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# 2022 ESC Guidelines on Cardio-Oncology

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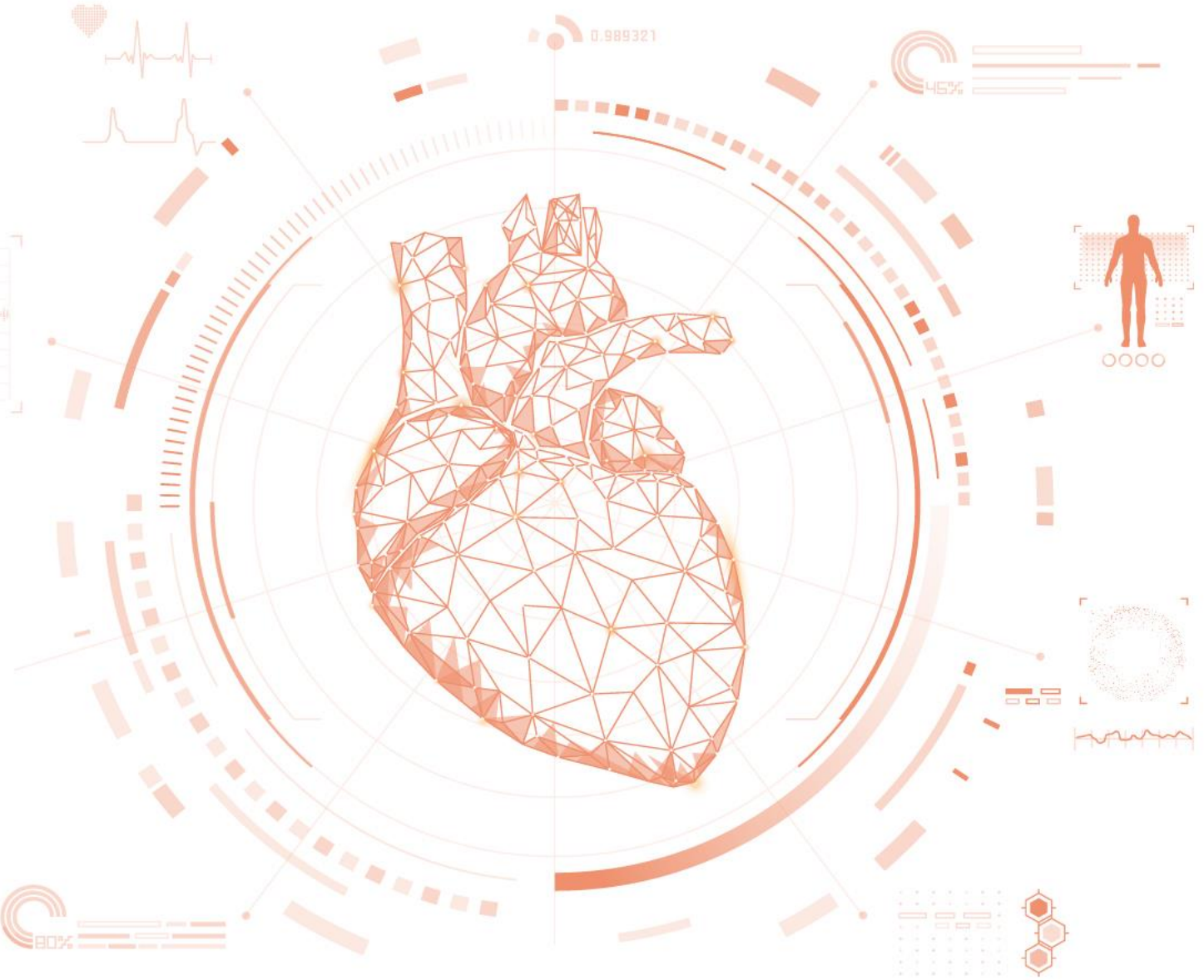
# Conflictos de interés

**Speaker fees:**

Philips, Janssen, Incyte

***El ponente no ha recibido honorarios por esta presentación***



# 2022 ESC Guidelines on Cardio-Oncology

This is the **first ESC Guideline on Cardio-Oncology** with **272 new recommendations**

- **Cardio-Oncology programmes**
- **New definition of CTR-CVT and CTRCD***
- **Prevention for CTR-CVT** based upon the baseline CV toxicity risk
- **Detailed monitoring pathways** during and after cancer therapy
- **Treatment recommendations for CTR-CVT** during and after cancer therapy
- **End-of-treatment assessment and coordination of long-term follow-up**

*CTR-CVT: cancer therapy-related cardiovascular toxicity; CTRCD: cancer therapy-related cardiac dysfunction



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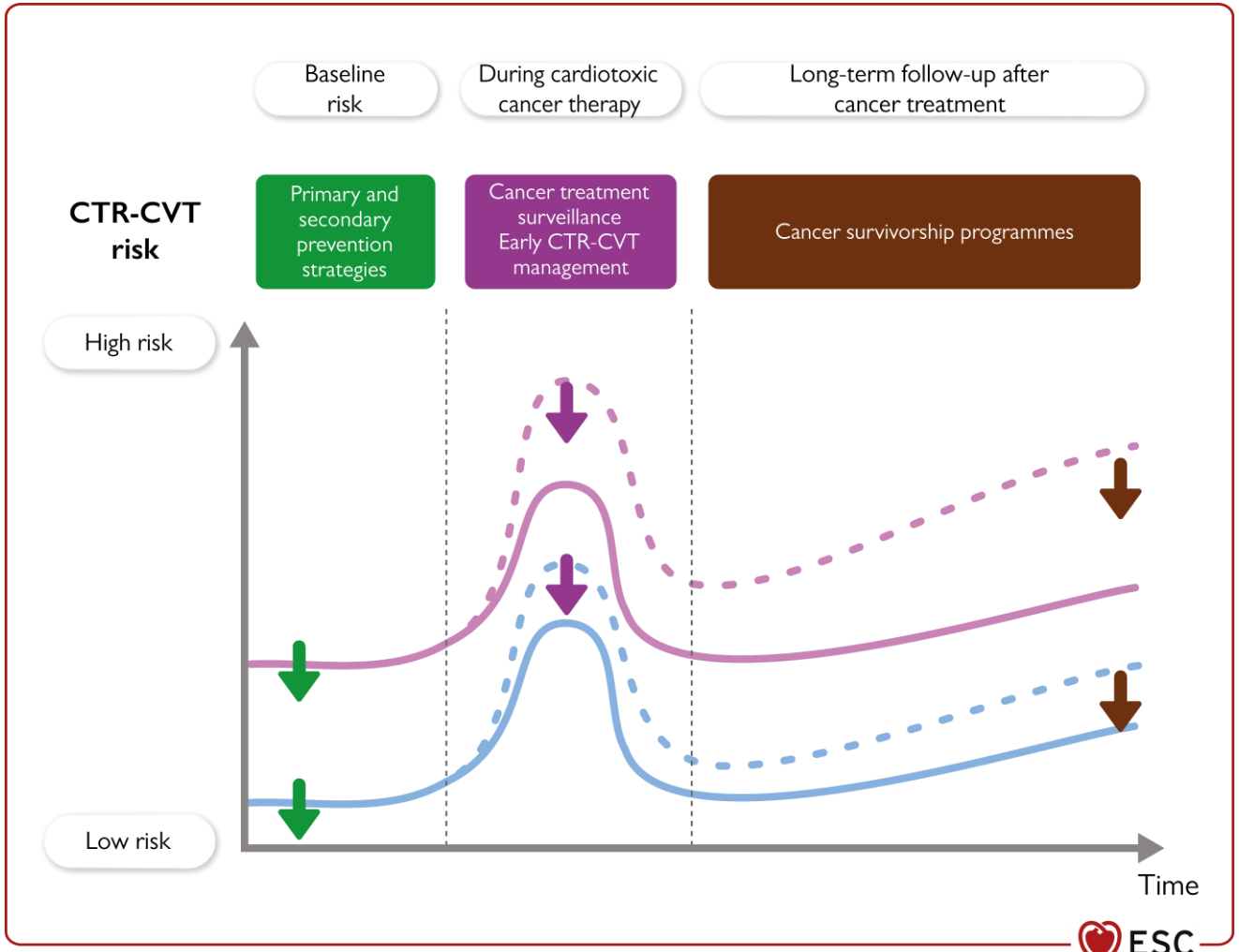
(*European Heart Journal*; 2022 – doi: 10.1093/eurheartj/ehac244)

