**** **Neoplasia of the Testis – Retroperitoneal Lymphadenectomy Histopathology Reporting Guide**

 **Elements in black text are CORE Elements in grey text are NON-CORE o indicates single select values □ indicates multi-select values**

|  |  |
| --- | --- |
| Definition of Core elements | CORE elements are those which are essential for the clinical management, staging or prognosis of the cancer. These elements will either have evidentiary support at Level III-2 or above (based on prognostic factors in the National Health and Medical Research Council (NHMRC) levels of evidence1). In rare circumstances, where level III-2 evidence is not available an element may be made a CORE element where there is unanimous agreement by the Dataset Authoring Committee (DAC). An appropriate staging system e.g., Pathological TNM staging would normally be included as a CORE element. Molecular and immunohistochemical testing is a growing feature of cancer reporting. However, in many parts of the world this type of testing is limited by the available resources. In order to encourage the global adoption of ancillary tests for patient benefit, International Collaboration on Cancer Reporting (ICCR) includes the most relevant ancillary testing in ICCR Datasets as CORE elements, especially when they are necessary for the diagnosis. Where the technical capability does not yet exist, laboratories may consider temporarily using these data elements as NON-CORE items.The summation of all CORE elements is considered to be the minimum reporting standard for a specific cancer.**Reference** 1 Merlin T, Weston A and Tooher R (2009). Extending an evidence hierarchy to include topics other than treatment: revising the Australian 'levels of evidence'. *BMC Med Res Methodol* 9:34.  |
| Definition of Non-core elements | NON-CORE elements are those which are unanimously agreed should be included in the dataset but are not supported by level III-2 evidence. These elements may be clinically important and recommended as good practice but are not yet validated or regularly used in patient management. Key information other than that which is essential for clinical management, staging or prognosis of the cancer such as macroscopic observations and interpretation, which are fundamental to the histological diagnosis and conclusion e.g., macroscopic tumour details, may be included as either CORE or NON-CORE elements by consensus of the DAC.  |
| Scope of this dataset | The dataset has been developed for the reporting of retroperitoneal and other lymphadenectomy specimens as well as visceral metastasis excision specimens from patients of any age with malignant tumours of the testis. The protocol applies to all malignant germ cell and sex cord-stromal tumours of the testis. Paratesticular malignancies are excluded. A separate ICCR dataset is available for the reporting of orchidectomy specimens.1The second edition of this dataset includes changes to align the dataset with the World Health Organization (WHO) Classification of Tumours, Urinary and Male Genital Tumours, 5th edition, 2022.2 The ICCR dataset includes 5th edition Corrigenda, July 2024.3 In development of this dataset, the DAC considered evidence up until July 2024.**References**1 International Collaboration on Cancer Reporting (2024). *Germ cell tumours of the testis – orchidectomy Histopathology Reporting Guide. 2nd edition*. Available from: https://www.iccr-cancer.org/datasets/published-datasets/urinary-male-genital/testis-orchidectomy/ (Accessed 30th November 2024). 2 WHO Classification of Tumours Editorial Board (2022). *Urinary and Male Genital Tumours, WHO Classification of Tumours, 5th edition, Volume 8*, IARC Publications, Lyon.3 WHO Classification of Tumours Editorial Board (2022). *Urinary and Male Genital Tumours, WHO Classification of Tumours, 5th edition, Volume 8 - Corrigenda July 2024.* Available from: file:///C:/Users/fleurw/Downloads/Uro5%20Corrigenda%20doc\_2024-07-08%20(1).pdf (Accessed 2nd August 2024).  |

| **Core/** **Non-core** | **Element name** | **Values** | **Commentary** | **Implementation notes** |
| --- | --- | --- | --- | --- |
| Core and Non-core | CLINICAL INFORMATION | * Information not provided
* Information provided

(select all that apply)* Previous history of testicular cancer*, specify*
* Previous therapy, *specify*
* Other clinical information, *specify*
 | Retroperitoneal lymph node dissection (RPLND) may be performed at the time of diagnosis of a testicular tumour, or may be performed after chemotherapy, and this will affect the likely pathological changes seen. Although the majority of excisions will be for germ cell tumours,1 primary prophylactic excisions for malignant sex cord- stromal tumours are also occasionally performed.2**References** 1. Latarius S, Leike S, Erb H, Putz J, Borkowetz A, Thomas C and Baunacke M (2023). Retroperitoneal lymph node dissection for testicular cancer is a demanding procedure: detailed real-life data of complications and additional surgical procedures in 295 cases. *World J Urol* 41(9):2397-2404.

2 Hendry J, Fraser S, White J, Rajan P and Hendry DS (2015). Retroperitoneal lymph node dissection (RPLND) for malignant phenotype Leydig cell tumours of the testis: a 10-year experience. *Springerplu*s 4(1):20 |  |
| Non-core | SERUM TUMOUR MARKERS | * Not provided
* Provided
* Serum tumour markers within normal limits

