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Recommendations for surveillance and follow-up of men with testicular germ cell tumors: a multidisciplinary consensus conference by the Italian Germ cell cancer Group and the Associazione Italiana di Oncologia Medica☆

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ABSTRACT

Background: No compelling evidence is available about surveillance and follow-up of patients with testicular germ cell tumour (TGCT).

Methods: In the light of the best clinical evidence, the Italian Germ cell cancer Group (IGG) and the Associazione Italiana di Oncologia Medica (AIOM) set up a multidisciplinary national consensus conference, involving 42 leading experts and 3 TGCT survivors. A minimum of 50% of votes was required in order to achieve a consensus recommendation on 29 questions.

Results: Recommendations have been summarized in three tables, divided by stage I seminoma, stage I non-seminoma and the advanced disease, which may be useful for clinicians to appropriately choose the clinical investigation and its timing during the surveillance and follow-up of TGCT patients based on an accurate estimation of their risk of disease relapse.

Conclusions: The IGG-AIOM consensus recommendations may help clinicians to choose appropriate clinical investigations for the surveillance and follow-up of TGCT patients.

☆ The paper has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki).

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1. Introduction

With the advent of effective chemotherapy the treatment of testicular germ cell tumour (TGCT) has become an example of a lifesaving achievement, as metastatic and relapsed disease became curable, and stage I disease treatment gradually shifted towards surveillance and delayed chemotherapy in case of relapse (Banna et al., 2006, 2007; Chovanec et al., 2016; Condello et al., 2018; De Giorgi et al., 2005).

Nowadays, through cisplatin-based chemotherapy, modern salvage therapies and post-chemotherapy surgical techniques - thanks to a multidisciplinary approach - the 10-year relative overall survival rate in the metastatic disease is between 80 and 90% (De Giorgi et al., 2006; Fizazi et al., 2008; Hanna and Einhorn, 2014; Simonelli et al., 2012).

At least 80% of patients with seminoma and 40–50% with non-seminoma present with a clinical stage I disease (Gori et al., 2005; Chovanec et al., 2016), which is characterized by a cure rate of 99–100% (Daugaard et al., 2014; Jones et al., 2013) following one of the three well-known options for the management of seminoma (active surveillance, adjuvant radiotherapy or chemotherapy) and non-seminoma (active surveillance, retroperitoneal lymph node dissection (RPLND) or adjuvant chemotherapy) (Albers et al., 2015).

Since the high cure rate achievable in TGCT, the long-term *sequelae* of treatments must be considered in these men whose life expectancy will extend for many decades following initial therapy (Travis et al., 2010). Survivors from TGCT can experience secondary malignancies, which have been demonstrated to reduce the life expectancy of these patients, as well as cardiovascular morbidity, neuronal, renal and pulmonary toxicity, hypogonadism, infertility, psychological, behavioral and cognitive disorders as a result of treatment (Chovanec et al., 2016; Travis et al., 2010). As a consequence, the survivors' ability to work, to father children and their general quality of life could be impaired.

These considerations should both drive clinicians in their treatment decisions and underline the need for proper surveillance and follow-up. No standard definition of surveillance and follow-up is currently set and these two terms are often considered as interchangeable. Some Authors suggested that surveillance is intended to reach an early diagnosis of relapse, with the term *active* indicating an alternative option to treatment. The follow-up, instead, aims at detecting medium- and long-term consequences of treatment (Beyer et al., 2013). Unfortunately, so far there is no strong evidence supporting the modalities and timing of examinations useful for these two clinical aspects but some practical guidelines have been reported over the latest decades (Chovanec et al., 2016; van As et al., 2008).

Aiming at providing an evidence-based, cost-effective, pragmatic and widely sharable recommendation for clinicians on the surveillance and follow-up of men with TGCT, the Italian Germ Cell Cancer Group (IGG) scientific society set up a multidisciplinary national consensus conference supported by the Associazione Italiana di Oncologia Medica (AIOM).

2. Materials and methods

On November 17th 2017, the IGG and the AIOM held a consensus conference in Milan, Italy, to discuss the issues relating to the surveillance and follow-up of patients with testicular cancer. The conference included a multidisciplinary panel of 42 leading experts in Medical Oncology (n = 18), Urology (N = 7), Radiology (n = 6), Psycho-Oncology (n = 3), Radiation Oncology (n = 2), Andrology (n = 2), General Medicine (n = 2), Internal Medicine (n = 1), Nuclear Medicine (n = 1) and three TGCT patients. The panelists were appointed by the following 14 Italian scientific societies previously informed about the consensus content, aimed and invited by the IGG and the AIOM to join the consensus by indicating distinguished professionals on the consensus topics: AIOM; AIMN (Associazione Italiana Medicina Nucleare e Imaging Molecolare); AIRO (Associazione Italiana di Radioterapia Oncologica); AURO (Associazione Italiana Urologi Italiani); IGG; FADOI (Federazione delle Associazioni dei Dirigenti Ospedalieri Internisti); FIMG (Società Italiana di Medicina Generale); SIA (Società Italiana di Andrologia); FIMMG (Federazione Italiana Medici di Medicina Generale); SIMI (Società Italiana Medicina Interna); SIPO (Società Italiana di Psico-Oncologia); SIRM (Società Italiana di Radiologia Medica); SIU (Società Italiana di Urologia); SIUrO (Società Italiana di Urologia Oncologica). The three TGCT patients were appointed by the following two patients' associations: AITT (Associazione Italiana Tumore Testicolo) and FAVO (Federazione Italiana delle Associazioni di Volontariato in Oncologia). All panelists participated in the preparatory work, the review of consensus results and subsequent manuscript development. Thirty-six-panel members attended the conference.

The preparatory work was chaired and co-chaired by Ugo De Giorgi and Giuseppe L. Banna, respectively, both on behalf of the IGG and AIOM. All experts and survivors were allocated to one of the two following working groups: 1) surveillance; 2) follow-up and survivorship.

The literature for the two groups was prepared in July 2017 and sent to all the panel members three months before the date of the conference. Published data for the panel discussion were selected by a PubMed search, performed with combinations of the following free search terms: "germ cell tumor, testis, seminoma, nonseminoma" AND "follow-up" AND/OR "surveillance" AND/OR "late effects" AND/OR "second cancer". Only articles written in English were considered. Relevant references from selected articles also were included and other articles were selected from the personal collections of the panelists.