# Dynamics of CV toxicity risk of patients with cancer



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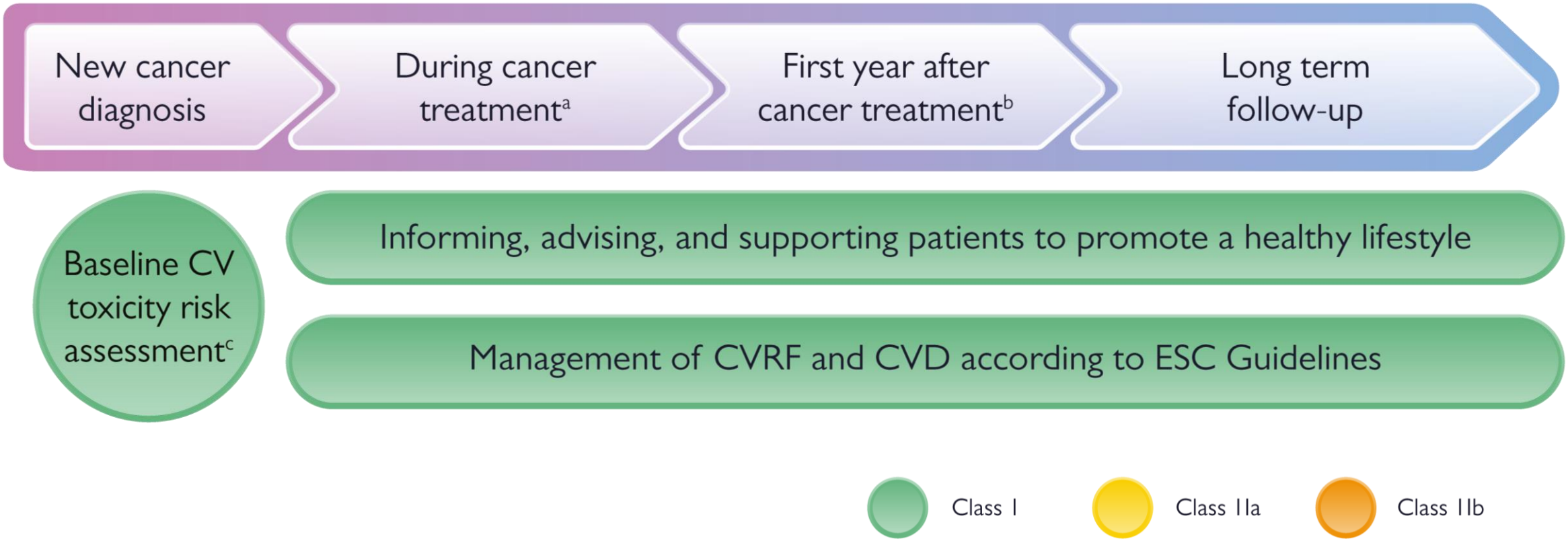
# Cardio-oncology care pathways



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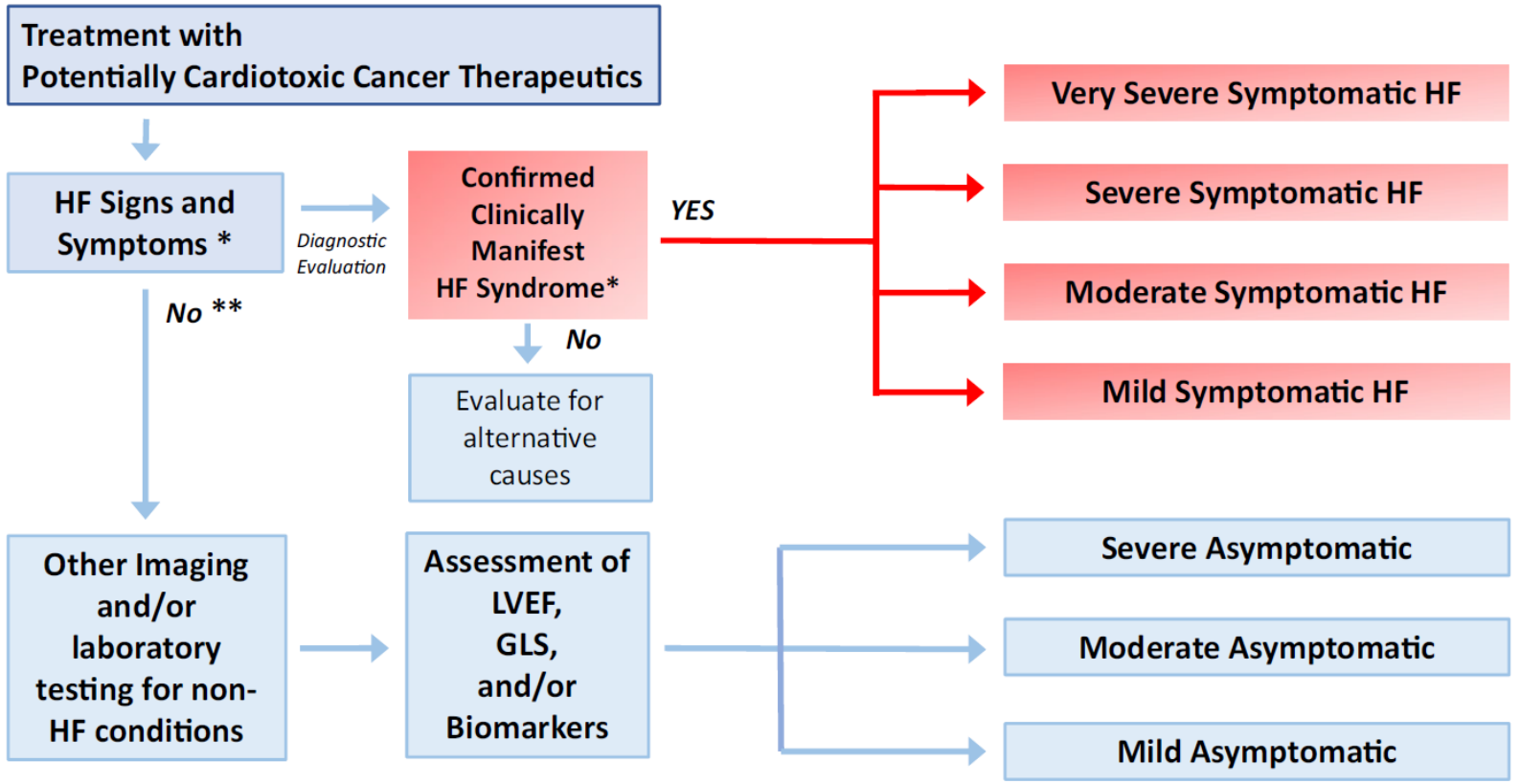
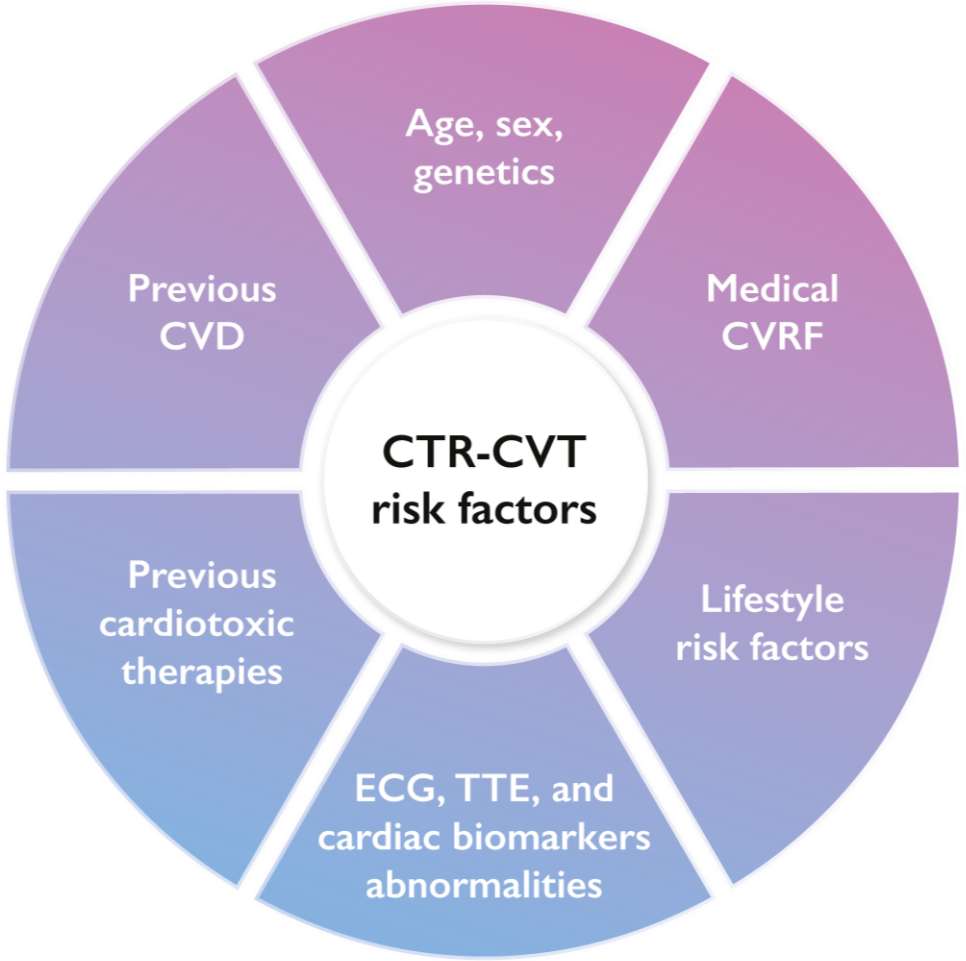
# Cancer therapy-related cardiovascular toxicity definitions (CTRCD)