Specify serum tumour markers used, level and date markers were drawn(select all that apply)Date \_\_\_* LDH \_\_\_
* AFP \_\_\_ ug/L
* b-HcG \_\_\_ IU/L
 | Serum marker studies play a key role in the clinical management of patients with testicular germ cell tumours and in the monitoring of recurrent disease.1-3Novel markers such as mi-371a-3p may be used in the future but are not at present ready for routine use.4,5Most patients who undergo post chemotherapy RPLND will have negative markers following orchiectomy as those with positive markers will be treated with further chemotherapy or radiotherapy. The occurrence of elevated serum levels of alpha-fetoprotein (AFP) or the beta subunit of human chorionic gonadotropin (b-hCG) may indicate the need for additional sections of certain specimens if the initial findings do not account for such elevations. Serum markers may be used if available to define anatomic stage/prognostic groups in RPLND specimens, as shown below.6,7 **Anatomic Stage/Prognostic Groups**Group T N M SStage 0 pTis N0 M0 S0Stage I pT1-4 N0 M0 SXStage IA pT1 N0 M0 S0Stage IB pT2 N0 M0 S0pT3 N0 M0 S0pT4 N0 M0 S0Stage IS Any pT/TX N0 M0 S1-3Stage II Any pT/TX N1,N2,N3 M0 SXStage IIA Any pT/TX N1 M0 S0Any pT/TX N1 M0 S1Stage IIB Any pT/TX N2 M0 S0Any pT/TX N2 M0 S1Stage IIC Any pT/TX N3 M0 S0Any pT/TX N3 M0 S1Stage III Any pT/TX Any N M1 SXStage IIIA Any pT/TX Any N M1a S0Any pT/TX Any N M1a S1Stage IIIB Any pT/TX N1,N2,N3 M0 S2Any pT/TX Any N M1a S2Stage IIIC Any pT/TX N1,N2,N3 M0 S3Any pT/TX Any N M1a S3Any pT/TX Any N M1b Any SA ‘y’ prefix indicates those cases in which classification is performed during or following initial multimodality therapy (i.e., chemotherapy, radiation therapy, or both chemotherapy and radiation therapy). **Prognostic Factors**Serum Tumour Markers (S)SX Serum marker studies not available or performedS0 Serum marker study levels within normal limitsLDH hCG (mIU/mL) AFP (ng/mL)S1 <1.5 x #N and <5,000 and <1,000S2 1.5-10 x #N or 5,000-50,000 or 1,000-10,000S3 >10 x N or >50,000 or >10,000LDH - lactate dehydrogenasehCG - human chorionic gonadotropinmIU/mL - milli-international units per millilitreAFP - alpha-fetoproteinng/mL **-** nanograms per millilitre#N indicates the upper limit of normal for the LDH assay.The Serum Tumour Markers (S) category comprises the following:* AFP – half-life 5 to 7 days
* hCG – half-life 1 to 3 days
* LDH.

**References** 1 Stephenson AJ, Bosl GJ, Motzer RJ, Kattan MW, Stasi J, Bajorin DF and Sheinfeld J (2005). Retroperitoneal lymph node dissection for nonseminomatous germ cell testicular cancer: impact of patient selection factors on outcome. *J Clin Oncol* 23(12):2781-2788.2 Choueiri TK, Stephenson AJ, Gilligan T and Klein EA (2007). Management of clinical stage I nonseminomatous germ cell testicular cancer. *Urol Clin North Am* 34(2):137-148; abstract viii.3 Donohue JP, Thornhill JA, Foster RS, Rowland RG and Bihrle R (1995). Clinical stage B non-seminomatous germ cell testis cancer: the Indiana University experience (1965-1989) using routine primary retroperitoneal lymph node dissection. *Eur J Cancer* 31a(10):1599-1604.4 Lobo J, Acosta AM and Netto GJ (2023). Molecular Biomarkers With Potential Clinical Application in Testicular Cancer. *Mod Pathol* 36(10):100307.5 Konneh B, Lafin JT, Howard J, Gerald T, Amini A, Savelyeva A, Woldu SL, Lewis CM, Jia L, Margulis V, Coleman N, Scarpini C, Frazier AL, Murray MJ, Amatruda JF and Bagrodia A (2023). Evaluation of miR-371a-3p to predict viable germ cell tumor in patients with pure seminoma receiving retroperitoneal lymph node dissection. *Andrology* 11(4):634-640.6 Brierley JD, Gospodarowicz MK and Wittekind C (eds) (2016). *Union for International Cancer Control.* *TNM Classification of Malignant Tumours, 8th Edition*, Wiley, USA.7 Amin MB, Edge SB, Greene FL, Byrd DR, Brookland RK, Washington MK, Gershenwald JE, Compton CC, Hess KR, Sullivan DC, Jessup JM, Brierley JD, Gaspar LE, Schilsky RL, Balch CM, Winchester DP, Asare EA, Madera M, Gress DM and Meyer LR (eds) (2017). *AJCC Cancer Staging Manual. 8th ed.*, Springer, New York.  |  |
| Core | SPECIMEN(S) SUBMITTED | (select all that apply)* Not specified
* Retroperitoneal lymphadenectomy*, specify nodal site(s)*
* No disease
* Necrosis
* Viable tumour
* No disease
* Necrosis
* Viable tumour
* No disease
* Necrosis
* Viable tumour
* No disease
* Necrosis
* Viable tumour
* Brain
* Lung
* Liver
* Other, *specify*
 | The type of retroperitoneal surgery performed is dependent on which testis was affected by tumour and a number of different surgical approaches are possible. Although there are exceptions, right-sided tumours metastasise to the interaortocaval lymph nodes first followed by the precaval and paracaval lymph nodes. Left sided testicular tumours metastasise to the para- and preaortic areas. Contralateral involvement is more frequent in right sided tumours as well as in bulky disease. The practice of specimen submission differs greatly, but often surgeons will resect separate nodal sites in separate containers.After chemotherapy, it is common practice to excise other remaining sites of disease, apart from RPLND and these should be identified.  |  |
| Core and Non-core | SIZE OF LARGEST LYMPH NODE | * Cannot be assessed

