CT contribute to the assessment of treatment response for testicular cancer?

DRAFT DSG Recommendation

a) PET is recommended for the assessment of treatment response in patients with seminoma and residual masses after chemotherapy.
b) PET is not recommended for the assessment of treatment response in patients with nonseminoma.

Provincial Consensus Meeting Deliberations

No major issues were raised during discussion of these recommendations.

FINAL Recommendation Put to Vote

a) PET is recommended for the assessment of treatment response in patients with seminoma and residual masses after chemotherapy.

	1 - Strongly Agree			4 - Neither Agree nor Disagree			7 - Strongly Disagree	N/A
	1	2	3	4	5	6	7	
Total	6	10	3	2				

Votes = 21

Issues raised on voting questionnaires:
-Should size criteria (> or < 3 cm) be clarified?
-Suggest evidence is reviewed by size of mass (e.g., > or < 3 cm)
-Feel there is some inconsistency between the 1st and 2nd recommendations for treatment response.

FINAL Recommendation Put to Vote

b) PET is not recommended for the assessment of treatment response in patients with nonseminoma.

	1 - Strongly Agree			4 - Neither Agree nor Disagree			7 - Strongly Disagree	N/A
	1	2	3	4	5	6	7	
Total	7	11	2	1				

Votes = 21

Qualifying Statement

- In NSGCTs, PET does not reliably distinguish mature teratoma from benign residual mass, and thus resection of residual masses is required.

RECURRENCE/RESTAGING

Clinical Question

What benefit to clinical management does PET or PET/CT contribute when recurrence of testicular cancer is suspected but not proven? What benefit to clinical management does PET or PET/CT contribute to restaging at the time of documented recurrence for testicular cancer?

DRAFT DSG Recommendation

A recommendation cannot be made for or against the routine use of PET for evaluation of recurrence due to insufficient evidence.

Provincial Consensus Meeting Deliberations

No major issues were raised during discussion of this recommendation.

FINAL Recommendation Put to Vote

A recommendation cannot be made for or against the routine use of PET for evaluation of recurrence due to insufficient evidence.

	1 – Strongly Agree			5 – Neither Agree nor Disagree				9 – Strongly Disagree		N/A
	1	2	3	4	5	6	7	8	9	
Total	8	6	6	1						1

Votes = 21

Qualifying Statement

None.

Solitary Metastasis Identified at Time of Recurrence

Clinical Question

What is the role of PET when a solitary metastasis is identified at the time of recurrence and a metastectomy is being contemplated?

This question was not addressed in the testicular evidence review.

FUTURE RESEARCH

A study is proposed to examine the role of PET in patients with clinical stage I seminoma undergoing management with surveillance. In this population, 15% to 20% will relapse and prognostic indicators for determining relapse are relatively poor. There are no data on the use of PET in this situation.

ACKNOWLEDGEMENTS

The GU DSG would like to thank Dr. Peter Chung for taking the lead in drafting this systematic review.

For a complete list of the Genitourinary DSG members, please visit the CCO Web site at http://www.cancercare.on.ca/

Funding

The PEBC is a provincial initiative of Cancer Care Ontario supported by the Ontario Ministry of Health and Long-Term Care through Cancer Care Ontario. All work produced by the PEBC is editorially independent from its funding source.

Contact Information

For further information about this report, please contact:

Dr. Peter Chung, Princess Margaret Hospital, 610 University Avenue, Toronto, Ontario Canada M5G 2M9, telephone (416) 946-6522, fax (416) 946-4586, email peter.chung@rmp.uhn.on.ca

For information about the PEBC and the most current version of all reports, please visit the CCO Web site at http://www.cancercare.on.ca/ or contact the PEBC office at:
Phone: 905-525-9140, ext. 22055 Fax: 905-522-7681