The discussion areas were: 1) exams and evaluations to be carried out for the diagnosis of disease recurrence or second cancer, their frequency and duration; 2) evaluations of late effects of treatments; 3) promotion of healthy lifestyles, impact on quality of life (QoL) and reduction of the risk of relapse; 4) psychological impact of the disease and of late effects of treatments; 5) modification of social and work functionality; 6) organization of the follow-up, concrete proposals and definition of survivorship care plan.

A questionnaire of 29 items (see Appendix A) regarding these topics was prepared and approved by the scientific board of the IGG and sent to all the experts one month before the conference. The questionnaire had been divided into 5 sections: 1) stage I seminoma (questions 1–5); 2) stage I nonseminoma (questions 6–10); 3) advanced disease (stage II or III or relapsed) in remission after treatment (questions 11–15); 4) general recommendations for the surveillance (questions 16–19); 5) survivorship (medium- and long-term treatment effects) (question 20–29). Questions regarding surveillance had been elaborated and submitted to the panelists considering the following risk-factor stratification criteria. For stage I seminoma, *high-risk* patients (15–30% of estimated risk of relapse) were defined by size of tumor ≥4 cm and/or *rete testis* invasion not undergoing any adjuvant therapy and *low-risk* patients (5% of estimated risk of relapse) were those without any of these two risk factors or those undergoing any adjuvant therapy. For stage I nonseminoma, *high-risk* patients (50% of estimated risk of relapse) were defined by the presence of vascular invasion not undergoing any adjuvant therapy, *intermediate-risk* patients (15% of estimated risk of relapse) by the absence of vascular invasion not undergoing any adjuvant therapy and *low-risk* patients (< 5% of estimated risk of relapse) if treated with one cycle of PEB (cisplatin, etoposide, bleomycin) chemotherapy (or with retroperitoneal lymphadenectomy-RPLND) independently of risk factors. For the advanced disease, *high-risk* patients (> 45% of estimated risk of relapse/progression) included *poor-risk* patients according to the IGCCG (International Germ Cell Consensus Classification, 1997) classification (International Germ Cell Consensus Classification, 1997) at the first-line treatment or all relapsed/refractory not "*very low risk*" according to the International Prognostic Factors Study Group (IPFSG) (International Prognostic Factors Study Group et al., 2010); *intermediate-risk* patients (25–30% of estimated risk of relapse/progression) were *intermediate-risk* according to IGCCG classification for the first-line treatment or

Table 1
5-year surveillance and follow-up for the stage I Seminoma.

Month	6th	12th
1 st year		
Physical examination and markers (AFP, bHCG e LDH)	all	all
Abdominal imaging (CT with contrast or MRI without contrast)[a]	only H	all
Testicular ultrasound	–	all
2nd Year		
Physical examination and markers (AFP, bHCG e LDH)	all	all
Abdominal imaging (CT with contrast or MRI without contrast)[a]	only H	all
Testicular ultrasound	–	all
FSH, LH, testosterone	–	all
3rd year		
Physical examination and markers (AFP, bHCG e LDH)	all	all
Abdominal imaging (CT with contrast or MRI without contrast)[a]	–	only H
Testicular ultrasound	–	all
4th year		
Physical examination and markers (AFP, bHCG e LDH)	alll	all
Abdominal imaging (CT with contrast or MRI without contrast)[a]	–	only H
Testicular ultrasound	–	all
5th year		
Physical examination and markers (AFP, bHCG e LDH)	all	all
Abdominal imaging (CT with contrast or MRI without contrast)[a]	–	only H
Testicular ultrasound	–	all
FSH, LH, testosterone	–	all
Other:		
Psycological[b]	–	–
Metabolism[c]	–	–
Visits[d]	–	–

H = *high-risk* patients (15–30% of estimated risk of relapse), size of tumor (≥4 cm) and/or rete testis invasion, not undergoing any adjuvant therapy.
L = *low-risk* patients (5% of estimated risk of relapse), no risk factors or those undergoing any adjuvant therapy.
Other abbreviations: CT, computed tomography; MRI, magnetic resonance imaging.

[a] Ultrasound only when a CT or MRI is not foreseen.

[b] In all cases, at least once at the beginning of follow-up and in cases presenting symptoms of psychosocial distress and/or reduction of perceived quality of life during the follow-up.

[c] Including blood lipids, glucose, creatinine, vitamin D, FSH, LH, testosterone, BMI and blood pressure: every 2–3 years in the first 5–10 years, after 10 years on the basis of personal anamnesis.

[d] Including andrology, internal medicine, cardiology, nephrology, ORL (+/- audiometric tests), pneumological (+/- respiratory tests) consulting: if symptoms, clinical or laboratory abnormalities, risk factors including PEB for 3–4 cycles and/or radiotherapy, desire of paternity (andrology and semen analysis).

relapsed/refractory "*very low risk*" according to the IPFSG (International Prognostic Factors Study Group et al., 2010) and *low-risk* patients (< 15% of estimated risk of relapse/progression) those *good-risk* according to IGCCG classification at the first-line treatment.

During the conference, all the panelists were required to electronically vote for each of the questions. The steering committee suggested all professionals consider to refrain from voting if their *expertise* was insufficient for the specific question; patients were not allowed to vote but were actively involved in the discussion of each question. To give a consensus recommendation for each question a minimum of 50% of votes was required from the panelists. This cut-off had been set for the wide range of professional figures involved in the consensus.

Following the conference, most of the voting results were summarized in three tables (see Tables 1–3) together with other statements included in this manuscript, that had been sent to all the panelists for their final approval.