Maximum dimension\_\_\_ mm Additional dimensions\_\_\_ mm x \_\_\_mm | There is a lack of clarity in the Union for International Cancer Control (UICC) and American Joint Committee on Cancer (AJCC) TNM8 as to whether to record the size of the 'largest lymph node' or 'largest nodal metastasis'.1,2 In the vast majority of cases these will be identical, but this does not exclude the possibility that in selected cases these might differ. As in any other organ the largest lymph node diameter should be recorded as well as the largest lymph node metastasis. We recognise that these will be the same in the vast majority of resection cases. **References** 1 Brierley JD, Gospodarowicz MK and Wittekind C (eds) (2016). *Union for International Cancer Control.* *TNM Classification of Malignant Tumours, 8th Edition*, Wiley, USA.2 Amin MB, Edge SB, Greene FL, Byrd DR, Brookland RK, Washington MK, Gershenwald JE, Compton CC, Hess KR, Sullivan DC, Jessup JM, Brierley JD, Gaspar LE, Schilsky RL, Balch CM, Winchester DP, Asare EA, Madera M, Gress DM and Meyer LR (eds) (2017). *AJCC Cancer Staging Manual. 8th ed.*, Springer, New York.  |  |
| Core and Non-core | SIZE OF LARGEST NODAL METASTASIS | * Cannot be assessed

Maximum dimension\_\_\_ mm Additional dimensions\_\_\_ mm x \_\_\_mm | A number of studies have shown that the ‘size of the retroperitoneal nodes’ is associated with the presence of tumour (teratoma and also of viable malignant elements).1,2 There is a lack of clarity whether this is a measurement of the lymph node or metastasis though in most cases these will be identical. Nodal metastasis size may be difficult to measure when nodes are confluent. The Dataset Authoring Committee suggest that where separate nodes are not readily identifiable then the largest diameter of the overall tumour be recorded.3,4 The other two dimensions are non-core items.**References** 1 Gerdtsson A, Torisson G, Thor A, Grenabo Bergdahl A, Almås B, Håkansson U, Törnblom M, Negaard HFS, Glimelius I, Halvorsen D, Karlsdóttir Á, Haugnes HS, Larsen SM, Holmberg G, Wahlqvist R, Tandstad T, Cohn-Cedermark G, Ståhl O and Kjellman A (2023). Validation of a prediction model for post-chemotherapy fibrosis in nonseminoma patients. *BJU Int* 132(3):329-336.2 Miranda Ede P, Abe DK, Nesrallah AJ, dos Reis ST, Crippa A, Srougi M and Dall'Oglio MF (2012). Predicting necrosis in residual mass analysis after retroperitoneal lymph node dissection: a retrospective study. *World J Surg Oncol* 10:203.3 Hudolin T, Kastelan Z, Knezevic N, Goluza E, Tomas D and Coric M (2012). Correlation between retroperitoneal lymph node size and presence of metastases in nonseminomatous germ cell tumors. *Int J Surg Pathol* 20(1):15-18.4 Spiess PE, Brown GA, Pisters LL, Liu P, Tu SM, Evans JG, Kamat AM, Black P and Tannir NM (2006). Viable malignant germ cell tumor in the postchemotherapy retroperitoneal lymph node dissection specimen: can it be predicted using clinical parameters? *Cancer* 107(7):1503-1510.  |  |
| Non-core | BLOCK IDENTIFICATION KEY | List overleaf or separately with an indication of the nature and origin of all tissue blocks. | The origin/designation of all tissue blocks should be recorded. This information should ideally be documented in the final pathology report and is particularly important should the need for internal or external review arise. The reviewer needs to be clear about the origin of each block in order to provide an informed specialist opinion. If this information is not included in the final pathology report, it should be available on the laboratory computer system and relayed to the reviewing pathologist. It may be useful to have a digital image of the specimen and record of the origin of the tumour blocks in some cases.Recording the origin/designation of tissue blocks also facilitates retrieval of blocks for further immunohistochemical or molecular analysis, research studies or clinical trials.Comprehensive sampling is essential for residual masses, as the identification of even a small area of a different subtype can alter patient management and impact on prognosis. Although the recommendation of one block per centimetre of tumour is usual, more may be required to adequately represent all the macroscopically different areas of tumour. The number of nodes harvested has been shown to impact on prognosis.1,2Blocks are selected to represent:* all areas of the positive node(s) with different macroscopic appearances (solid, cystic,

pale or haemorrhagic)* the minimum distance of the tumour to the nearest resection margin (which may be

inked)* all macroscopically negative nodes to search for micrometastatic disease.