J. Herrmann et al. Eur Heart J. 2022 Jan 31;43(4):280-299

# Baseline CV toxicity risk assessment checklist




## Clinical assessment

- Cancer treatment history
- CV history
- CVRF
- Physical examination
- Vital signs measurement [a]

## Complementary tests

- BNP or NT-proBNP [b]
- cTn [b]
- ECG
- Fasting plasma glucose / HbA1c
- Kidney function / eGFR
- Lipid profile
- TTE [c]



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# Baseline CV toxicity risk assessment

**2022 ESC Guidelines on cardio-oncology developed in collaboration with the European Hematology Association (EHA), the European Society for Therapeutic Radiology and Oncology (ESTRO) and the International Cardio-Oncology Society (IC-OS) Supplementary data**

- Anthracycline
- HER2-targeted therapies
- VEGF inhibitors
- BCR-ABL inhibitors
- Multiple myeloma drugs
- RAF and MEK inhibitors
- Androgen deprivation

**Table S2** Baseline cardiovascular toxicity risk assessment of patients treated with anthracycline chemotherapy

| Risk factor | Score | Level of evidence |
|---|---|---|
| **Previous CVD** | | |
| HF or cardiomyopathy | Very high | B |
| Severe VHD | High | C |
| MI or previous coronary revascularization (PCI or CABG) | High | C |
| Stable angina | High | C |
| **Cardiac imaging** | | |
| Baseline LVEF < 50% | High | B |
| Borderline LVEF 50–54% | Medium2 | C |
| **Cardiac biomarkers (where available)** | | |
| Elevated baseline troponin[a] | Medium1 | C |
| Elevated baseline BNP or NT-proBNP[a] | Medium1 | C |
| **Demographic and CVRF** | | |
| Age ≥ 80 years | High | B |
| Age 65–79 years | Medium2 | B |
| Hypertension[b] | Medium1 | B |
| DM[c] | Medium1 | C |
| Chronic kidney disease[d] | Medium1 | C |
| **Previous cardiotoxic cancer treatment** | | |
| Previous anthracycline exposure | High | B |
| Prior RT to left chest or mediastinum | High | C |
| Previous non-anthracycline-based chemotherapy | Medium1 | C |
| **Lifestyle risk factors** | | |
| Current smoker or significant smoking history | Medium1 | C |
| Obesity (BMI > 30 kg/m$^2$) | Medium1 | C |



| Score | Risk of future cardiotoxicity |
|---|---|
| Low | 2% |
| Med | 2-9% |
| High | 10-19% |
| Very high | > 20% |



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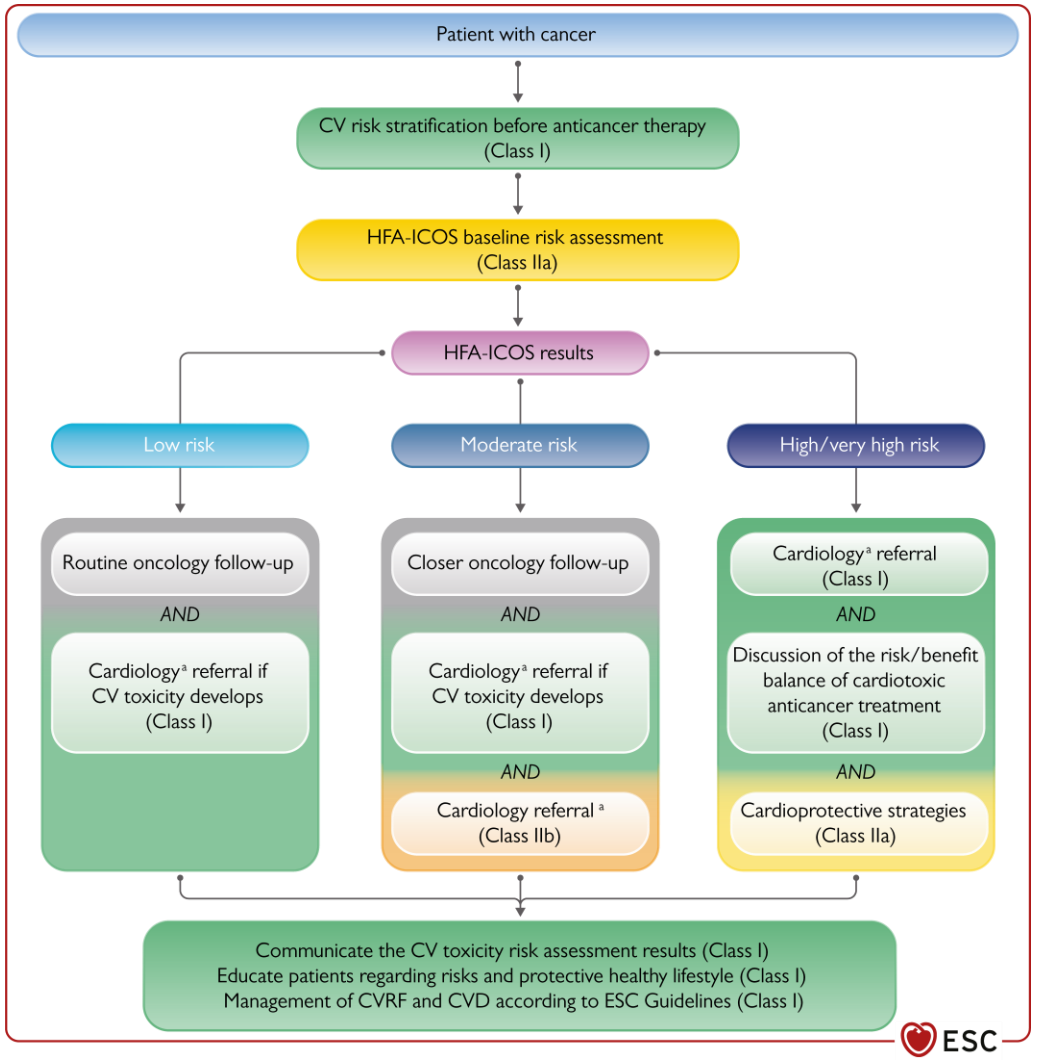
# General approach based on HFA-ICOS risk assessment