3. Results

The consensus conference voting results regarding surveillance and follow-up of TGCT are extensively described in Appendix A. Recommendations arising from voting are mostly summarized in Tables 1–3 as divided as stage I seminoma, stage I nonseminoma and complete remission following advanced disease and are reported below according to the following five paragraphs: a) stage I seminoma; b) stage I nonseminoma; c) advanced disease (stage II-III or relapsed) in remission after treatment; d) general recommendations for the surveillance; e) survivorship.

a) *Recommendations for stage I seminoma:*
b) A five-year duration of surveillance should be observed (level of consensus: 67%, 34 voters).
c) The frequency of follow-up visits, including physical examination (evaluation of abdominal scrotal, supraclavicular masses, and the presence of gynecomastia), should be based on the risk of disease relapse: every 6 months for 5 years for high-risk patients (15–30% of estimated risk of relapse) and every 6 months for the first 3 years and then every 6–12 months for the remaining 2 years for low-risk patients (level of consensus: 56%, 32 voters).
d) The frequency of abdominal imaging with computed tomography (CT) scan with contrast medium (upper and lower abdomen) should be based on the risk of relapse: every 6 months in the first two years and then annually up to the fifth year (7 exams) years for high-risk patients; annually in the first two years and then in the fifth year (3 exams) for low-risk patients (level of consensus: 70%, 33 voters).
e) It should not be routinely performed a chest X-ray or chest CT scan for the surveillance of patients with stage I seminoma (level of consensus: 67%, 33 voters).
f) The level of serum tumor markers (beta-hCG, LDH) should be determined in all patients with the frequency of each visit (level of consensus: 65%, 31 voters).
g) *Recommendations for stage I nonseminoma:*
h) A five-year duration of surveillance should be observed for high-risk patients (50% of estimated risk of relapse) with possible shorter duration (3–5 years) for intermediate- (15% of estimated risk of relapse) and low-risk (< 5% of estimated risk of relapse) patients (level of consensus: 84%, 32 voters).
i) The frequency of follow-up visits including physical examination, (evaluation of abdominal scrotal, supraclavicular masses, and the presence of gynecomastia) should be administered to any patient (regardless of the risk of relapse): every 4 months for the first 3 years, then every 6 months up to the fifth year, then yearly (if any) (level of consensus: 53%, 34 voters).
j) The frequency of abdominal imaging with computed tomography (CT) scan with contrast medium (upper and lower abdomen) should be based on the risk of relapse: every 4 months the first year, then every 6 months up to the third year, then yearly up to the fifth (total 8 exams), with possible de-escalation following the 2nd year (i.e. only once at the third year) in high-risk patients; every 6 months for the first two years, then the third year (total 5 exams), with possible omission of the exam at 18 months, for intermediate-risk patients; once after 4–6 months and another at 12–18 months (total 2 exams), with possible omission of one exam (i.e. only once after 6–12 months) for low-risk patients (level of consensus: 71%, 28 voters).
k) A chest X-ray should be accepted instead of chest CT scan for the surveillance of patients with stage I nonseminoma, for all patients, at each visit when abdomen imaging is provided (level of consensus: 69%, 29 voters).
l) The level of serum tumor markers (beta-hCG, LDH) should be determined in all patients with the frequency of each visit (level of consensus: 84%, 31 voters).
m) *Recommendations for advanced disease (stage II or III or relapsed) in*

Table 2
5-year surveillance and follow-up for the stage I Nonseminoma.

Month	4th	6th	8th	12th
1 st Year				
Physical examination and markers (AFP, bHCG e LDH)	all	–	all	all
Abdominal (CT with contrast or MRI without contrast)[a] and thoracic (X-ray better than CT) imaging	only H	only I-L	only H	all
Testicular ultrasound	–	–	–	all
2nd Year				
Physical examination and markers (AFP, bHCG e LDH)	all	–	all	all
Abdominal (CT with contrast or MRI without contrast)[a] and thoracic (X-ray better than CT) imaging	–	all	–	only H-I
Testicular ultrasound	–	–	–	all
FSH, LH, testosterone	–	–	–	all
3rd Year				
Physical examination and markers (AFP, bHCG e LDH)	–	all	–	all
Abdominal (CT with contrast or MRI without contrast)[a] and thoracic (X-ray better than CT) imaging	–	only H	–	only H-I
Testicular ultrasound	–	–	–	all
4th Year				
Physical examination and markers (AFP, bHCG e LDH)	–	all	–	all
Abdominal (CT with contrast or MRI without contrast)[a] and thoracic (X-ray better than CT) imaging	–	–	–	only H
Testicular ultrasound	–	–	–	all
5th Year				
Physical examination and markers (AFP, bHCG e LDH)	–	all	–	all
Abdominal (CT with contrast or MRI without contrast)[a] and thoracic (X-ray better than CT) imaging	–	–	–	only H
Testicular ultrasound	–	–	–	all
FSH, LH, testosterone	–	–	–	all
Other:				
Psycological[b]	–	–	–	–
Metabolism[c]	–	–	–	–
Visits[d]	–	–	–	–

H = *high-risk* patients (50% of estimated risk of relapse): vascular invasion present, not undergoing any adjuvant therapy.
I = *intermediate-risk* patients (15% of estimated risk of relapse): no vascular invasion, not undergoing any adjuvant therapy.
L = *low-risk* patients (< 5% of estimated risk of relapse): after treatment with one cycle of PEB chemotherapy (or retroperitoneal lymphadenectomy-RPLND) independently of risk factors.
Abbreviations: CT, computed tomography; MRI, magnetic resonance imaging; PEB, cisplatin, etoposide, bleomycin.
[a] Ultrasound only when a CT or MRI is not foreseen.
[b] At least once at the beginning of follow-up and in cases presenting symptoms of psychosocial distress and/or reduction of perceived quality of life during the follow-up.
[c] Including blood lipids, glucose, creatinine, vitamin D, FSH, LH, testosterone, BMI and blood pressure: every 2–3 years in the first 5–10 years, after 10 years on the basis of personal anamnesis.
[d] Including andrology, internal medicine, cardiology, nephrology, ORL (+/- audiometric tests), pneumological (+/- respiratory tests) consulting: if symptoms, clinical or laboratory abnormalities, risk factors including PEB for 3–4 cycles and/or radiotherapy, desire of paternity (andrology and semen analysis).