It is recommended that a record is kept of a good representative paraffin block of tumour and if frozen tissue is stored.**References** 1 Carver BS, Cronin AM, Eggener S, Savage CJ, Motzer RJ, Bajorin D, Bosl GJ and Sheinfeld J (2010). The total number of retroperitoneal lymph nodes resected impacts clinical outcome after chemotherapy for metastatic testicular cancer. *Urology* 75(6):1431-1435.2 Nayan M, Jewett MA, Sweet J, Anson-Cartwright L, Bedard PL, Moore M, Chung P, Warde P and Hamilton RJ (2015). Lymph Node Yield in Primary Retroperitoneal Lymph Node Dissection for Nonseminoma Germ Cell Tumors. *J Urol* 194(2):386-391.  |  |
| Core  | HISTOLOGICAL TUMOUR TYPE | (select all that apply)* Viable tumour
* Absent
* Present

\_\_\_\_ %* Germ cell tumour, *specify type and percentag*e

\_\_\_\_\_\_\_\_\_\_\_ \_\_\_ %\_\_\_\_\_\_\_\_\_\_\_ \_\_\_ %\_\_\_\_\_\_\_\_\_\_\_ \_\_\_ %\_\_\_\_\_\_\_\_\_\_\_ \_\_\_ %* Other, *specify*
 | The classification of testicular tumours is taken from the World Health Organization (WHO) Classification of Tumours, Urinary and Male Genital Tumours, 5th edition, 2022 (Table 1).1 The International Collaboration on Cancer Reporting (ICCR) dataset includes 5th edition Corrigenda, July 2024.2 Please note that some of these entities do not metastasize but the entire classification is given here for completeness.**Table 1** (See end of the document for Table)**Retroperitoneal lymph node dissection (RPLND) before treatment**The type of tumour identified in an RPLND is crucial information to determine further treatment. The tumour in prechemotherapy RPLNDs (also referred to as primary RPLNDs) generally (but not always) show similar findings to that in the orchidectomy specimen. In primary setting, pathologic N staging is more commonly used to determine the need for adjuvant chemotherapy with pN0 and pN1 leading to surveillance and pN2 and pN3 (rare) leading to adjuvant chemotherapy. **Retroperitoneal lymph node dissection (RPLND) after treatment**After chemotherapy, and especially in late relapses, the pathology may be substantially different from that seen in primary RPLND.4 In general terms, after chemotherapy, 40-50% of germ cell tumour cases show pure necrosis with no viable tissue seen. A further 40% show teratoma, while the remaining 10% show a mixture of ‘malignant’ germ cell elements such as embryonal carcinoma, or yolk sac tumour, and a small number may show somatic transformation. Pure teratomatous metastasis is generally treated by surgical excision alone, whereas patients who have other residual germ cell tumour components are usually treated with additional chemotherapy. Metastatic sex cord-stromal tumours are also occasionally operated upon.5 Even the type of tumour seen substantially affects the prognostic and therapeutic implications6with, for example, certain variants being associated with a good outcome7while others are associated with an intermediate,8 or more aggressive course.9 Diagnosis of these variants may be challenging and require expert consultation. The percentage of ‘viable malignant cells’ has also shown to be a determinant of prognosis in a number of studies.10-13 10% is the most common cut-off used to determine the need for further treatment.14For post-chemotherapy residual masses, particularly in the absence of a biopsy diagnosis prior to treatment, it is often useful to examine areas of necrosis, as ghost outlines of the tumour often remain and allow the distinction between seminoma and non-seminomatous germ cell tumour. The reporting of number and location of lymph nodes involved by necrosis, fibrosis, xanthomatous and fibroxanthomatous reaction is important to the treating physician to evaluate the extent and distribution of tumour in different lymph nodes. There is evidence that fibrosis often represents neoplastic stroma originating from teratoma or yolk sac tumour.15 The spindle cells in the areas of fibrosis are often reactive to cytokeratin and display allelic loss (85%) and 12p anomalies (33%) characteristic of germ cell tumours. Xanthomatous and fibroxanthomatous reaction may sometimes pose a diagnostic challenge and immunohistochemical staining for evaluation of residual tumour is deemed necessary in occasional cases. It is important to recognise that residual viable malignancy (embryonal carcinoma, yolk sac tumour, classical seminoma or choriocarcinoma) may trigger further chemotherapy and therefore it is important to only report viable elements along with percentage of viable tumour and not semi-viable or non-viable tumour. Necrosis and post-chemotherapy teratoma would not usually trigger further therapy, unless the clinical situation dictates otherwise. In the case of cystic trophoblastic tumour (CTT), an explanatory note should be provided to caution the physicians against further chemotherapy. Data for CTT are limited but the largest study of 15 patients with follow-up showed that 11 did not recur, three showed late recurrences of possibly unrelated yolk sac tumour and the one patient who did recur with a rise in human chorionic gonadotropin (b-hCG) had unresected residual masses.7 For post-chemotherapy RPLND, it may be desirable to embed more of the specimen if it is found to contain necrosis or non-viable tumour to exclude small foci of viable tumour.Secondary somatic malignancy is rare and challenging to diagnose. The tumour typically consists of an expansile and pure population of atypical mesenchymal or epithelial cells and occupies at least 5 millimetres (mm) in diameter often with invasion of other components or structures outside the lymph node.1 Sarcomas are the most common type, though some post-chemotherapy sarcoma-like tumours may be sarcomatoid yolk sac tumours.16 Embryonic neuroectodermal tumour (previously called primitive neuroectodermal tumour17) is another relatively common somatic-type malignancy which behaves aggressively.18,19 Most carcinomas are adenocarcinomas, usually not otherwise specified (NOS) type. Occasionally, patients may develop nephroblastoma.20A somatic malignancy in a metastasis increases likelihood of dying from the disease and if it is localised, surgical resection is the optimal treatment.9 Patients usually respond poorly to the treatment for conventional germ cell malignancy.21 Some somatic malignancies may respond to a