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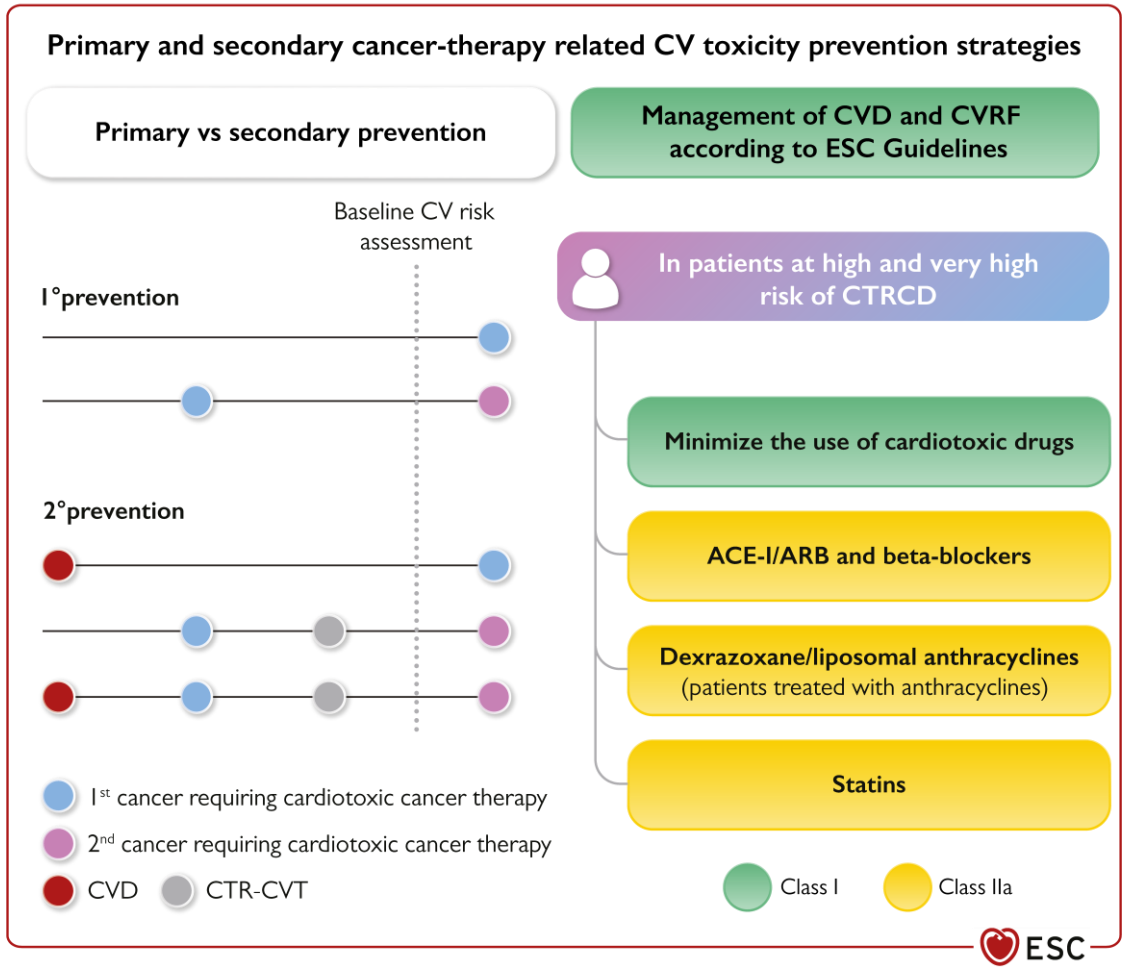
# Primary and secondary CTR-CVT prevention



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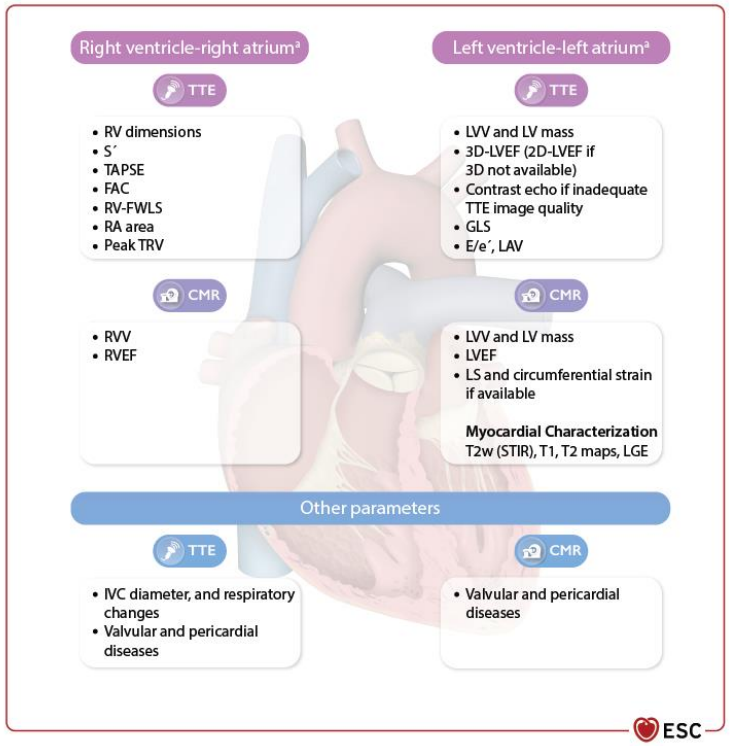
# Recommended TTE and CMR parameters in the evaluation of patients with cancer




| Recommendations | Class | Level |
|---|---|---|
| ***General*** | | |
| Echocardiography is recommended as the first-line modality for the assessment of cardiac function in patients with cancer. | I | C |
| 3D echocardiography is recommended as the preferred echocardiographic modality to measure LVEF. | I | B |
| GLS is recommended in all patients with cancer having echocardiography, if available. | I | C |
| CMR should be considered for the assessment of cardiac function when echocardiography is unavailable or non-diagnostic. | IIa | C |
| MUGA may be considered when TTE is not diagnostic and CMR is not available. | IIb | C |
| ***Baseline cardiac imaging prior to potentially cardiotoxic therapies*** | | |
| Baseline comprehensive TTE is recommended in all patients with cancer at high risk and very high risk of CV toxicity before starting anticancer therapy. | I | C |



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# CTR-CVT monitoring protocols

- Anthracycline chemotherapy
- HER2-targeted therapies
- Fluoropyrimidines
- VEGFi
- BCR-ABL TKI
- Bruton tyrosine kinase inhibitors
- Multiple myeloma therapies
- RAF and MEK
- Immune checkpoint inhibitors
- Androgen deprivation therapies
- Endocrine therapies for breast cancer
- CDK 4/6 inhibitors
- Anaplastic lymphoma kinase inhibitors
- EGFR inhibitors
- CAR-T and TIL
- Haematopoietic stem cell transplantation
- Radiotherapy
- Other cancer treatments



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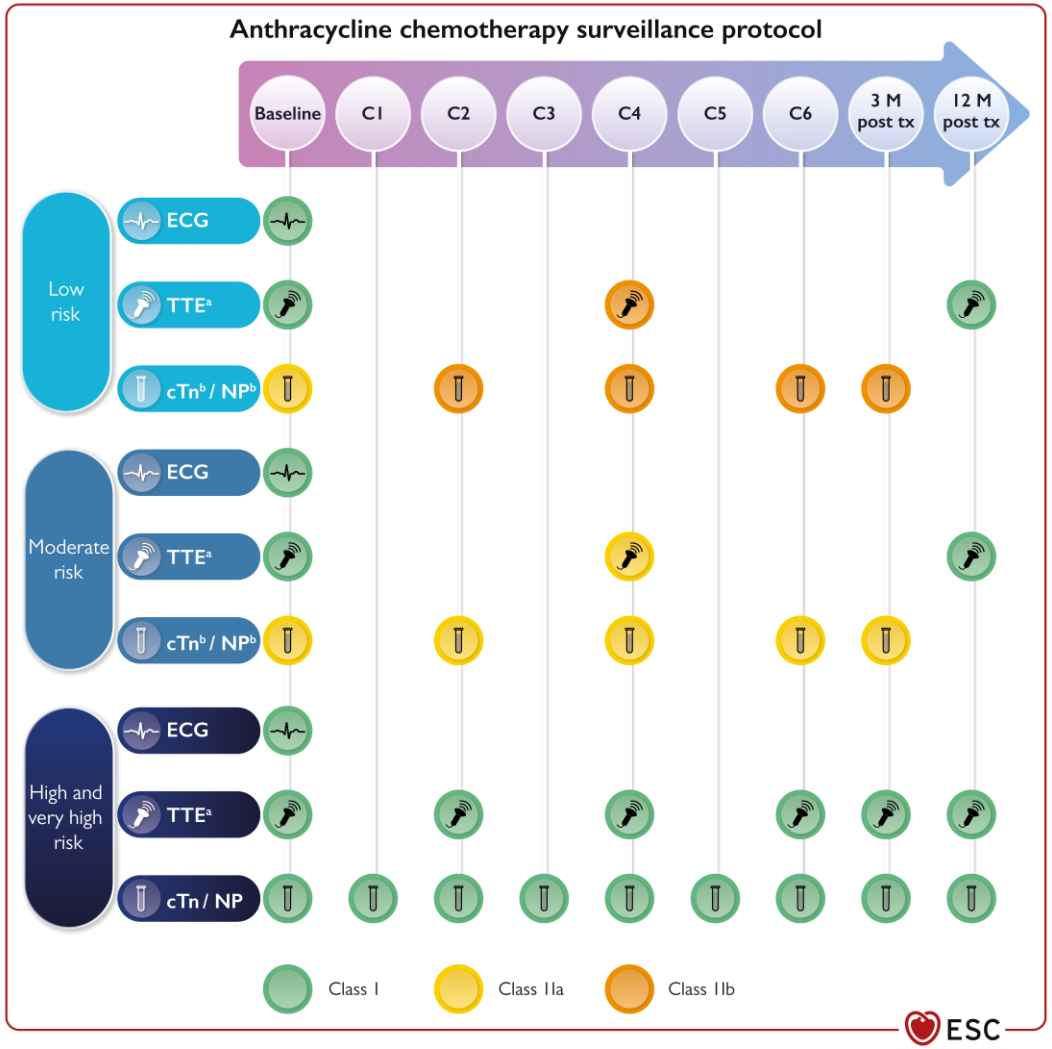
# Anthracycline chemotherapy surveillance protocol



