Lesson 12: Biopsy, cytology, immunohistochemistry, staging systems (TNM)

Lesson 12 – Cancer Staging, Grading and Key Oncology Terms

1. Why This Lesson Matters

As an Ayurvedic oncologist you will constantly see words like TNM, Stage IIIB, poorly differentiated, ECOG 3, CR, PR, PFS, first-line chemo. If you don't understand these precisely, you cannot judge seriousness of disease, set realistic goals, or design appropriate Ayurvedic support. This lesson makes you fluent in the basic "language of oncology" so you can integrate Ayurveda intelligently and communicate confidently with oncologists.

2. What Is Cancer Staging?

Staging describes the **extent** of cancer in the body. It answers:

- How big is the primary tumour?
- Are regional lymph nodes involved?
- Has it spread to distant organs?
  Staging helps to decide treatment intent (curative vs palliative), choose modality (surgery, chemo, RT, targeted, immunotherapy), predict prognosis, and compare results in research. Most solid tumours use the **TNM** system.

3. TNM System – Backbone Of Staging

TNM = Tumour, Nodes, Metastasis.

3.1 T – Primary Tumour

T describes size and local extension.
Typical categories (conceptual):

- Tis – carcinoma in situ (very early, intra-epithelial)
- T1–T4 – progressively larger or more locally invasive tumour
  Example idea (breast, simplified):
- T1: ≤2 cm
- T2: 2–5 cm
- T3: >5 cm
- T4: any size with chest wall or skin involvement
  Exact cut-offs vary by organ, but principle is simple: higher T = more local bulk/invasion.

3.2 N – Regional Lymph Nodes

N describes spread to nearby lymph nodes.

- N0 – no regional node involvement
- N1, N2, N3 – increasing number, size, or level of nodes involved
  Higher N = greater nodal disease, usually worse prognosis and more intensive treatment.

3.3 M – Distant Metastasis

M describes spread to distant organs.

- M0 – no distant metastasis
- M1 – distant metastasis present

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Any M1 is usually Stage IV and rarely curable (with some exceptions).

3.4 Clinical Vs Pathological TNM

- cTNM – clinical staging: based on exam + imaging + biopsy before definitive surgery
- pTNM – pathological staging: based on what pathologist finds in resected specimen (exact tumour size, number of nodes involved, margins)
  Example: cT2N1M0 can become pT2N2M0 if more positive nodes are found at surgery. Both are important for your planning and counselling.

4. Stage Grouping – Stage 0 To Stage IV

TNM values are combined into overall stages:

- Stage 0: carcinoma in situ (Tis)
- Stage I: small, localized tumour, no or minimal nodes
- Stage II: larger tumour and/or limited nodal disease
- Stage III: locally advanced (bigger tumour, more/fixed nodes, local structure involvement)
- Stage IV: any T, any N with M1 (distant spread)
  Broad clinical meaning:
- Stage I–II: often curable with surgery ± chemo/RT
- Stage III: still potentially curable but needs multimodal aggressive therapy
- Stage IV: usually incurable; aim mainly disease control and palliation, though survival can still be improved
  Ayurvedic reflection:
- Stage I–II: strong focus on supporting curative treatment, reducing side-effects, early rasayana in recovery
- Stage III: intense supportive care to maintain strength through multimodal therapy
- Stage IV: symptom control, QOL, gentle Agni–Ojas support, psychological and spiritual care

5. Cancer Grading – How Aggressive Are The Cells?

Stage = “how far”. Grade = “how wild”.
Grade describes how abnormal cells look under microscope and how fast they are likely to grow.

- Grade 1 (well differentiated): resemble normal tissue fairly well, slower growth
- Grade 2 (moderately differentiated): intermediate
- Grade 3 (poorly differentiated): very abnormal, faster growth and spread
  (Some systems also use Grade 4 / undifferentiated).
  For your integrative planning:
- Low-grade tumours: slower course, long survivorship; Ayurveda can focus on long-term rasayana, metabolic correction, and QOL.
- High-grade tumours: biologically aggressive; modern therapy will be intense; your role is to protect Agni–Ojas and help patient tolerate treatment.

6. Performance Status – How Fit Is The Patient?

Treatment decisions depend not only on tumour but also on **patient fitness**. Performance status quantifies ability to perform daily activities.

6.1 ECOG Performance Status (0–5)

- 0: Fully active, no restriction
- 1: Restricted in strenuous activity, but ambulatory and able to do light work
- 2: Ambulatory, capable of self-care, unable to work; up and about >50% of waking hours
- 3: Limited self-care; confined to bed or chair >50% of waking hours
- 4: Completely disabled; totally bedridden
- 5: Dead

Most intensive chemo/RT regimens are given when ECOG is 0–2. ECOG 3–4 usually get only palliative treatment.

6.2 Karnofsky Performance Status (KPS, 0–100)

- 100: Normal, no complaints
- 70: Cares for self but unable to work
- 40: Disabled, needs special care
- 0: Dead
  Higher KPS = better fitness.
  Ayurvedic mapping: performance status closely reflects **Bala and Ojas**. Low PS means you must avoid exhausting procedures and focus on gentle, comfort-oriented care.

7. Key Response And Outcome Terms

You will see these terms in reports and tumour board notes.