specific chemotherapy that is effective for the specific subtype, so accurate subtyping of the somatic transformation is important. **References**1 WHO Classification of Tumours Editorial Board (2022). *Urinary and Male Genital Tumours, WHO Classification of Tumours, 5th edition, Volume 8*, IARC Publications, Lyon.2 WHO Classification of Tumours Editorial Board (2022). *Urinary and Male Genital Tumours, WHO Classification of Tumours, 5th edition, Volume 8 - Corrigenda July 2024. Available from:* file:///C:/Users/fleurw/Downloads/Uro5%20Corrigenda%20doc\_2024-07-08%20(1).pdf (Accessed 2nd August 2024).3 Fritz A, Percy C, Jack A,  Shanmugaratnam K, Sobin L, Parkin DM  and Whelan S (eds) (2020). *International Classification of Diseases for Oncology, Third edition, Second revision ICD-O-3.2*. Available from: http://www.iacr.com.fr/index.php?option=com\_content&view=category&layout=blog&id=100&Itemid=577 (Accessed 2nd August 2024).4 Daneshmand S, Albers P, Fossa SD, Heidenreich A, Kollmannsberger C, Krege S, Nichols C, Oldenburg J and Wood L (2012). Contemporary management of postchemotherapy testis cancer. *Eur Urol* 62(5):867-876.5 Hendry J, Fraser S, White J, Rajan P and Hendry DS (2015). Retroperitoneal lymph node dissection (RPLND) for malignant phenotype Leydig cell tumours of the testis: a 10-year experience. *Springerplus* 4(1):20.6 Riggs SB, Burgess EF, Gaston KE, Merwarth CA and Raghavan D (2014). Postchemotherapy surgery for germ cell tumors--what have we learned in 35 years? *Oncologist* 19(5):498-506.7 Ulbright TM, Henley JD, Cummings OW, Foster RS and Cheng L (2004). Cystic trophoblastic tumor: a nonaggressive lesion in postchemotherapy resections of patients with testicular germ cell tumors. *Am J Surg Pathol* 28(9):1212-1216.8 Howitt BE, Magers MJ, Rice KR, Cole CD and Ulbright TM (2015). Many postchemotherapy sarcomatous tumors in patients with testicular germ cell tumors are sarcomatoid yolk sac tumors: a study of 33 cases. *Am J Surg Pathol* 39(2):251-259.9 Rice KR, Magers MJ, Beck SD, Cary KC, Einhorn LH, Ulbright TM and Foster RS (2014). Management of germ cell tumors with somatic type malignancy: pathological features, prognostic factors and survival outcomes. *J Urol* 192(5):1403-1409.10 Berney DM, Shamash J, Hendry WF, Arora A, Jordan S and Oliver RT (2001). Prediction of relapse after lymph node dissection for germ cell tumours: can salvage chemotherapy be avoided? *Br J Cancer* 84(3):340-343.11 Fox EP, Weathers TD, Williams SD, Loehrer PJ, Ulbright TM, Donohue JP and Einhorn LH (1993). Outcome analysis for patients with persistent nonteratomatous germ cell tumor in postchemotherapy retroperitoneal lymph node dissections. *J Clin Oncol* 11(7):1294-1299.12 Fizazi K, Tjulandin S, Salvioni R, Germa-Lluch JR, Bouzy J, Ragan D, Bokemeyer C, Gerl A, Flechon A, de Bono JS, Stenning S, Horwich A, Pont J, Albers P, De Giorgi U, Bower M, Bulanov A, Pizzocaro G, Aparicio J, Nichols CR, Theodore C, Hartmann JT, Schmoll HJ, Kaye SB, Culine S, Droz JP and Mahe C (2001). Viable malignant cells after primary chemotherapy for disseminated nonseminomatous germ cell tumors: prognostic factors and role of postsurgery chemotherapy--results from an international study group. *J Clin Oncol* 19(10):2647-2657.13 Fizazi K, Oldenburg J, Dunant A, Chen I, Salvioni R, Hartmann JT, De Santis M, Daugaard G, Flechon A, de Giorgi U, Tjulandin S, Schmoll HJ, Bouzy J, Fossa SD and Fromont G (2008). Assessing prognosis and optimizing treatment in patients with postchemotherapy viable nonseminomatous germ-cell tumors (NSGCT): results of the sCR2 international study. *Ann Oncol* 19(2):259-264.14 Antonelli L, Ardizzone D, Tachibana I, Adra N, Cary C, Hugar L, Sexton WJ, Bagrodia A, Mego M, Daneshmand S, Nicolai N, Nazzani S, Giannatempo P, Franza A, Heidenreich A, Paffenholz P, Saoud R, Eggener S, Ho M, Oswald N, Olson K, Tryakin A, Fedyanin M, Naoun N, Javaud C, Cazzaniga W, Nicol D, Gerdtsson A, Tandstad T, Fizazi K and Fankhauser CD (2023). Risk Factors for Relapse in Nonseminomatous Testicular Cancer After Postchemotherapy Retroperitoneal Lymph Node Dissection With Viable Residual Cancer. *J Clin Oncol* 41(34):5296-5305.15 Cheng L, Zhang S, Wang M, Davidson DD, Morton MJ, Huang J, Zheng S, Jones TD, Beck SD and Foster RS (2007). Molecular genetic evidence supporting the neoplastic nature of stromal cells in 'fibrosis' after chemotherapy for testicular germ cell tumours. *J Pathol* 213(1):65-71.16 Magers MJ, Kao CS, Cole CD, Rice KR, Foster RS, Einhorn LH and Ulbright TM (2014). "Somatic-type" malignancies arising from testicular germ cell tumors: a clinicopathologic study of 124 cases with emphasis on glandular tumors supporting frequent yolk sac tumor origin. *Am J Surg Pathol* 38(10):1396-1409.17 Flood TA, Ulbright TM and Hirsch MS (2021). "Embryonic-type Neuroectodermal Tumor" Should Replace "Primitive Neuroectodermal Tumor" of the Testis and Gynecologic Tract: A Rationale for New Nomenclature. *Am J Surg Pathol* 45(10):1299-1302.18 Michael H, Hull MT, Ulbright TM, Foster RS and Miller KD (1997). Primitive neuroectodermal tumors arising in testicular germ cell neoplasms. *Am J Surg Pathol* 21(8):896-904.19 Giannatempo P, Pond GR, Sonpavde G, Albany C, Loriot Y, Sweeney CJ, Salvioni R, Colecchia M, Nicolai N, Raggi D, Rice KR, Flack CK, El Mouallem NR, Feldman H, Fizazi K, Einhorn LH, Foster RS, Necchi A and Cary C (2016). Treatment and Clinical Outcomes of Patients with Teratoma with Somatic-Type Malignant Transformation: An International Collaboration. *J Urol* 196(1):95-100.20 Michael H, Hull MT, Foster RS, Sweeney CJ and Ulbright TM (1998). Nephroblastoma-like tumors in patients with testicular germ cell tumors. *Am J Surg Pathol* 22(9):1107-1114.21 Motzer RJ, Amsterdam A, Prieto V, Sheinfeld J, Murty VV, Mazumdar M, Bosl GJ, Chaganti RS and Reuter VE (1998). Teratoma with malignant transformation: diverse malignant histologies arising in men with germ cell tumors. *J Urol* 159(1):133-138.  | Value list based on the WHO Classification of Urinary and Male Genital Tumours (2022).Note that permission to publish the WHO Classification of Tumours may be needed in your implementation. It is advisable to check with the International Agency for Research on Cancer (IARC). |
| Core and Non-core | MARGIN STATUS | * Cannot be assessed
* Not involved