REFERENCES

1. McEwan AJ, Gulenchyn K, Ospina M, Horton J, Seida J, Vandermeer B, et al. Positron emission tomography for nine cancers (bladder, brain, cervical, kidney, ovarian, pancreatic, prostate, small cell lung, testicular). Rockville, Maryland: Agency for Healthcare Research and Quality; August 2008. Draft.
2. Matchar DB, Kulasingam SL, Havrilesky L, Mann LO, Myers ER, McCrory DC, et al. Positron emission tomography for six cancers (brain, cervical, small cell lung, ovarian, pancreatic, and testicular). Rockville, Maryland: Agency for Healthcare Research and Quality; February 2004. [cited 19 January 2009]. Available from: http://www.cms.hhs.gov/mcd/viewtechassess.asp?where=search&tid=21
3. Lassen U, Daugaard G, Eigtved A, Højgaard L, Damgaard K, Rørth M. Whole-body FDG-PET in patients with stage I non-seminomatous germ cell tumours. Eur J Nucl Med Mol Imaging 2003;30(3):396-402.
4. Huddart RA, O'Doherty MJ, Padhani A, Rustin GJ, Mead GM, Joffe JK, et al. 18fluorodeoxyglucose positron emission tomography in the prediction of relapse in patients with high-risk, clinical stage I nonseminomatous germ cell tumors: preliminary report of MRC Trial TE22--the NCRI Testis Tumour Clinical Study Group. J Clin Oncol. 2007 Jul 20;25(21):3090-5.
5. Hinz S, Schrader M, Kempkensteffen C, Bares R, Brenner W, Krege S, et al. The role of positron emission tomography in the evaluation of residual masses after chemotherapy for advanced stage seminoma. J Urol 2008;179(3):936-40.
6. Becherer A, De Santis M, Karanikas G, Szabó M, Bokemeyer C, Dohmen BM, et al. FDG PET is superior to CT in the prediction of viable tumour in post-chemotherapy seminoma residuals. Eur J Radiol 2005;54(2):284-8.
7. Karapetis CS, Strickland AH, Yip D, Steer C, Harper PG. Use of fluorodeoxyglucose positron emission tomography scans in patients with advanced germ cell tumour following chemotherapy: single-centre experience with long-term follow up. Intern Med J 2003;33(9-10):427-35.

Appendix 1. PET for testicular cancer: summary of the evidence from 2003 to March 2008.

TESTICULAR Q1 - Diagnostic performance								
Citation (ref #)	Study design	PET imaging	Reference std	Sens	Spec	PPV	NPV	Evidence grade
Staging								
Lassen2003 (3)	Prospective	PET	Hist/bx or clin fup	70%	100%	100%	92%	B
Recurrence								
Hinz2008 (5)	Prospective	PET	Hist/bx	100%	47%	25%	100%	B
Karapetis2003 (7)	Retrospective	PET	Clin fup	100%	72%	25%	100%	D
Restaging								
*Becherer2005 (6)	Prospective	PET	Hist/bx or clin fup	All lesions 80% Lesions <3 cm 25% Lesions ≥3 cm 100%	All lesions 100% Lesions <3 cm 100% Lesions ≥3 cm 100%	All lesions 100% Lesions <3 cm 100% Lesions ≥3 cm 100%	All lesions 97% Lesions <3 cm 93% Lesions ≥3 cm 100%	B

*Results in AHRQ appendix (pg D104) are incorrect (reversed) for <3 and ≥3cm.
Abbreviations: bx, biopsy; clin, clinical; fup, follow up; PET, positron emission tomography; Sens, sensitivity; Spec, specificity; std, standard.

TESTICULAR Q2 - Diagnostic thinking					
Citation (ref #)	Study design	PET imaging	Purpose of PET	Management decision	Evidence grade
Karapetis2003 (7)	Retrospective	PET	Recurrence	Rx strategy changed for 1/15 pts (7%) -From surveillance to surgical excisions of residual masses. Confirmation of small residual masses in 4/15 pts – subsequent Rx not altered.	D

Abbreviations: PET, positron emission tomography; pts, patients; Rx, treatment.