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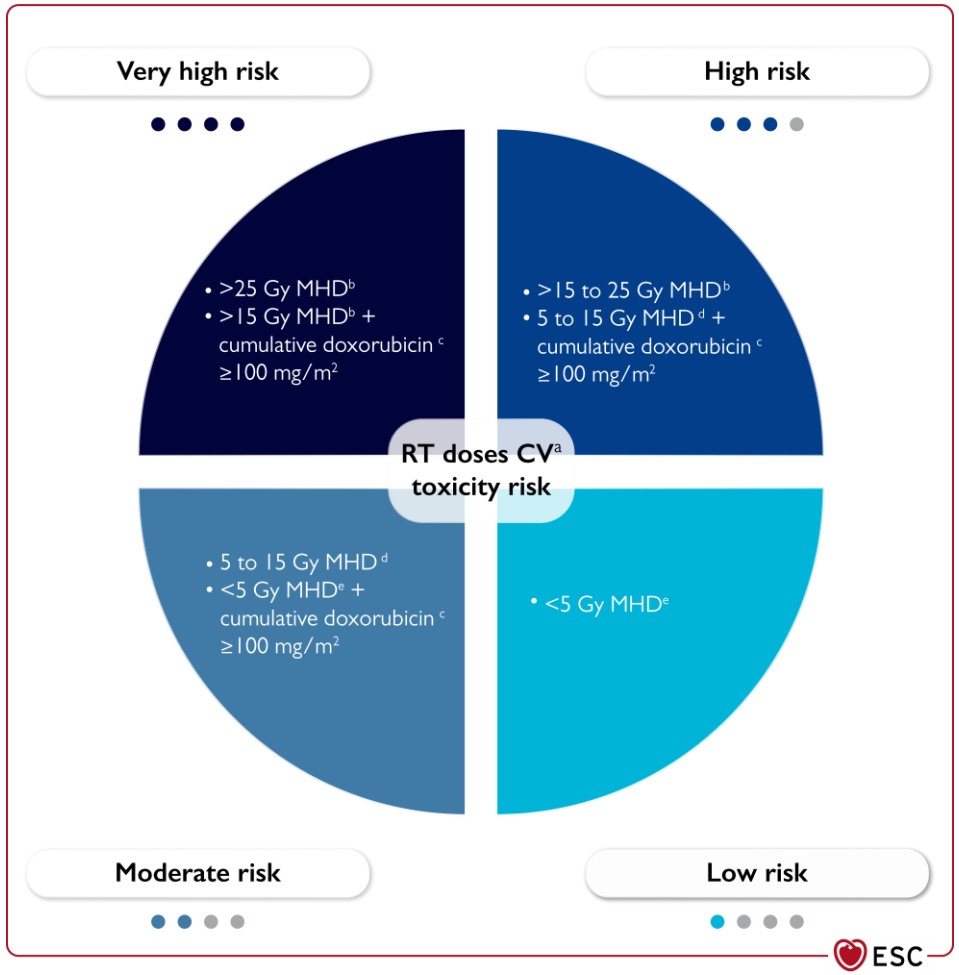
# RT mean heart dose and associated CV toxicity risk




**Recommendation Table 21 — Recommendations for baseline risk assessment of patients before radiotherapy to a volume including the heart**

| Recommendations | Class[a] | Level[b] |
|---|---|---|
| Baseline CV risk assessment[c] and estimation of 10-year fatal and non-fatal CVD risk with SCORE2 or SCORE2-OP[d] is recommended.[19,389] | I | B |
| Baseline echocardiography should be considered in patients with previous CVD before RT to a volume including the heart. | IIa | C |





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# Recommendation for the management of cardiovascular disease and cancer therapy-related cardiovascular toxicity in patients receiving anticancer treatment

| Recommendations | Class | Level |
|---|---|---|
| A specialist CV assessment is recommended for optimal diagnostic workup and management of patients with cancer who present with new CV toxicity during and after cancer treatment. | I | C |



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# Recommendation for the management of cardiovascular disease and cancer therapy-related cardiovascular toxicity in patients receiving anticancer treatment

1. The prevention and management of CVD in patients with cancer **should generally follow published ESC Guidelines for specific CVD.**
2. **This chapter highlights where management differs** for patients with cancer compared with those without
3. **Treatment decisions should consider:** cancer and CV symptom burden, cancer prognosis, ongoing cancer treatment requirements including alternative options, possible adverse drug reactions, drug–drug interactions, and patient preferences
4. **An extensive list of drug–drug interactions** is provided in Tables S15–S17.



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# Recommendation for the management of cardiovascular disease and cancer therapy-related cardiovascular toxicity in patients receiving anticancer treatment

- Myocardial dysfunction and heart failure
- Coronary artery disease
- Arterial hypertension
- Valvular heart disease
- Arrhythmias and autonomic disease
- Venous thromboembolism
- Peripheral artery disease and stroke
- Pericardial complications
- Pulmonary hypertension