Distance of tumour from closest margin \_\_\_ mmSpecify closest margin(s), if possible* Involved

Specify margin(s), if possible | Complete resection of viable ‘malignant’ germ cell elements is an important prognostic factor in RPLND and therefore is a core element.1 It is therefore important to liaise with the surgeon to ensure that all margins are true margins, especially when adjacent lymph nodes/tissue is removed individually. Use of marking sutures may be useful in these circumstances to indicate orientation.2-6 There is no evidence whether the distance to the margin is prognostic in these specimens and therefore this has been listed as non-core as it is standard practice in other pathological neoplastic diseases. **References** 1 Antonelli L, Ardizzone D, Tachibana I, Adra N, Cary C, Hugar L, Sexton WJ, Bagrodia A, Mego M, Daneshmand S, Nicolai N, Nazzani S, Giannatempo P, Franza A, Heidenreich A, Paffenholz P, Saoud R, Eggener S, Ho M, Oswald N, Olson K, Tryakin A, Fedyanin M, Naoun N, Javaud C, Cazzaniga W, Nicol D, Gerdtsson A, Tandstad T, Fizazi K and Fankhauser CD (2023). Risk Factors for Relapse in Nonseminomatous Testicular Cancer After Postchemotherapy Retroperitoneal Lymph Node Dissection With Viable Residual Cancer. *J Clin Oncol* 41(34):5296-5305.2 Fizazi K, Tjulandin S, Salvioni R, Germa-Lluch JR, Bouzy J, Ragan D, Bokemeyer C, Gerl A, Flechon A, de Bono JS, Stenning S, Horwich A, Pont J, Albers P, De Giorgi U, Bower M, Bulanov A, Pizzocaro G, Aparicio J, Nichols CR, Theodore C, Hartmann JT, Schmoll HJ, Kaye SB, Culine S, Droz JP and Mahe C (2001). Viable malignant cells after primary chemotherapy for disseminated nonseminomatous germ cell tumors: prognostic factors and role of postsurgery chemotherapy--results from an international study group. *J Clin Oncol* 19(10):2647-2657.3 Fizazi K, Oldenburg J, Dunant A, Chen I, Salvioni R, Hartmann JT, De Santis M, Daugaard G, Flechon A, de Giorgi U, Tjulandin S, Schmoll HJ, Bouzy J, Fossa SD and Fromont G (2008). Assessing prognosis and optimizing treatment in patients with postchemotherapy viable nonseminomatous germ-cell tumors (NSGCT): results of the sCR2 international study. *Ann Oncol* 19(2):259-264.4 Hendry WF, Norman AR, Dearnaley DP, Fisher C, Nicholls J, Huddart RA and Horwich A (2002). Metastatic nonseminomatous germ cell tumors of the testis: results of elective and salvage surgery for patients with residual retroperitoneal masses. *Cancer* 94(6):1668-1676.5 Heidenreich A, Ohlmann C, Hegele A and Beyer J (2005). Repeat retroperitoneal lymphadenectomy in advanced testicular cancer. *Eur Urol* 47(1):64-71.6 McKiernan JM, Motzer RJ, Bajorin DF, Bacik J, Bosl GJ and Sheinfeld J (2003). Reoperative retroperitoneal surgery for nonseminomatous germ cell tumor: clinical presentation, patterns of recurrence, and outcome. *Urology* 62(4):732-736. |  |
| Core | EXTRANODAL EXTENSION | * Indeterminate
* Not identified
* Present
 | The detection of extranodal extension of disease has been studied in a number of publications, and although some have shown it to be an indicator of poor prognosis, this may not be independently significant of other prognostic parameters such as tumour size, incomplete excision and type of tumour. However, in the TNM staging it upstages from pN1 to pN2 and is utilised as a cut off point for the decision on further chemotherapy.1,2**References** 1 Al-Ahmadie HA, Carver BS, Cronin AM, Olgac S, Tickoo SK, Fine SW, Gopalan A, Stasi J, Rabbani F, Bosl GJ, Sheinfeld J and Reuter VE (2013). Primary retroperitoneal lymph node dissection in low-stage testicular germ cell tumors: a detailed pathologic study with clinical outcome analysis with special emphasis on patients who did not receive adjuvant therapy. *Urology* 82(6):1341-1346.2 Beck SD, Cheng L, Bihrle R, Donohue JP and Foster RS (2007). Does the presence of extranodal extension in pathological stage B1 nonseminomatous germ cell tumor necessitate adjuvant chemotherapy? *J Urol* 177(3):944-946.  |  |
| Core | PATHOLOGICAL STAGING (UICC TNM 8**th** edition)a | **TNM Descriptors** (only if applicable) * y - post-therapy