remission after treatment:

n) A consensus on the exact duration of follow-up for patients with advanced TGCTs was not reached, but optimal duration should range between five and ten years for all patients, independently by their estimated risk of relapse/progression (level of consensus: 66%, 36 voters).
o) The frequency of follow-up visits including physical examination (evaluation of abdominal, scrotal, supraclavicular masses, and the presence of gynecomastia) should be based on the risk of disease relapse/progression: every 3–6 months for the first 2 years, then every 6 months up to the 5th (and then annual up to 10 years) for high-risk patients (> 45% estimated risk of relapse/progression); every 6 months for the first 5 years (then annual up to 10 years) for intermediate-risk patients (25–30% estimated risk of relapse/progression); every 6 months for 3 years, then every 6–12 months up to 5 years for low-risk patients (< 15% risk estimated risk of relapse/progression) (level of consensus: 77%, 35 voters).
p) The frequency of abdominal imaging with computed tomography (CT) scan with contrast medium (upper and lower abdomen) should be based on the risk of relapse: every 3–4 months for the first 2 years, then every 6–12 months up to the fifth year for high-risk patients; every 6 months for 5 years for intermediate-risk patients; every 6 months for the first 2 years, then yearly up to 5 years for low-risk patients (level of consensus: 53%, 34 voters).
q) A chest CT scan or X-ray should be performed for the surveillance of patients with advanced TGCT in remission, for all patients, at each visit when abdomen imaging is provided (level of consensus: 69%, 23 voters).
r) The level of serum tumor markers (beta-hCG, LDH) should be determined in all patients with the frequency of each visit (level of consensus: 61%, 31 voters).
s) *General recommendations for the surveillance of TGCT:*
t) Abdominal MRI with no intravenous contrast medium may replace CT scan in all cases (level of consensus: 86%, 36 voters).
u) Abdominal ultrasound may be administered when CT or MRI are not provided, both in early (within 5 years) and in late (after 5 years) follow-up periods (level of consensus: 54%, 35 voters).
v) Ultrasound of the contralateral testis is recommended in all patients yearly until surveillance is planned (level of consensus: 65%, 34 voters).
w) No consensus on the type of chest imaging was achieved. However, low-dose chest CT scan and chest X-ray were considered appropriate by 71% of the panelists (31 voters).
x) *Survivorship:*
y) Sex hormones (FSH, LH, testosterone) determination every 2–3 years in the first 5–10 years should be provided in all cases and even after 10 years is recommended (level of consensus: 57%, 30 voters).
z) An andrological specialist visit +/- possible analysis of the seminal fluid is recommended (in addition to the diagnosis), at least once more time after surgery or chemotherapy, then in case of hormonal

Table 3
5-year surveillance and follow-up for the advanced disease in remission after treatment.

Month	4th	6th	8th	12th
1 st Year				
Physical examination and markers (AFP, bHCG e LDH)	only H	all	only H	all
Abdominal (CT with contrast or MRI without contrast)[a] and thoracic (X-ray or low-dose CT or CT with contrast)[b] and other imaging examinations based on the sites of advanced disease	only H	only I-L	only H	all
Testicular ultrasound	–	–	–	all
2nd Year				
Physical examination and markers (AFP, bHCG e LDH)	only H	all	only H	all
Abdominal (CT with contrast or MRI without contrast)[a] and thoracic (X-ray or low-dose CT or CT with contrast)[b] and other imaging examinations based on the sites of advanced disease	only H	only I-L	only H	all
Testicular ultrasound	–	–	–	all
FSH, LH, testosterone	–	–	–	all
3rd Year				
Physical examination and markers (AFP, bHCG e LDH)	–	all	–	all
Abdominal (CT with contrast or MRI without contrast)[a] and thoracic (X-ray or low-dose CT or CT with contrast)[b] and other imaging examinations based on the sites of advanced disease	–	only H-I	–	all
Testicular ultrasound	–	–	–	all
4th Year				
Physical examination and markers (AFP, bHCG e LDH)	–	all	–	all
Abdominal (CT with contrast or MRI without contrast)[a] and thoracic (X-ray or low-dose CT or CT with contrast)[b] and other imaging examinations based on the sites of advanced disease	–	only H-I	–	all
Testicular ultrasound	–	–	–	all
5th Year				
Physical examination and markers (AFP, bHCG e LDH)	–	all	–	all
Abdominal (CT with contrast or MRI without contrast)[a] and thoracic (X-ray or low-dose CT or CT with contrast)[b] and other imaging examinations based on the sites of advanced disease	–	only H-I	–	all
Testicular ultrasound	–	–	–	all
FSH, LH, testosterone	–	–	–	all
Other:				
Psycological[c]	–	–	–	–
Metabolism[d]	–	–	–	–
Visits[e]	–	–	–	–

H = *high-risk* patients (> 45% of estimated risk of relapse/progression): poor-risk according to IGCCG classification [1] at the first-line treatment or relapsed/refractory not "very low risk" according to the IPFSG [2] (95% of patients).
I = *intermediate-risk* patients (25–30% of estimated risk of relapse/progression): intermediate-risk according to IGCCG classification [1] for the first-line treatment or relapsed/refractory "very low risk" according to the IPFSG [2].
L = *low-risk* patients (< 15% of estimated risk of relapse/progression): good-risk according to IGCCG classification [1] at the first-line treatment.
[1] International Germ Cell Consensus Classification: a prognostic factor-based staging system for metastatic germ cell cancers. International Germ Cell Cancer Collaborative Group, Journal of clinical oncology: official journal of the American Society of Clinical Oncology 15(2) (1997) 594–603.
[2] G. International Prognostic Factors Study, A. Lorch Beyer, C. Bascoul-Mollevi, A. Kramar, L.H. Einhorn, A. Necchi, C. Massard, U. De Giorgi, A. Flechon, K.A. Margolin, J.P. Lotz, J.R. Germa Lluch, T. Powles, C.K. Kollmannsberger, Prognostic factors in patients with metastatic germ cell tumors who experienced treatment failure with cisplatin-based first-line chemotherapy, Journal of clinical oncology : official journal of the American Society of Clinical Oncology 28(33) (2010) 4906-11.
[a] Ultrasound only when a CT or MRI is not foreseen.
[b] If a risk of thoracic relapse is estimated (i.e. > 5%).
[c] In all cases, at least once at the beginning of follow-up and in cases presenting symptoms of psychosocial distress and/or reduction of perceived quality of life during the follow-up.
[d] Including blood lipids, glucose, creatinine, vitamin D, FSH, LH, testosterone, BMI and blood pressure: every 2–3 years in the first 5–10 years, after 10 years on the basis of personal anamnesis.
[e] Including andrology, internal medicine, cardiology, nephrology, ORL (+/- audiometric tests), pneumological (+/- respiratory tests) consulting: if symptoms, clinical or laboratory abnormalities, risk factors including PEB for 3–4 cycles and/or radiotherapy, desire of paternity (andrology and semen analysis).

alterations or if clinically suggested (testis atrophy, hypo-fertility) or every 2–3 years (level of consensus: 84%, 31 voters).