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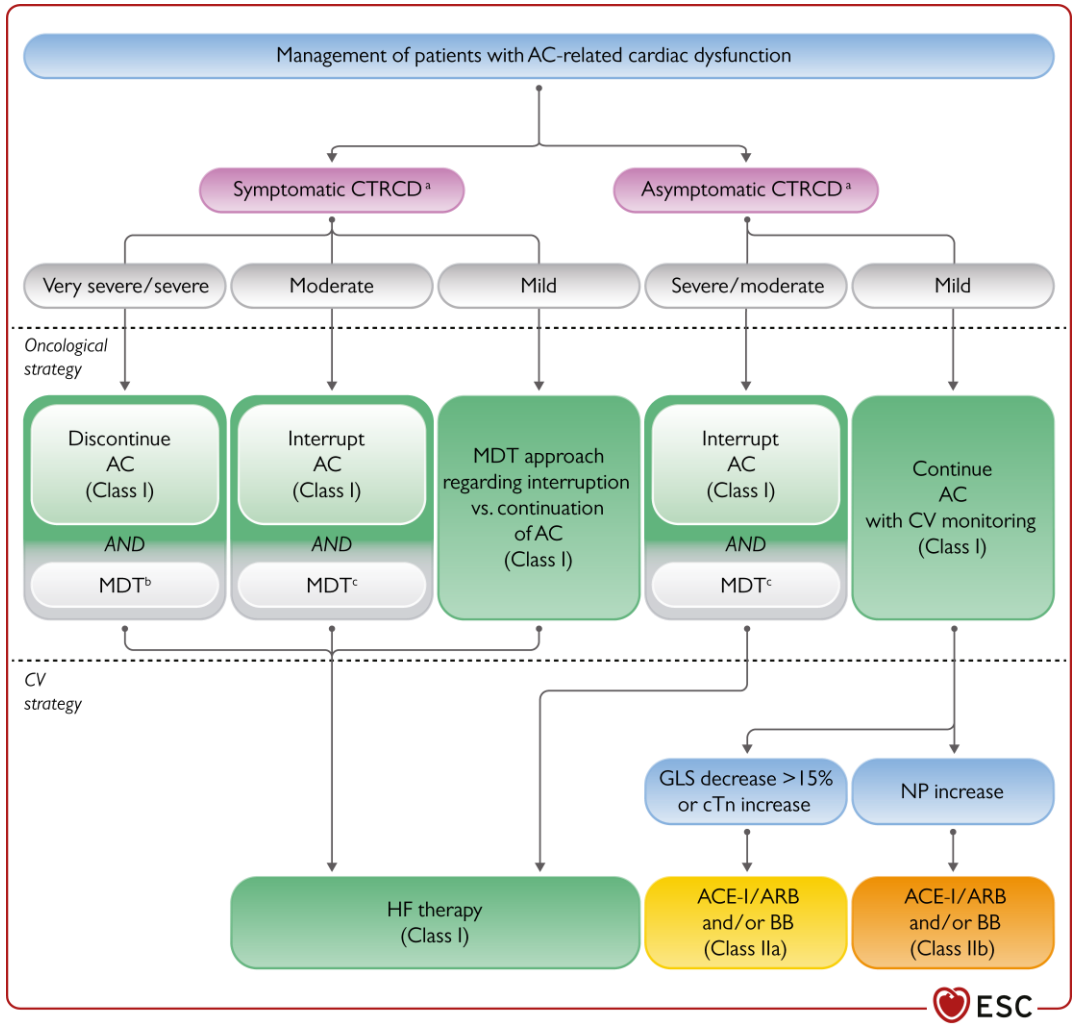
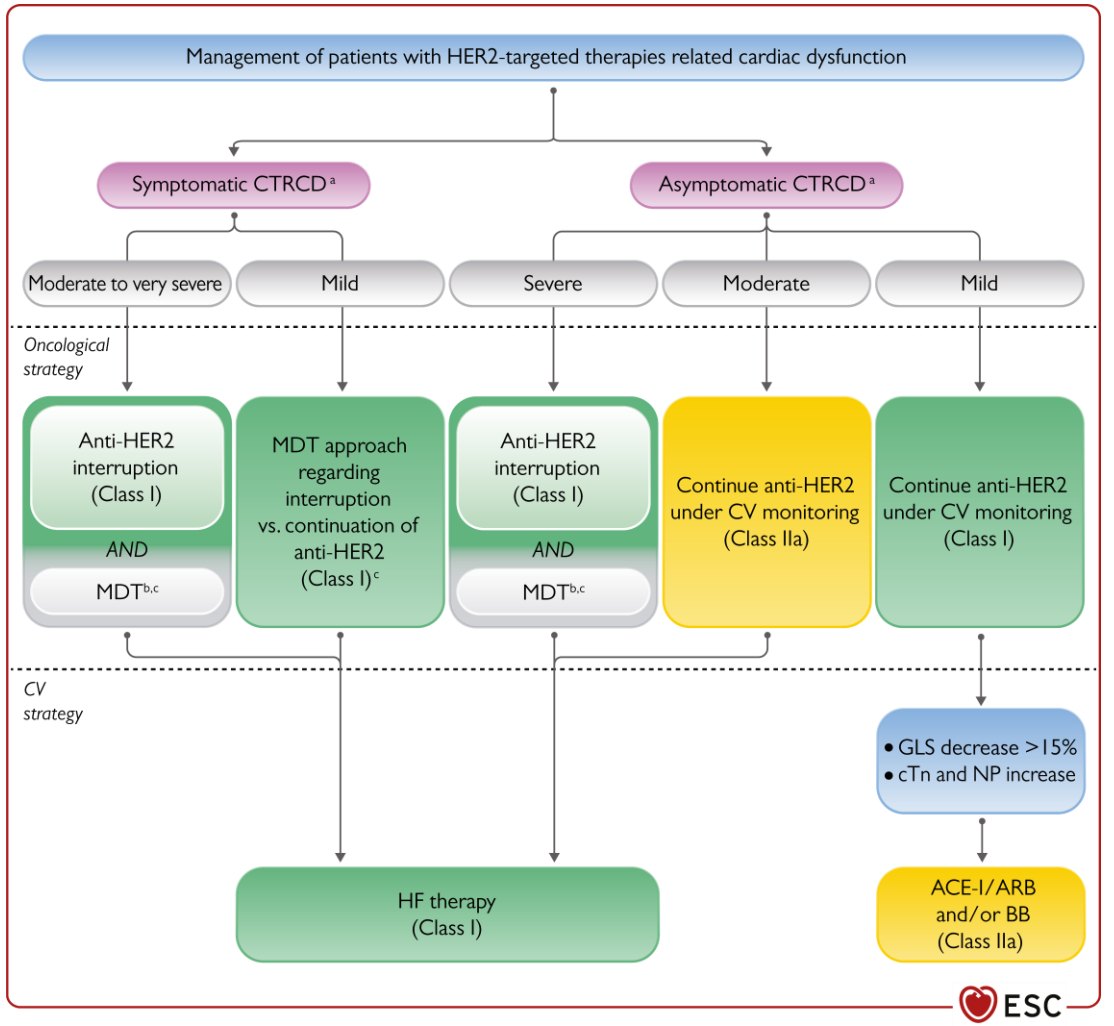
# Management of CTRCD



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(*European Heart Journal*; 2022 – doi: 10.1093/eurheartj/ehac244)

# End-of-cancer therapy cardiovascular risk assessment

## Risk factors for future cardiovascular disease at the end-of-cancer therapy cardiovascular risk assessment

| High-risk conditions |
| --- |
| High- and very-high baseline CV toxicity risk based on HFA-ICOS assessment |
| Specific anticancer treatment proven to have a high risk of long-term CV complications:<br>• Doxorubicin ≥250 mg/m$^2$<br>• RT >15 Gy MHD<br>• Both doxorubicin ≥100 mg/m$^2$ and RT 5–15 Gy MHD<br>• High-risk HSCT patients |
| Moderate or severe CTR-CVT during cancer treatment (especially CTRCD), ICI-related myocarditis, cardiac arrhythmias, or severe vascular toxicities (ACS, stroke, PVD) |
| New CV symptoms or new asymptomatic abnormalities in echocardiography and/or cardiac serum biomarkers at the end of therapy assessment |