**Regional lymph nodes (pN)*** NXb Regional lymph nodes cannot be assessed
* N0 No regional lymph node metastasis
* N1 Metastasis with a lymph node mass 2 cm or less in greatest dimension and five or fewer positive nodes, none more than 2 cm in greatest dimension
* N2 Metastasis with a lymph node mass more than 2 cm but not more than 5 cm in greatest dimension; or more than five nodes positive, none more than 5 cm; or evidence of extranodal extension of tumour
* N3 Metastasis with a lymph node mass more than 5 cm in greatest dimension

**Distant metastasis (pM**)(if resected)* No distant metastases
* M1 Distant metastasis
* M1a Non-regional lymph node(s) or lung
* M1b Other sites
 | This dataset includes the updated UICC 8th edition definitions,1 which now are optimally aligned with the and AJCC 8th edition definitions.2 The staging will depend on the nature of the resected specimens. Although most post-chemotherapy resections are of lymph node groups, usually in the retroperitoneum, there are occasional resections of other post-chemotherapy specimens from the lung, brain, liver or other sites. Most, but not all, of these specimens will either be of teratoma or show necrosis. All non-lymphoid sites should be classified under M. An alternative method of staging which may be used is the modified Royal Marsden staging system (see below).3 This staging method has been suggested in some studies to be more prognostically significant and helpful in guiding further therapy than TNM and it is included below as it is requested by some oncological centres and still used in some large scale trials.4,5 **TNM8 Descriptors for Retroperitoneal lymph node dissections (RPLND) and other metastatic resections of primary testicular neoplasms1,13****Regional lymph nodes (pN)**The regional lymph nodes are the abdominal para-aortic (peri-aortic), pre-aortic, interaortocavalprecaval, paracaval, retrocaval, and retro-aortic nodes. Nodes along the spermatic vein should beconsidered regional.Laterality does not affect the N classification.The intrapelvic and the inguinal nodes are considered regional after scrotal or inguinal surgery.A ‘y’ prefix indicates those cases in which classification is performed during or following initial multimodality therapy (i.e., chemotherapy, radiation therapy, or both chemotherapy and radiation therapy). Modified Royal Marsden Staging SystemStage I Tumour confined to the testisStage II Infradiaphragmatic nodal involvement IIA Greatest dimension of involved nodes less than 2 centimetres (cm) IIB Greatest dimension of involved nodes 2 cm or more but less than 5 cm IIC Greatest dimension of involved nodes 5 cm or more but less than 10 cm IID Greatest dimension of involved nodes 10 cm or moreStage III Supraclavicular or mediastinal involvementStage IV Extranodal metastases**References** 1 Brierley JD, Gospodarowicz MK and Wittekind C (eds) (2016). *Union for International Cancer Control.* *TNM Classification of Malignant Tumours, 8th Edition*, Wiley, USA.2 Amin MB, Edge SB, Greene FL, Byrd DR, Brookland RK, Washington MK, Gershenwald JE, Compton CC, Hess KR, Sullivan DC, Jessup JM, Brierley JD, Gaspar LE, Schilsky RL, Balch CM, Winchester DP, Asare EA, Madera M, Gress DM and Meyer LR (eds) (2017). *AJCC Cancer Staging Manual. 8th ed.*, Springer, New York.3 Thomas G, Jones W, VanOosterom A and Kawai T (1990). Consensus statement on the investigation and management of testicular seminoma 1989. *Prog Clin Biol Res* 357:285-294.4 Honecker F, Aparicio J, Berney D, Beyer J, Bokemeyer C, Cathomas R, Clarke N, Cohn-Cedermark G, Daugaard G, Dieckmann KP, Fizazi K, Fosså S, Germa-Lluch JR, Giannatempo P, Gietema JA, Gillessen S, Haugnes HS, Heidenreich A, Hemminki K, Huddart R, Jewett MAS, Joly F, Lauritsen J, Lorch A, Necchi A, Nicolai N, Oing C, Oldenburg J, Ondruš D, Papachristofilou A, Powles T, Sohaib A, Ståhl O, Tandstad T, Toner G and Horwich A (2018). ESMO Consensus Conference on testicular germ cell cancer: diagnosis, treatment and follow-up. *Ann Oncol* 29(8):1658-1686.5 Joffe JK, Cafferty FH, Murphy L, Rustin GJS, Sohaib SA, Gabe R, Stenning SP, James E, Noor D, Wade S, Schiavone F, Swift S, Dunwoodie E, Hall M, Sharma A, Braybrooke J, Shamash J, Logue J, Taylor HH, Hennig I, White J, Rudman S, Worlding J, Bloomfield D, Faust G, Glen H, Jones R, Seckl M, MacDonald G, Sreenivasan T, Kumar S, Protheroe A, Venkitaraman R, Mazhar D, Coyle V, Highley M, Geldart T, Laing R, Kaplan RS and Huddart RA (2022). Imaging Modality and Frequency in Surveillance of Stage I Seminoma Testicular Cancer: Results From a Randomized, Phase III, Noninferiority Trial (TRISST). *J Clin Oncol* 40(22):2468-2478.  | Note that permission to publish the TNM cancer staging tables may be needed in your implementation. It is advisable to check.a Reproduced with permission. Source: UICC TNM Classification of Malignant Tumours, 8th Edition, eds by James D. Brierley, Mary K. Gospodarowicz, Christian Wittekind. 2016, Publisher Wiley (incorporating any errata published up until 12th July 2024).b NX should be used only if absolutely necessary. |