- Metabolism tests including blood lipids, blood sugar, creatinine, vitamin D, body mass index (BMI), blood pressure are recommended for all patients but no consensus on timing was achieved; 48% of panelists suggested occasional check every 2–3 years in the first 5–10 years of follow-up and based on anamnesis after 10 years (29 voters).
- General medicine, cardiology or nephrology visits are recommended only in patients with abnormal blood examinations and/or if clinically indicated, particularly in patients undergoing at least PEB x 3–4 cycles or radiotherapy (level of consensus: 60%, 30 voters).
- The support of an ear, nose, and throat (ENT) specialist is not needed in the follow-up of TGCT, possible audiometric test and therapies are deserved to symptomatic patients (level of consensus: 97%, 30 voters).
- The support of a pulmonologist is not needed in the follow-up of TGCT, possible respiratory tests and therapies are deserved to symptomatic patients (level of consensus: 67%, 30 voters).
- There are no currently available recommendations about secondary tumors long-term examinations for the early diagnosis of secondary tumors in intermediate-high risk cases (eg, previous radiotherapy or different chemotherapy lines with etoposide dose > 2 g/m2) (level of consensus: 57%, 28 voters).
- Monitoring of long-term complications and secondary tumors according to the evaluations indicated in the follow-up of TGCT should be delegated to the GP after an illustration of the risk at the time of discharge of the patient from the early follow-up period (level of consensus: 54%, 28 voters).

- Psychological consultation and possible psychological intervention are recommended in the surveillance of TGCT in all patients at least once at the beginning of follow-up and thereafter in cases presenting symptoms of psychosocial distress and/or perceived quality of life decline during the surveillance (level of consensus: 53%, 30 voters).
- Psychological consultation and possible psychological intervention are recommended in the long-term survivorship follow-up in patients presenting symptoms of psycho-social discomfort and/or perceived quality of life decline (level of consensus: 90%, 30 voters).

4. Discussion

The goal of surveillance is to timely diagnose recurrent disease in order to ensure to the patient a curative treatment with the least aggressive therapy (Beyer et al., 2013). Surveillance needs to be tailored on patient's risk of relapse with the clinical investigations and their schedule being acceptable to the patient, the physicians and the health care system (Cathomas et al., 2011). Evidence in this field is limited: only one randomized clinical trial investigating the implication of different follow-up schedules and the use of imaging and tumor markers has been published (Rustin et al., 2007). Hence, the clinical unmet need of minimal recommendations for the surveillance and follow-up of TGCT has been addressed by recent publications (Albers et al., 2015; Chau et al., 2015; Daugaard et al., 2014; Ko et al., 2016; Kollmannsberger et al., 2015; Mead et al., 2011; Mortensen et al., 2014; Oliver et al., 2011; Tandstad et al., 2009, 2016), contributing to the development of consensus recommendations by the European Society for Medical Oncology (Honecker et al., 2018; Oldenburg et al., 2017).

The present AIOM-IGG consensus is one of the few examples reported in the literature of a broad multidisciplinary panel involving the expertise from professionals of several disciplines, patients and their advocacy group (Stacchiotti et al., 2015) (Kasper et al., 2015) (Kamat et al., 2017) and, to our knowledge, the first experience made for the follow-up of testicular germ cell tumors. The recommendations of the AIOM-IGG consensus introduce some differences.

Firstly, a more detailed patients' stratification according to their risk of disease relapse has been used for recommendations for the surveillance of TGCT. This has not only been restricted to the histology and stage of TGCT, but also considered risk factors for both stages I and advanced TGCT. In particular, two classes of risk (high and low) were considered for stage I seminoma and three ones for stage I non-seminoma and advanced disease in remission after treatment. This risk stratification has some limitations: risk factors for stage I seminoma are not so strongly recognized as in nonseminoma counterpart (Oldenburg et al., 2015); administration of adjuvant therapy in stage I disease favorably impacts the risk of recurrence, but different strategies (e.g. primary RPLND in nonseminoma) associate with different patterns of recurrences, both in terms of timing and sites (Albers et al., 2008); the risk stratification in advanced disease may not exactly correspond to the current scenario, as it was released more than 20 years ago (International Germ Cell Consensus Classification, 1997). Nonetheless, such stratification allowed the panelists to suggest different clinical investigations and their timing as well according to patients' risk of relapse.

Secondly, aiming at reducing the diagnostic radiation exposure risks associated with repeated CT scanning (Brenner and Hall, 2007), alongside with the reduction in the number of CT scans performed during the surveillance period already reported in the latest years (Albers et al., 2015), the use of abdomen MRI without contrast medium instead of CT scan with contrast medium was recommended with a high consensus among the panelists. Furthermore, although no consensus has been achieved on the type of thoracic imaging to be preferred, low-dose chest CT scan or chest X-ray were considered acceptable by the majority of panelists. These two recommendations, based on the use of abdomen MRI and low-dose CT scan or chest X-ray, suggest a novel radiological approach for the surveillance of TGCT, although MRI and US imaging may be operator-dependent techniques subjected to interpretations more than CT scans.

Thirdly, the panelists agreed that monitoring of long-term complications and secondary tumors should be entrusted to the GP competences rather than in a hospital-based context. This is a relevant issue, since the vast majority of TGCT patients, usually between 18 and 40 years, will be cured and, based on five-year relative survival rates, are expected to be definitively cured and become cancer survivors in more than 95% of cases in Western Europe (Travis et al., 2010). According to the present consensus recommendations, specialists' consultations are suggested, if needed, but the role of the GP should be driving during the follow-up of TGCT for monitoring long-term toxicities, screening and the treatment for known risk factors (such as arterial hypertension, hyperlipidaemia and testosterone deficiency) and lifestyle recommendations (Beyer et al., 2013; Haugnes et al., 2012).

Fourthly, psychosocial distress and/or perceived quality of life decline should be adequately addressed during the surveillance and follow-up of TGCT through a psychological consultation, and possible psychological intervention in all patients. It is well-known that the quality of life of TGCT patients is transiently impaired by chemotherapy and other treatments, because of possible loss of appetite, increased fatigue, increased dyspnoea and reduced social- and physical function (de Wit et al., 2001; Fossa et al., 2003; van Leeuwen et al., 2017) and also in the long-term follow-up where a moderate, but significant, increase in anxiety and depression may occur (Smith et al., 2016; Vehling et al., 2016). Furthermore, following the diagnosis of TGCT approximately 11% of patients suffer from post-traumatic stress disorder in the long-term, with significant quality of life impairment (Dahl et al., 2016). Thus, the importance for healthcare professionals to explore stress symptoms at control visits, in order to timely recommend psychological support.