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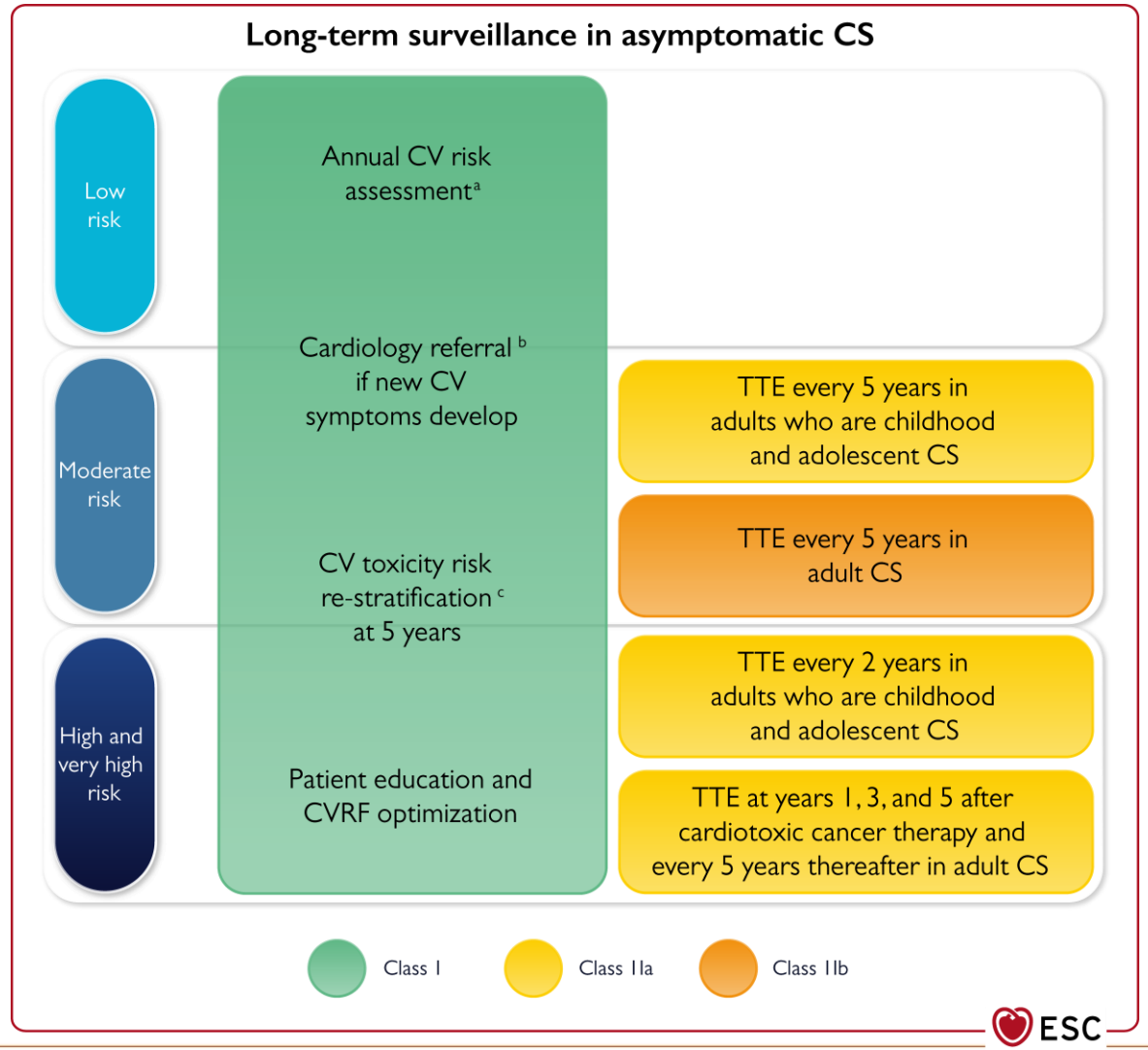
# Long term surveillance of asymptomatic cancer survivors




**Risk categories for asymptomatic adults who are childhood and adolescent cancer survivors**

| Risk category | RT dose (Gy MHD) | Total cumulative doxorubicin dose (mg/m²) | Combination therapy | |
|---|---|---|---|---|
| | | | RT dose (Gy MHD) | Total cumulative doxorubicin dose (mg/m²) |
| Very high risk | >25 | ≥400 | >15 | ≥100 |
| High risk | >15 to 25 | 250–399 | 5–15 | ≥100 |
| Moderate risk | 5–15 | 100–249 | <5 | ≥100 |
| Low risk | <5 | <100 | - | |

**Risk categories for asymptomatic adult cancer survivors**

| Risk category | Patient characteristics |
|---|---|
| Very high risk | • Very high baseline CV toxicity risk pre-treatment<br>• Doxorubicin ≥400 mg/m²<br>• RT >25 Gy MHD<br>• RT >15 to 25 Gy MHD + doxorubicin ≥100 mg/m² |
| Early high risk (<5 years after therapy) | • High baseline CV toxicity risk<br>• Symptomatic or asymptomatic moderate-to-severe CTRCD during treatment<br>• Doxorubicin 250–399 mg/m²<br>• High-risk HSCT |
| Late high risk | • RT >15 to 25 Gy MHD<br>• RT 5–15 Gy MHD + doxorubicin ≥100 mg/m²<br>• Poorly-controlled CVRF |
| **Risk category** | **Patient characteristics** |
| Moderate risk | • Moderate baseline CV toxicity risk<br>• Doxorubicin 100–249 mg/m²<br>• RT 5–15 Gy MHD<br>• RT<5 Gy MHD + doxorubicin ≥100 mg/m² |
| Low risk | • Low baseline CV toxicity risk and normal end-of-therapy cardiac assessment<br>• Mild CTRCD during therapy but recovered by the end of cancer therapy<br>• RT <5 Gy MHD<br>• Doxorubicin <100 mg/m² |



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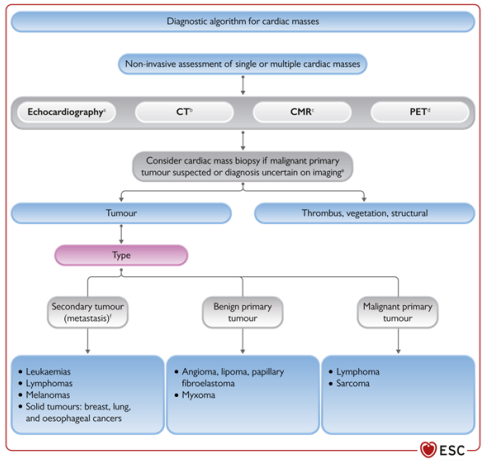
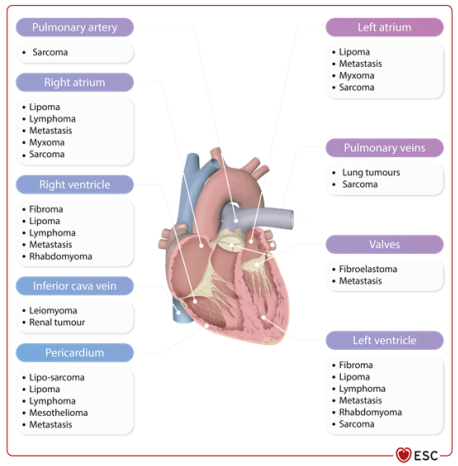
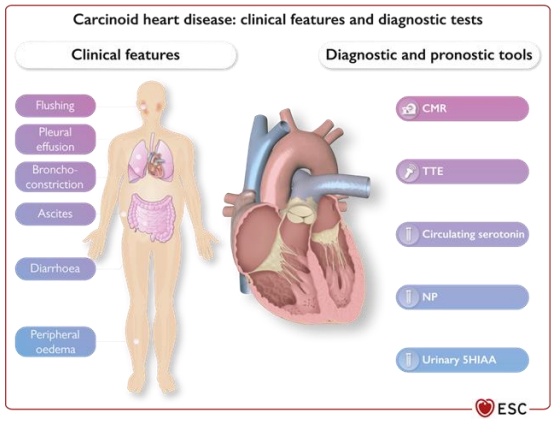
# Cardiac masses and cardiac tumours



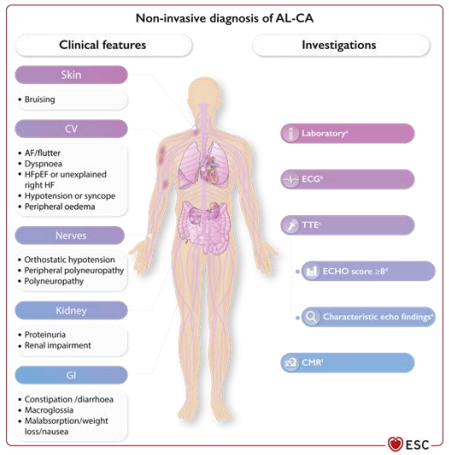

# Carcinoid heart disease




**Recommendations for carcinoid valvular heart diseases**

| Recommendations | Class | Level |
|---|---|---|
| Echocardiography is recommended for the detection of carcinoid cardiac involvement in all patients with carcinoid syndrome and elevated NP levels and/or clinical signs of carcinoid heart disease, and for surveillance every 3 or 6 months depending on the severity of cardiac involvement and clinical status. | I | B |
| NP should be considered for screening and surveillance of carcinoid heart disease every 6 months. | IIa | B |
| A MDT discussion for optimal medial management to prevent carcinoid crisis is recommended before any invasive or surgical cardiac procedure. | I | C |
| Valve replacement surgery is recommended in symptomatic patients with severe carcinoid tricuspid or pulmonary VHD and an expected survival ≥12 months. | I | C |
| Valve replacement surgery should be considered in patients with asymptomatic severe carcinoid tricuspid or pulmonary VHD, progressive RV dysfunction/dilatation, and an expected survival ≥12 months. | IIa | C |
| Valve replacement or repair surgery is recommended in symptomatic patients with severe carcinoid mitral or aortic VHD and an expected survival ≥12 months. | I | C |

