Article:
Andratschke, N, Willmann, J, Appelt, AL orcid.org/0000-0003-2792-9218 et al. (16 more authors) (2022) European Society for Radiotherapy and Oncology and European Organisation for Research and Treatment of Cancer consensus on re-irradiation: definition, reporting, and clinical decision making. The Lancet Oncology, 23 (10). e469-e478. ISSN 1470-2045

https://doi.org/10.1016/s1470-2045(22)00447-8

Tables

Table 1

Guideline for reporting in research studies on re-irradiation. * Relative majority vote on the priority of reporting: “Required”; “Recommended”, “Optional”, “Not relevant”. Categories of the respective items are printed in bold. See the Appendix A3 for percentage of panellists who gave the majority vote and round in which the decision was reached.

Abbreviations: ECOG: Eastern Cooperative Oncology Group, TNM: Tumour, Node, Metastasis, UICC: Union for International Cancer Control, ESTRO: European Society Radiation, EORTC: European Organisation for Research and Treatment of Cancer; CTCAE: Common Terminology Criteria of Adverse Events.

	Priority of reporting*
Patient characteristics	
General information (e.g. age, sex)	Required
Lifestyle factors (e.g. drinking and smoking habits)	Recommended
Performance status (e.g. ECOG or Karnofsky performance status)	Required
Comorbidities	Recommended
Charlson Comorbidity Index	Recommended
Organ function	Required
Tumour characteristics	
Primary tumour histology	Required
Site and location	Required
Local recurrence vs. metastases vs. new primary	Required
In-field vs. marginal vs. out-of-field recurrence	Required
Re-treatment target volume size	Required
TNM stage	Required

UICC stage or similar classification	Optional
ESTRO EORTC stage of oligometastatic disease (if applicable)	Recommended
Previous and current oncologic treatments	
Previous systemic therapies	Recommended
Current systemic therapies	Required
Previous surgical interventions	Required
Planned surgical interventions	Required
Toxicities and impairments from previous medical treatments	Required
Previous radiotherapy information	
Number of previous courses	Required
Time interval since previous courses	Required
Efficacy of previous radiotherapy	Recommended
Persistent toxicity of previous courses scored according to the most recent CTCAE	Required
Dose prescription and fractionation	Required
Radiotherapy modality & delivery technique	Required
Indication to perform re-treatment	
Treatment approach: re-irradiation, repeat irradiation, new course of radiotherapy	Required
Treatment intent: palliative, curative, local ablative	Required
Treatment goal: local control, symptom relief or prevention, prolonging survival	Required
Treatment planning	
Dose prescription and fractionation	Required
Imaging modality for target and organs at risk delineation	Required
Target and organs at risk definition guideline/protocol	Required
Biological recalculation of accumulated dose	Recommended
Dose calculation algorithm	Recommended
Organs at risk dose constraints	Required

Prioritisation of planning objectives	Recommended
Radiotherapy modality & delivery technique	Required
Assessment of cumulative doses	
Image registration technique	Required
Dose summation method (3D or point doses, physical or biological)	Required
Radiobiological considerations (α/β, tissue recovery, etc.)	Required
OAR cumulative doses	Required
Treatment delivery	
Setup and Immobilisation	Optional
Image-guidance	Recommended
Motion management	Recommended
Follow-up	
Follow-up intervals and duration	Required
Standardised reporting of toxicity (e.g. CTCAE)	Required
Imaging modalities and other clinical investigations	Required

Table 2

Considerations and recommendations for re-irradiation in clinical practice. Round in which the final statement was agreed on. Percentage of agreement, defined as panellists who gave the Likert response “strongly agree” or or “agree”; the answering categories on the Likert scale were 1: strongly agree; 2: agree; 3: not sure; 4: disagree; 5: strongly disagree. Categories of the respective considerations and statements are printed in bold. See the Appendix A4 for the voting history of each statement. Abbreviations: ECOG: Eastern Cooperative Oncology Group, EQD2: equivalent dose in 2 Gy fractions, BED: biologically effective dose