At the end of the process, the panelists reviewed their voting results in order to seek a synthesis of their recommendations in the three tables presented. These tables were included in the new edition of the AIOM Italian guidelines for testicular cancer and represent a practical tool for clinicians to quickly assist them in the decision making of clinical investigations to be planned for the next individual TGCT patient's control visit during their surveillance and follow-up.

These recommendations were based on currently available literature for common clinical situations and histological variants. For rare histological types (e.g. teratoma with heterologous transformation or pure choriocarcinoma) and special clinical situations (e.g. uncommon metastatic sites or multiple relapsed cases), the follow-up strategy needs to be shared with referring Institutions for the management of testicular tumors.

5. Conclusions

The AIOM-IGG consensus recommendations may represent a useful tool for clinicians to appropriately drive their indications for the surveillance and follow-up of TGCT patients based on an estimation of their risk of relapse, the use of effective, low-toxic clinical investigations and attention to the quality of life.

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Conflict of interest

Authors declare no conflict of interest regarding the paper "Recommendations for surveillance and follow-up of men with testicular germ cell tumors: a multidisciplinary consensus conference by the Italian Germ cell cancer Group and the Associazione Italiana di Oncologia Medica".

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Appendix A. TGCT surveillance and folllow-up consensus conference: questions and voting results

No.		Topic	No. voters	% votes
		Stage I Seminoma		
1		Overall duration of the proposed follow-up:	34	
	A	all 10 years		18
	B	all 5 years		38
	C	based on the risk of relapse: −15–30% risk: 10 years; −5% risk: 5 years.		15
	D	based on the risk of relapse: −15–30% risk: 5 years; −5% risk: 3–5 years.		29
2		Frequency of follow-up visits including physical examination (evaluation of abdominal scrotal, supraclavicular masses and the presence of gynecomastia):	32	
	A	for everyone (regardless of the risk): every 4 months for 3 years, then every 6 months up to the 5th year, then yearly (if any);		12
	B	for everyone (regardless of the risk): every 6 months up to the 5th year, then yearly (if any);		31
	C	based on the risk of relapse: −15–30% risk: every 6 months for the first 5 years and then yearly up to 10 years; −5% risk: every 6 months for 5 years.		34
	D	based on the risk of relapse: −15–30% risk: every 6 months for 5 years; −5% risk: every 6 months x 3 years then yearly up to 5 years.		22
3		Frequency of abdominal imaging with CT with contrast medium (upper and lower abdomen):	33	
	A	to each control (regardless of the risk)		3
	B	every two controls (regardless of the risk)		12
	C	based on the risk: 15–30% risk, every 6 months in the first two years and then yearly up to the 5th year (total 7); 5% risk, yearly in the first two years and then in the 5th year (total 3)		70
	D	in all cases (not according to risk): every 6 months in the first two years and then yearly up to the 5th year (total 7)		15
4		Type and frequency of thoracic imaging. Is it recommended to perform an RX or chest CT scan in patients with stage I seminoma during surveillance?	33	
	A	only chest CT with contrast medium at each visit where abdomen imaging is expected		6
	B	only chest X-ray at each visit where abdomen imaging is expected		6
	C	only chest X-ray in patients with 15–30% risk at each visit where abdomen imaging is expected		21
	D	Never		67
5		Tumor markers (beta-hCG, LDH). Is it recommended to determine the level of these serum markers in patients with stage I seminoma?		
	A	yes, in all patients with the frequency of each control visit	31	65
	B	every two checks		0
	C	yearly, until follow-up is foreseen		10
	D	only in those who expressed it at the onset of disease		26
		Stage I Nonseminoma		
6		Overall duration of the proposed surveillance:	32	
	A	all 10 years		0
	B	all 5 years		47
	C	based on the risk of relapse: 50% risk, 10 years; 15% risk, 5 years; < 5% risk, 3-5 years.		16
	D	based on the risk of relapse: 50% risk, 5 years; 15% risk: 3–5 years; < 5% risk 3–5 years		37
7		Frequency of follow-up visits including physical examination (evaluation of abdominal scrotal, supraclavicular masses and the presence of gynecomastia):	34	