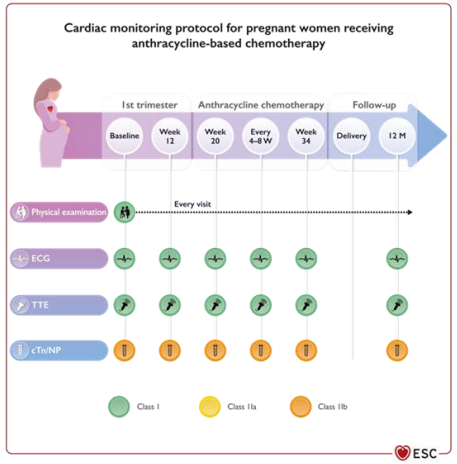
# AL cardiac amyloidosis




**Recommendations for amyloid light-chain cardiac amyloidosis diagnosis and monitoring**

| Recommendations | Class | Level |
|---|---|---|
| Echocardiography, NP, and cTn are recommended for the diagnosis of AL-CA in patients with plasma cell dyscrasia. | I | B |
| CMR is recommended in patients with suspected AL-CA. | I | A |
| EMB should be considered in patients with suspected AL-CA involvement if CMR is not diagnostic. | IIa | C |
| Admission with inpatient ECG monitoring should be considered for high-risk patients with AL-CA requiring PI during their first cycle of therapy. | IIa | C |

# Pregnant women receiving cancer therapy




**Recommendations for cardiovascular assessment and monitoring of pregnant women with cancer**

| Recommendations | Class | Level |
|---|---|---|
| Management by an expert MDT (the pregnancy heart team) in an expert centre is recommended for pregnant women with cancer who require cardiotoxic cancer therapy. | I | C |
| Cardiac assessment prior to cardiotoxic cancer therapy in pregnant women is recommended and consists of clinical history, physical examination, ECG, and echocardiography. | I | C |
| Monthly or bimonthly CV evaluation, including TTE, should be considered during cardiotoxic cancer therapy in pregnant women with cancer. | IIa | C |
| cTn may be considered at baseline and during anthracycline chemotherapy in pregnant women with cancer. | IIb | C |



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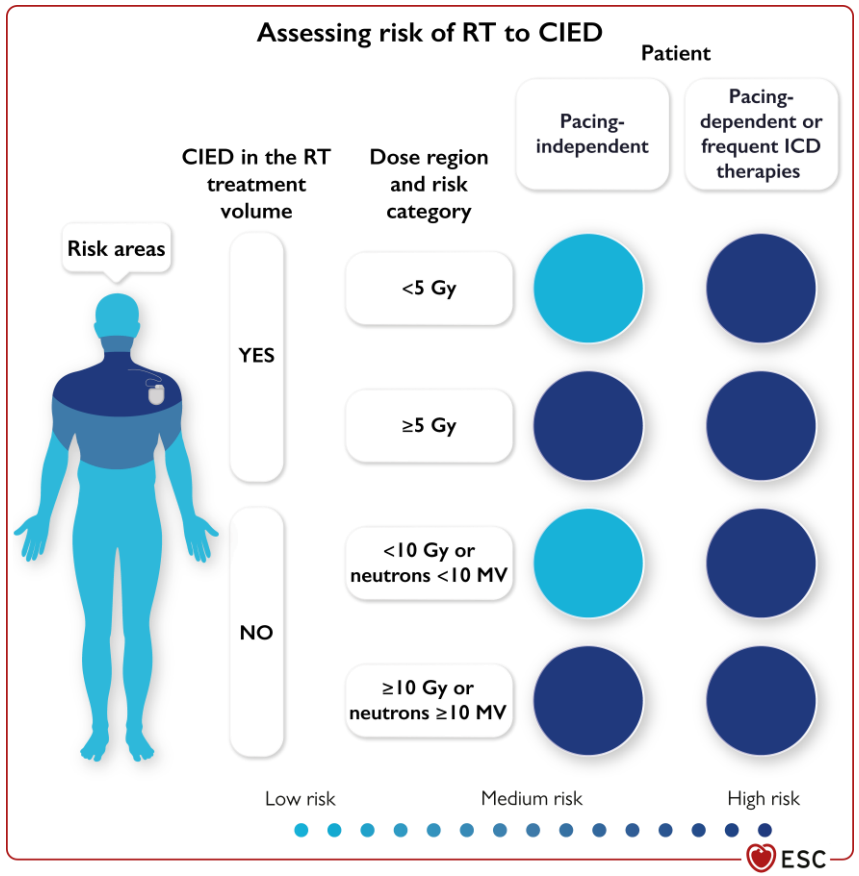
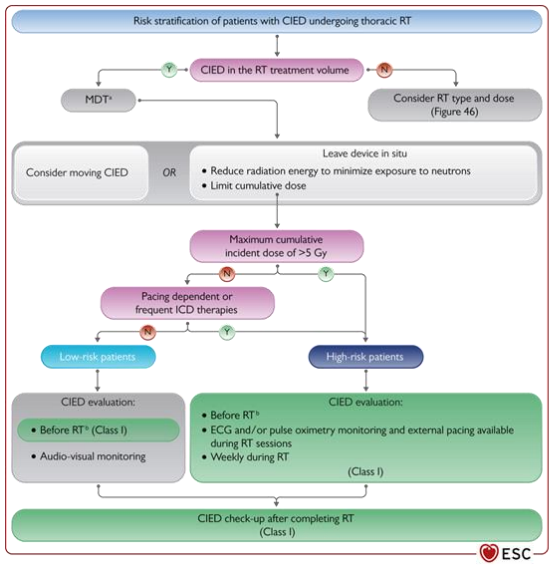
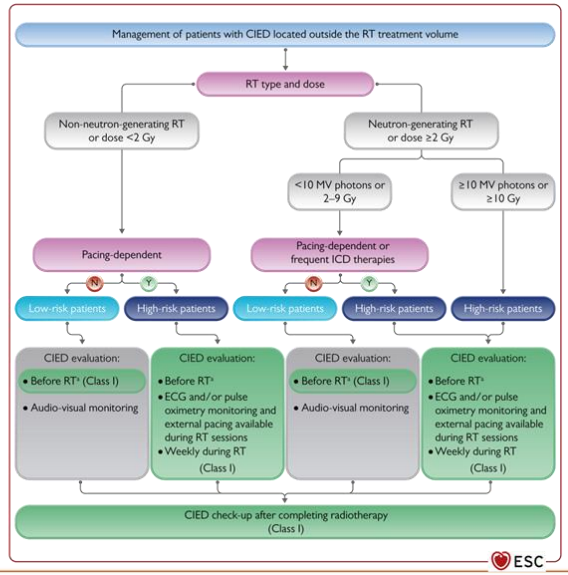
# Cardiac Implantable Electronic Devices (CIED) and RT




## Recommendations for risk stratification and monitoring for patients with cardiac implantable electronic devices undergoing radiotherapy

| Recommendations | Class | Level |
|---|---|---|
| Risk stratification including planned radiation type and energy, dose to CIED, the patient's device type, and pacing dependence is recommended prior to starting treatment. | I | C |
| In patients undergoing RT, a CIED check is recommended in all patients before and after completing RT, and during RT according to individual risk. | I | C |
| In patients with a CIED undergoing RT at high risk of arrhythmia and/or device dysfunction, ECG monitoring and/or pulse oximetry are recommended during every RT session. | I | C |



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ESC European Society of Cardiology
European Heart Journal (2022) **00**, 1–133
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ESC GUIDELINES

# 2022 ESC Guidelines on cardio-oncology developed in collaboration with the European Hematology Association (EHA), the European Society for Therapeutic Radiology and Oncology (ESTRO) and the International Cardio-Oncology Society (IC-OS)

## Developed by the task force on cardio-oncology of the European Society of Cardiology (ESC)

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ESC Pocket Guidelines


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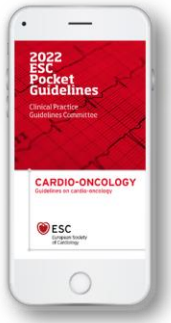
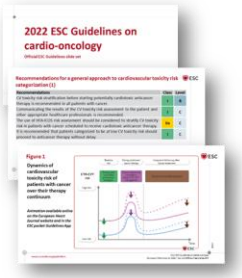



Official ESC Guidelines slide set




ESC Essential messages


Patient summary


*To come in the next months…*



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