TNMN Staging System for Retinoblastoma

(Version 8)

TNM is developed, updated, and monitored for accurate use, by the American Joint Commision on Cancer and the Union for International Cancer Control (AJCC/UICC). Each type of cancer has unique features to determine TNM classification.

The system includes both clinical (cTNM) and pathological (pTNM) findings. Primary retinoblastoma (T) is divided into four groups, with several sub-groups in each, and many additional descriptors. The stages from cT1a – cT3b closely reflect the five stages of the International Intraocular Retinoblastoma Classification.

Stage cT3 (IIRC Group E) indicates high risk for tumour extension outside the eye, and need for urgent removal of the eye. Stage pT2 and pT3 confirm local invasion of tumour. Stages cT4, pT4, N and M involve disease dissemination beyond the eye.

When both eyes are affected, each eye is staged independently. Stage for a bilaterally affected child is based on the worst affected eye, as an indicator of risk to the child's life.

Retinoblastoma is the first cancer to incorporate heritability (TNM**H**) into the staging system. This was introduced with Version 8, published in 2016.

Clinical Classification (cTNM)

Primary Tumour (T)

cTX: Unknown evidence of intraocular tumor.

cT0: No evidence of intraocular tumour.

cT1: ***Intraretinal tumor(s) with sub-retinal fluid ≤ 5 mm from the base of any tumor*:**

cT1a: Tumors ≤ 3 mm and further than 1.5 mm from the disc and fovea.

cT1b: Tumors > 3 mm or closer than 1.5 mm to the disc and fovea.

cT2: ***Intraocular tumor(s) with retinal detachment, vitreous seeding or sub-retinal seeding***

cT2a: Sub-retinal fluid >5 mm from the base of any tumor.

cT2b: Tumors with vitreous seeding and/or sub-retinal seeding.

cT3: ***Advanced intraocular Tumour(s):***

cT3a: Phthisis or pre-phthisis bulbi

cT3b: Tumor invasion of the pars plana, ciliary body, lens, zonules, iris or anterior chamber.

cT3c: Raised intraocular pressure with neovascularization and/or buphthalmos

cT3d: Hyphema and/or massive vitreous hemorrhage

cT3e: Aseptic orbital cellulitis

cT4: Extraocular tumor(s) involving orbit, including optic nerve

cT4a: Radiologic evidence of retrobulbar optic nerve involvement or thickening of optic nerve or involvement of orbital tissues.

cT4b: Extraocular tumor clinically evident with proptosis and/or an orbital mass.

Regional Lymph Nodes (N)

cNX: Regional lymph nodes cannot be assessed.

cN0: No regional lymph node involvement.

cN1: Evidence of preauricular, submandibular, and cervical lymph node involvement

Distant Metastasis (M)

cMX: Presence of distant metastasis cannot be assessed

cM0: No signs or symptoms of intracranial or distant metastasis

cM1: Distant metastasis without microscopic confirmation:

cM1a: Tumor(s) involving any distant site (e.g., bone marrow, liver) on clinical or radiologic tests.

cM1b: Tumor involving the CNS on radiologic imaging (not including trilateral retinoblastoma)

Definition of Heritable Trait (H)

HX: Unknown or insufficient evidence of a constitutional *RB1* gene mutation.

H0: Normal *RB1* alleles in blood tested with demonstrated high-sensitivity assays.

H1: Bilateral retinoblastoma, retinoblastoma with an intracranial primitive neuroectodermal tumor (i.e., trilateral retinoblastoma), patient with family history of retinoblastoma, **or** molecular definition of a constitutional *RB1* gene mutation.

Pathologic Classification (pTNM)

Primary Tumour (pT)

pTX: Unknown evidence of intraocular tumor.

pT0: No evidence of intraocular tumour.

pT1: Intraocular tumor(s) without any local invasion, focal choroidal invasion, or pre- or intralaminar involvement of the optic nerve head.

pT2: Intraocular tumor(s) with local invasion:

pT2a: Concomitant focal choroidal invasion and pre- or intralaminar involvement of the optic nerve head.

pT2b: Tumor invasion of stroma of iris and/or trabecular meshwork and/or Schlemm's canal.

pT3: Intraocular tumor(s) with significant local invasion

pT3a: Massive choroidal invasion (>3 mm in largest diameter, or multiple foci of focal choroidal involvement totalling >3 mm, or any full-thickness choroidal involvement).

pT3b: Retrolaminar invasion of the optic nerve head, not involving the transected end of the optic nerve.

pT3c: Any partial-thickness involvement of the sclera within the inner two thirds.

pT3d: Full-thickness invasion into the outer third of the sclera and/or invasion into or around emissary channels.

pT4: Evidence of extraocular tumor: tumor at the transected end of the optic nerve, tumor in the meningeal spaces around the optic nerve, full thickness invasion of the sclera with invasion of the episclera, adjacent adipose tissue, extraocular muscle, bone, conjunctiva, or eyelids.

Regional Lymph Nodes (pN)

pNX: Regional lymph node involvement cannot be assessed.

pN0: No regional lymph node involvement.

pN1: Regional lymph node involvement

Metastasis (pM)

pMX: Presence of metastasis cannot be assessed.

pM0: No distant metastasis.

pM1: Distant metastasis with microscopic confirmation:

pM1a: Pathological evidence of tumor at any distant site (e.g., bone marrow, liver, or other).

pM1b: Pathological evidence of tumor in the cerebrospinal fluid or CNS parenchyma.

AJCC PROGNOSTIC STAGE GROUPS

Clinical Stage (cTNM)

When cT is…	And N is…	And M is…	And H is…	Then the clinical stage group is …
cT1, cT2, cT3	cN0	cM0	Any	I
cT4a	cN0	cM0	Any	II
cT4b	cN0	cM0	Any	III
Any	cN1	cM0	Any	III
Any	Any	cM1 or pM1	Any	IV

Pathological Stage (pTNM)

When pT is…	And N is…	And M is…	And H is…	Then the pathological stage group is …
pT1, pT2, pT3	pN0	cM0	Any	I
pT4	pN0	cM0	Any	II
Any	pN1	cM0	Any	III
Any	Any	cM1 or pM1	Any	IV