	A	for everyone (regardless of the risk): every 4 months for 3 years, then every 6 months up to the 5th year, then yearly (if any);		53
	B	for everyone (regardless of the risk): every 6 months up to the 5th year, then yearly (if any);		9
	C	based on the risk of relapse - greater intensity proposal: 50% risk, every 3 months, first 2 years, then every 6 months up to the 5th year, then yearly (if required); 15% risk, every 4 months, first 2 years, then every 6 months up to the 5th year; < 5% risk: every 6 months, first two years, then yearly at the 3rd or 5th year		9
	D	based on the risk of relapse - proposed lower intensity: 50% risk, every 4 months, first 2 years, then every 6 months up to the 5th year, then yearly (if required); 15% risk, every 6 months, first 2 years, then yearly up to the 5th year; < 5% risk, every 6 months first year, then yearly until the 3rd or 5th year.		29
8		Frequency of abdominal imaging with CT with contrast medium (upper and lower abdomen):	28	
	A	based on the risk of relapse - increased intensity proposal: 50% risk, every 4 months in the 1 st year, every 6 months up to the 5th year (total 12); 15% risk, every 4 months in the 1 st year, every 6 months in the 2nd year, then one in the 3rd year (total 6); < 5% risk, one after 6, 12 and 24 months (total 3)		7
	B	based on the risk of relapse - medium intensity proposal: 50% risk, every 4 months first year, then every 6 months up to the 3rd year, then yearly up to the 5th (total 8); 15% risk, every 6 months, first 2 years, then the 3rd year (total 5); < 5% risk: one after 4–6 months and another at 12–18 months (total 2)		46
	C	based on the risk of relapse - lower intensity proposal: 50% risk, every 4 months 1 st year, then every 6 months until the 2nd year, then one at the 3rd year (total 6); 15% risk, after 6, 12, 24 and 36 months (total 4); < 5% risk, one after 6–12 months (total 1)		25
	D	at each clinical check (regardless of the risk)		21
9		Type and frequency of thoracic imaging. Is it recommended to perform an RX or chest CT scan in patients with stage I seminoma during surveillance?	29	
	A	to all, only chest CT at each visit where abdomen imaging is expected		0
	B	to all, only chest X-ray at each visit where abdomen imaging is expected		69
	C	to all, only chest X-ray at each visit		17
	D	never		14
10		Tumor markers (AFP, beta-hCG, LDH). Is it recommended to determine the level of these serum markers in patients with stage I nonseminoma?	31	
	A	yes, in all patients with the frequency of each control visit but with greater intensity in the first year in those who expressed them (regardless of the risk)		39
	B	yes, in all patients with the frequency of each control visit (regardless of the risk)		45
	C	yes, coinciding with the control visits in cases that do not express them at the onset; if they expressed them at the diagnosis based on their risk (higher intensity): 50% risk, every 1–2 months in the first year, then every 2–3 months up to the 3rd year, then yearly until the end of the follow-up; < 5% at 15% risk, every 2 months in the first year, then every 3 months up to the 3rd year, then at each follow-up visit		13
	D	yes, coinciding with the control visits in the cases that do not express them at the onset; if they expressed them to the diagnosis based on their risk (lower intensity): 50% risk, every 2–3 months in the first year, then every 3–4 months up to the 3rd year, then at each follow-up visit; < 5% at 15% risk, every 2–3 months in the first year, then every 3–6 months up to the 3rd year, then at each follow-up visit		3
		Advanced disease (stage II or III or relapsed) in remission after treatment		
11		Overall duration of the proposed follow-up in the advanced disease in remission:	36	
	A	all 10 years		22
	B	all 5 years		44
	C	based on the risk of relapse: > 25% risk, 10 years; < 15% risk, 5 years		17
	D	based on the risk of relapse: > 25% risk, 5 years; < 15% risk, 3–5 years		17
12		Frequency of follow-up visits including physical examination (evaluation of abdominal scrotal, supraclavicular masses and the presence of gynecomastia):	35	
	A	for everyone (regardless of the risk - increased intensity): every 4 months for 3 years, then every 6 months up to the 5th year, then yearly (if any)		17
	B	for everyone (regardless of the risk - lower intensity): every 6 months up to the 5th year, then yearly (if any)		6
	C	based on the risk of relapse (increased intensity): > 45% risk, every 3–4 months for the first 2 years, then every 6 months up to the 5th and then yearly up to 10 years; 25–30% risk, every 6 months for the first 5 years, then yearly up to 10 years; < 15% risk: every 6 months for 5 years		43
	D	based on the risk of relapse (lower intensity): > 45% risk, every 4–6 months for the first 2 years, then every 6 months up to the 5th and then yearly up to 10 years; 25–30% risk, every 6 months for 5 years; < 15% risk, every 6 months x 3 years then yearly up to 5 years.		34
13		Frequency of abdominal imaging with CT with contrast medium (upper and lower abdomen):	34	
	A	for everyone (regardless of the risk - increased intensity): every 4 months for 3 years, then every 6 months up to the 5th year, then yearly (if any)		6
	B	for everyone (regardless of the risk - lower intensity): every 6 months up to the 5th year, then yearly (if any);		12
	c	based on the risk of relapse (increased intensity): > 45% risk, every 3–4 months for the first 2 years, then every 6–12 months up to the 5th; 25–30% risk, every 6 months for 5 years; < 15% risk, every 6 months for the first 2 years, then yearly up to 5 years		53
	D	based on the risk of relapse (lower intensity): > 45% risk, every 4–6 months for the first 2 years, then every 6–12 months up to the 5th; 25–30% risk, every 6 months for the first 2 years, then yearly up to 5 years; < 15% risk, every 6–12 months for 2 years and then for the 3rd and / or 5th year		29
14		Type and frequency of thoracic imaging. Is it recommended to perform a RX or chest CT scan for patients with advanced TGCT in remission during surveillance?	23	
	A	only chest CT scan at each visit where abdomen imaging is expected		43
	B	only chest X-ray at each visit where abdomen imaging is expected		26
	C	thorax CT scan only to those with significant risk of relapse (i.e. > 5%) and always at each visit where abdomen imaging is expected		13
	D	only X-ray if non-significant of thoracic relapse (i.e. < 5%), reserving chest CT scan only to those with a significant risk of relapse (i.e. > 5%) and always at each visit where abdomen imaging is expected		17
15		Tumor markers (AFP, beta-hCG, LDH). Is it recommended to determine the level of these serum markers in patients with advanced TGCT during surveillance?	31	
	A	yes, in all patients with the frequency of each control visit but with greater intensity in the first two years in those who expressed them (regardless of the risk)		26
	B	yes, in all patients with the frequency of each control visit (regardless of the risk)		61
	C	yes, coinciding with the control visits in cases that have never been expressed, while in those that have expressed them according to risk (higher intensity): > 25% risk, every 1–2 months in the first year, then every 2-3 months up to the 3rd year, then yearly until the end of the follow-up; < 15% risk, every 2 months in the first year, then every 3 months up to the 3rd year, then at each follow-up visit		3
	D	yes, coinciding with the control visits in the cases that do not express at the onset, while in the positive ones at the diagnosis based on the risk (lower intensity): > 25% risk, every 2 months in the first year, then every 3–6 months up to the 3rd year, then at each follow-up visit; < 15% risk, every 2-3 months in the first year, then every follow-up visit.		10
		General recommendations for the surveillance		
16		Abdominal imaging. Is it recommended the use of abdomen MRI with no intravenous contrast medium in the surveillance of TGCT:		
	A	never abdomen MRI, only CT with contrast medium to all patients		3
	B	CT scan replaceable by MRI in all cases		86