**Table**

**Table 1: World Health Organization classification of tumours of the testis and paratesticular tissue.1**

| **Descriptor** | **ICD-O codesa** |
| --- | --- |
| **Germ cell tumours derived from germ cell neoplasia in situ (GCNIS)** |  |
| *Non-invasive germ cell neoplasia* |  |
| Germ cell neoplasia in situ | 9064/2 |
| Specific forms of intratubular germ cell neoplasia |  |
| Gonadoblastoma | 9073/1 |
| *The germinoma family of tumours* |  |
| Seminoma | 9061/3 |
| *Non-seminomatous germ cell tumours* |  |
| Embryonal carcinoma | 9070/3 |
| Yolk sac tumour, postpubertal-type | 9071/3 |
| Choriocarcinoma | 9100/3 |
| Placental site trophoblastic tumour | 9104/3 |
| Epithelioid trophoblastic tumour | 9105/3 |
| Cystic trophoblastic tumour |  |
| Teratoma, postpubertal-type | 9080/3 |
| Teratoma with somatic-type malignancies | 9084/3 |
| *Mixed germ cell tumours of the testis* |  |
| Mixed germ cell tumours | 9085/3 |
| *Germ cell tumours of unknown type* |  |
| Regressed germ cell tumours | 9080/1 |
| **Germ cell tumours unrelated to germ cell neoplasia in situ** |  |
| Spermatocytic tumour | 9063/3 |
| Teratoma, prepubertal type | 9084/0 |
| Yolk sac tumour, prepubertal-type  | 9071/3 |
| Testicular neuroendocrine tumour, prepubertal-type | 8240/3 |
| Mixed teratoma and yolk sac tumour, prepubertal-type  | 9085/3 |

a The morphology codes are from the International Classification of Diseases for Oncology (ICD-O).3 Behaviour is coded /0 for benign tumours; /1 for unspecified, borderline, or uncertain behaviour: /2 for carcinoma in situ and grade Ill intraepithelial neoplasia; /3 for malignant tumours, primary site: and /6 for malignant tumours, metastatic site. Behaviour code /6 is not generally used by cancer registries. Subtype labels are indented. Incorporates all relevant changes from the 5th edition Corrigenda, July 2024.2

Note: Only a limited subset of these tumours are capable of spread to retroperitoneal nodes.

© World Health Organization/International Agency for Research on Cancer. Reproduced with permission.

**References**

1 WHO Classification of Tumours Editorial Board (2022). *Urinary and Male Genital Tumours, WHO Classification of Tumours, 5th edition, Volume 8*, IARC Publications, Lyon.

2 WHO Classification of Tumours Editorial Board (2022). *Urinary and Male Genital Tumours, WHO Classification of Tumours, 5th edition, Volume 8 - Corrigenda July 2024.* Available from:file:///C:/Users/fleurw/Downloads/Uro5%20Corrigenda%20doc\_2024-07-08%20(1).pdf (Accessed 2nd August 2024).

3 Fritz A, Percy C, Jack A,  Shanmugaratnam K, Sobin L, Parkin DM  and Whelan S (eds) (2020). *International Classification of Diseases for Oncology, Third edition, Second revision ICD-O-3.2*. Available from: http://www.iacr.com.fr/index.php?option=com\_content&view=category&layout=blog&id=100&Itemid=577 (Accessed 2nd August 2024).