7.1 Treatment Response

Based largely on RECIST criteria (measuring lesions on imaging):

- CR (Complete Response / Complete Remission): disappearance of all detectable disease
- PR (Partial Response): significant tumour shrinkage (e.g. ≥30% decrease in sum of diameters) but not complete
- SD (Stable Disease): neither enough shrinkage for PR nor enough increase for PD
- PD (Progressive Disease): significant growth of tumour or new lesions
  Ayurvedic planning:
- CR: focus on survivorship rasayana, long-term lifestyle, vigilance for recurrence
- PR / SD: continue integrative support to improve tolerance and try to deepen response
- PD: disease escaping regimen; lines of therapy will change or shift to palliation; Ayurveda focuses on symptom control, mind–body support, and careful Ojas protection.

7.2 Recurrence / Relapse

- Local recurrence: at or near primary site
- Regional recurrence: in draining lymph nodes
- Distant recurrence: metastasis to remote organs
  This often happens after a period of remission. Survivorship protocols (diet, lifestyle, rasayana, follow-up) aim to reduce recurrence risk and support patient emotionally around fear of relapse.

7.3 Lines Of Therapy

- First-line: initial standard regimen for that stage/disease
- Second-line: used when first-line fails or is not tolerated
- Third-line and beyond: later options with usually diminishing success probability
  More lines used generally means more advanced or resistant disease; your Ayurvedic involvement progressively becomes more palliative and QOL-focused, though support is valuable at every line.

7.4 Survival Metrics

Common study endpoints:

- OS (Overall Survival): time from diagnosis or treatment start to death from any cause
- DFS (Disease-Free Survival): time after treatment during which no disease is detectable
- PFS (Progression-Free Survival): time during and after treatment when disease is present but not progressing
  These help you interpret research and explain prognosis in a balanced way.

8. Imaging And Pathology Terms You Should Recognise

You already learned imaging basics in Lesson 11. In reports you will also see:

8.1 Biopsy Types

- FNAC (Fine Needle Aspiration Cytology): cells only; suggests malignancy but limited architecture
- Core needle biopsy: tissue cores; standard for many solid tumours
- Excisional biopsy: whole lesion removed (common in small lymph nodes, some skin tumours)

8.2 Margin Status After Surgery

- R0: no residual tumour, all margins clear microscopically
- R1: microscopic tumour at margin
- R2: macroscopic residual tumour
  R0 is ideal; R1/R2 indicate higher recurrence risk and need for adjuvant therapy.

9. Putting It Together With Ayurvedic Assessment

For each patient you should try to write both:

1. A precise modern summary, e.g.:
   “Invasive ductal carcinoma, left breast; Stage IIB (cT2N1M0); Grade 2; ER/PR positive, HER2 negative; ECOG 1; planned neoadjuvant chemotherapy followed by surgery and adjuvant hormonal therapy.”
2. An Ayurvedic summary, e.g.:
   “Kapha–Meda predominant māṃsa-pradoṣaja vikāra at stana; doṣa: Kapha with secondary Pitta, systemic Vāta beginning to increase; dhātu: Rasa–Rakta–Māṃsa–Meda; srotas: Rasavaha, Raktavaha, Māṃsavaha, Artavavaha; Agni: Mandāgni with mild Ama; Ojas: mild–moderate kṣaya.”
   From this dual lens you design your integrative plan:

- Phase with high-intensity chemo: focus on Agni support, Ama management, symptom relief, psychological support, gentle Rasayana.
- Post-surgery and adjuvant phase: graded Rasayana, metabolic correction, rehabilitation, mind–body practices.
- If later there is metastatic relapse: realistic aim shifts to control and comfort; avoid aggressive shodhana, use gentle supportive chikitsā.

10. Key Take-Home Points

1. TNM describes local size (T), nodal status (N), and distant spread (M); from this we derive Stage 0–IV.
2. Stage tells you disease extent and broad intent (curative vs palliative); grade tells you how aggressive the cells are.
3. Performance status (ECOG/KPS) reflects patient’s functional capacity and roughly mirrors Bala/Ojas; it strongly influences how aggressive therapy can be.
4. Response terms (CR, PR, SD, PD) describe how tumour behaves under treatment; recurrence and lines of therapy show disease course over time.
5. Survival metrics (OS, DFS, PFS) are needed to interpret oncology research and to counsel patients about prognosis without giving false promises.
6. Imaging and pathology (biopsy, margins) provide objective evidence that you must combine with your doṣa–dhātu–srotas–Agni–Ojas assessment.
7. Using both languages together (TNM + Ayurvedic framework) makes your integrative oncology practice precise, ethical, and clinically relevant.

11. Review Questions

1. Explain the components of TNM in your own words and give a simple example (e.g., cT2N1M0).
2. How is Stage II different from Stage IV disease in terms of extent and usual treatment intent?

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3. Differentiate clearly between **stage** and **grade** in cancer; why do you need to know both for planning Ayurvedic support?
4. Describe ECOG 0, 2, and 3. How would your Ayurvedic approach differ between a patient with ECOG 1 and ECOG 3?
5. Define CR, PR, SD, and PD. How would your integrative goals differ between a patient in CR and one with PD after second-line therapy?
6. What is R0 resection? Why is it important for recurrence risk and for planning rasayana/survivorship protocols?
7. Write a combined modern + Ayurvedic case summary for a hypothetical patient with carcinoma of the colon, cT3N1M0, Grade 2, ECOG 2, with weight loss and constipation.