	C	CT scan replaceable by MRI in all cases with many expected abdominal imaging (i.e. > 4–5)		6
	D	MRI only in selected cases where CT with contrast medium is not recommended (i.e. severe allergic reactions)		6
17		Abdominal imaging. Is it recommended the use of abdomen ultrasound in the surveillance of TGCT:		
	A	instead of the CT scan (or MRI) in all cases		3
	B	in the control visits in which the CT (or MRI) is not included in the first years and therefore also in the long-term follow-up in which there are visits without CT (or MRI)		54
	C	only in the long-term follow-up in which visits are planned without TAC (or RM)		37
	D	never		6
18		Scrotal ultrasound. In the surveillance of patients with TGCT is it recommended to carry out the ultrasound of the contralateral testis?	34	
	A	yes, in all patients yearly, until surveillance is planned		65
	B	only to patients with risk factors (i.e. hypotrophic testis, history of retained testicle) twice a year, until surveillance is foreseen		3
	C	only to patients with risk factors (i.e. hypotrophic testis, history of retained testicula) once a year, until surveillance is foreseen		15
	D	no, never for screening		18
19		Thoracic imaging. In the surveillance of patients with TGCT which thoracic imaging is recommended?	31	
	A	Thorax CT scan with contrast medium in all cases when an abdomen CT is indicated		29
	B	Thorax CT low-dose without contrast medium in all cases (baseline CT scan with contrast medium should be available)		23
	C	Chest X-ray		16
	D	Thorax CT low-dose alternating with chest X-ray		32
		Survivorship		
20		Which hormone dosages are suggested in the follow-up of TGCT?	30	
	A	sex hormones (FSH, LH, testosterone) every 2–3 years in the first 5-10 years in all cases, to be indicated even after 10 years		57
	B	sex hormones (FSH, LH, testosterone) yearly in all cases		30
	C	sex hormones (FSH, LH, testosterone) regularly only in selected cases and/or in those presenting deficiencies at the initial post-surgery/therapy evaluation		13
	d	not regularly indicated in the follow-up		0
21		When an andrological specialist visit +/- possible analysis of the seminal fluid is recommended (in addition to the diagnosis) in the follow-up of TGCT?	31	
	A	annually		6
	B	at least once more after the surgery or chemotherapy, then according to need of the case or every 2–3 years		42
	C	only in case of hormonal alterations or if clinically suggested (testis atrophy, hypofertility, desire of paternity)		42
	D	regularly, with frequency based on clinical situations		10
22		What metabolism tests are recommended for the follow-up of TGCT?	29	
	A	occasional check every 2–3 years in the first 5–10 years of blood lipids, glucose, creatinine, vitamin D, FSH, LH, testosterone, BMI and blood pressure, after 10 years based on anamnesis in everyone		48
	B	regular annual control of blood lipids, glucose, creatinine, vitamin D, FSH, LH, testosterone, BMI and blood pressure in cases undergoing at least PEB for 3–4 cycles or radiotherapy and/or with other risk factors, more occasional in others		31
	C	check every 2–3 years in the first 10 years of blood lipids, glucose, creatinine, vitamin D, FSH, LH, testosterone, BMI and blood pressure, after 10 years on the basis of anamnesis in cases undergoing at least PEB x 3–4 cycles or radiotherapy and/or with other risk factors, more occasional in others		21
	D	unnecessary regular checks of the metabolism, unless in those that present them already altered at the onset of testicular neoplasia		0
23		In which cases a general medicine, cardiology or nephrology visit is recommended in the follow-up of TGCT?	30	
	A	every 2–3 years		3
	B	at least once more after the surgery or chemotherapy, then based on the necessity of the case		7
	C	only in case of haematochemical changes and/or if clinically indicated, in particular in cases undergoing at least PEB x 3–4 cycles or radiotherapy		60
	D	only in case of haematochemical changes or hypertension or BMI increase		30
24		In which cases the support of an ENT specialist is recommended in the follow-up of TGCT?	30	
	A	ENT visit in all cases at the end of PEB x3 or x4 cycles for studying platinum auditory damage		0
	B	ENT visit in all symptomatic cases at the end of the PEB x3 or x4 cycles and therefore also following possible 2nd line for the study of platinum auditory damage		3
	C	ENT visit, in all symptomatic cases at the end of the PEB x3 or x4 cycles and in all cases after 2nd-line for the study of platinum auditory damage		0
	D	Not needed specialist support, possible audiometric tests and therapies only in symptomatic cases		97
25		In which cases the support of a pulmonologist is recommended in the follow-up of TGCT?	30	
	A	pneumological examination in all cases at the end of PEB x3 or x4 cycles		3
	B	pneumological examination in symptomatic cases related to residual disease and/or with damage from drugs at the thoracic imaging (eg, post-bleomycin of PEB x3 or x4 cycles)		20
	C	pneumological examination only in symptomatic cases		10
	D	specialistic support not needed, possible respiratory tests and therapies in symptomatic cases		67
26		Secondary tumors. Is it possible to recommend long-term examinations for the early diagnosis of secondary tumors in intermediate-high risk cases (eg, previous radiotherapy or different chemotherapy lines with etoposide dose > 2 g/m2) in the follow-up of TGCT?	28	
	A	yes, in all patients with intermediate-high risk with specific tests		4
	B	yes, in selected patients		0
	C	there are no currently available recommendations		57
	D	there are no useful recommendations unless reporting to the General Practitioner, at the time of the conclusion of the regular oncological follow-up, that having performed a certain type of chemotherapy or radiotherapy is a potential risk		39
27		Professional figure for long-term follow-up. Monitoring of long-term complications and secondary tumors according to the evaluations indicated in the follow-up of TGCT should be performed:	28	
	A	in a hospital context with the various convoluted specialists (Oncologist, Radiotherapist, Andrologist, Internist, etc.)		0
	B	in a hospital context coordinated by the Oncologist		0
	C	in a mixed hospital-territory medicine context (General Practitioner)		46
	D	in a context exclusively of territory medicine (General Practitioner)		54
28		Psychological evaluation in the surveillance of TGCT. In which cases consultation and possible psychological intervention are recommended?	30	
	A	in all cases at least once at the start of the surveillance		10
	B	in all cases at the start of the surveillance and at regular intervals		7
	C	in cases presenting symptoms of psycho-social discomfort and/or perceived quality of life decline during the surveillance		30

	D	in all cases, at least once at the beginning of the surveillance, and in cases presenting symptoms of psychosocial distress and/or perceived quality of life decline during the surveillance	53
29		Psychological evaluation in the long-term survivorship. In which cases consultation and possible psychological intervention are recommended?	30
	A	in all cases presenting complications related to the previous history of testicular tumor	0
	B	in selected cases presenting complications related to the previous history of testicular tumor with potential impact on quality of life, such as hypogonadism, infertility, moderate to severe cardiovascular disease	10
	C	in cases presenting symptoms of psycho-social discomfort and/or perceived quality of life decline	90
	D	it is not possible to give any suggestion of this kind	0

Abbreviations: BMI, bosy mass index; CT, computed tomography; ENT, ear, nose, and throat; MRI, magnetic resonance imaging; PEB, cisplatinum, etoposide, bleomycin; TGCT, testicular germ cell tumour.

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