		Statement	**Round**	**Agreement**
Interdisciplinary management and shared decision making				
Treatment alternatives	S1	Treatment alternatives to and salvage options after radiotherapy should be discussed in an interdisciplinary team, including surgeons and medical oncologists, together with the patient for shared decision making.	2	88%
Patient’s risk acceptance if established OAR dose constraints are exceeded	S2	For patients with limited life expectancy, re-irradiation for symptom control may be considered without concerns for irreversible toxicity despite excessive cumulative doses.	2	76%
Treatment intent	S3	The treatment intent should be defined interdisciplinary and transparently communicated with the patient for optimal shared decision making.	2	100%
Patient and tumour specific factors				
Performance status	S4	A stable performance status of ECOG ≤2 is recommended for patients who are considered for high-dose re-irradiation.	3.1	88%
Estimated survival based on tumour situation and comorbidity status	S5	High-dose re-irradiation in curative intent is not recommended if estimated survival is <6 months.	3.1	82%

Persistent toxicity from previous irradiation courses	S6	Re-irradiation should be critically discussed in case of persistent grade 3 or greater radiation-induced toxicity, also taking patient‘s risk acceptance into account.	3.1	88%
Time interval since last irradiation	S7	High-dose re-irradiation in curative intent within 6 months from previous irradiation should be carefully weighed against the benefit from the initial radiotherapy and the estimated risk of toxicity.	2	82%
Radiobiological aspects				
Tumour response to previous irradiation	S8	High-dose re-irradiation in curative intent should not be prescribed if the best response was progressive disease.	2	82%
Radioresistance and radiosensitivity of the primary tumour histologies	S9	The decision for or against re-irradiation should not be driven by general radiobiological assumptions, but rather by the response to and benefit from the initial irradiation.	3.1	82%
α/β values for tumour and organs at risk	S10	In the absence of better clinical radiobiology data, the use of α/β values established for primary irradiation of tumour and organs at risk is recommended for re-irradiation as well.	2	82%
Serial vs. parallel organs	S11	When assessing the risk for toxicity from cumulative doses, maximum doses need to be considered for serial organs (e.g. the spinal cord), whereas the irradiated volume is relevant for parallel organs (e.g. the lung or liver).	2	94%
Re-irradiation specific factors				
Availability of previous treatment plans for dose reconstruction and estimation	S12	If high-dose re-irradiation is considered, access to full information on previous treatments, including imaging, treatment plans and dose distributions is strongly recommended for assessing cumulative dose summation.	2	76%
Quantification of dose overlap	S13	If the previous dose distribution is not available in any reasonable format for dose reconstruction, the prescription dose may be assumed to be “given homogeneously to an area or organ at risk” for a conservative approximation of cumulative doses.	3.1	76%
Cumulative dose assessment	S14	If the previous dose distribution is not available in electronic format, but can be reconstructed from simulation fields or portal images, conservative approximation is reasonable for computer calculated 3D dose summation.	2	94%
	S15	If the previous dose distribution is available electronically, an overlay of dose distributions in 3D is mandatory.	2	88%

	S16	Biologically equieffective doses (e.g. EQD2 or BED) should be calculated when performing dose summations of treatment plans, especially when using different doses per fraction.	2	82%
Dose constraints and prioritisation	S17	Prioritisation of target volumes and organs at risk dose should be guided by the patient's life expectancy, risk acceptance and the general treatment goal.	2	94%
	S18	When analysing organs at risk doses, potentially shorter latencies of irreversible toxicities after previous irradiation should be considered.	3.2	94%
	S19	If established dose constraints of an organ at risk are not exceeded in the dose summation, re-irradiation can be deemed safe.	2	88%
Tolerance and recovery	S20	Tissue-dependent recovery or dose discount are subject to ongoing research and therefore a reliable recommendation on their use is not possible, except for central nervous system and spinal cord.	3.2	82%
Follow-up	S21	Patients should be followed regularly after re-irradiation with appropriate imaging and clinical examination by a radiation oncologist.	3.1	88%
	S22	After high-dose re-irradiation, a follow up every 3-4 months during the first year, and yearly thereafter is advised, unless the anticipated risk of significant irreversible toxicity is low.	3.2	100%