The evolving TNM cancer staging system: an essential component of cancer care

Before therapy commences for any cancer patient, 3 essential factors should be known: the site of origin, the histological type (including grade) and the extent or stage of the cancer. Cancer staging is an important component, not only of patient care, but also of cancer research and control activities. The globally accepted method for describing the extent of cancer is the anatomically based TNM (tumour, node, metastases) staging system, which classifies the cancer as to its local, regional and distant extent. Developed in France in the 1940s by Pierre Denoix, the TNM classification has become the accepted basis of cancer staging.

The general rules of the TNM system change as new technologies in cancer diagnosis and treatment develop.[1] For example, because sentinel nodes are now biopsied more frequently in several types of malignant diseases, including breast cancer and melanoma, the sn designation has been introduced to indicate that a pathologic categorization of a regional node was based on a sentinel-node biopsy rather than on a full nodal dissection (Box 1, Box 2). The prognostic significance of micrometastases and especially of isolated tumour cells, although still uncertain, can now be detected through improvements in immunohistochemistry, and should be reported.

In addition to new designations, the numbers of nodes to be examined in pathology specimens from various sites have been clarified. Note that when the number of lymph nodes resected is fewer than the number recommended for assessment (e.g., < 12 nodes in cases of colorectal cancer) and all nodes are judged to be negative for metastases, it is the N0 category that should be assigned. In such circumstances it is important *not* to record the cancer classification as NX, even though all of the nodes are negative. The inappropriate use of NX in situations such as this results in a loss of valuable information.[2]

With the increasing use of neoadjuvant therapy, which can affect the local and regional extent of a tumour, the prefix y is a useful tool. The insertion of y before the pathologic stage indicates that neoadjuvant therapy has been provided preoperatively, and that the pathologic extent of disease may therefore change.

Changes in the definitions of TNM categories and the stage groupings of cancers at some of the major tumour sites are summarized in Table 1. The staging of tumours in less common sites such as hepatoma and melanoma has undergone major revision as well; details can be found in the International Union Against Cancer's *TNM Classification of Malignant Tumours* (sixth edition, Wiley-Liss; 2002), the American Joint Committee on Cancer's *AJCC Cancer Staging Manual* (likewise the sixth edition, Springer; 2002) and on the Web (at www.cancerstaging.org/products/ajccproducts.html#guide).

An annual process is now in place for review of the literature to identify evidence supporting the need for changes to the TNM staging system. The evidence is then assessed by panels of site-specific experts with international recognition. Changes in the next (seventh) edition, due in 2009, will be evidence-based.[3] The National Cancer Institute of Canada's Committee on Cancer Staging continues to act

Box 1: Codes for cancer staging utilized during the examination of lymph nodes

PN0	Negative results from the node dissection
pN0(sn)	Negative results from sentinel-node biopsy
pN1(mi)	Positive results from node dissection; micrometastases found, ≤ 0.2 cm and > 0.2 mm in diameter
pN0(i+)	Isolated tumour cells < 0.2 mm in diameter found (usually detected by immunohistochemistry)
pN0(mol+)	No tumour cells identified histologically, but positive molecular (RT-PCR) findings
pN0(i+)(sn)	Isolated tumour cells < 0.2 mm in size found in sentinel-node biopsy sample

Note: RT-PCR = reverse transcriptase–polymerase chain reaction.

Box 2: Case report with examples of staging

A 55-year-old woman finds a 2.5-cm lump in the upper outer quadrant of her right breast. Mammography reveals a spiculated density. Findings from a physical examination and chest radiography are normal. She undergoes a lumpectomy and lymph-node biopsy.

The type of nodes dissected can affect cancer staging; for example:

Sentinel-node dissection

- The pathology specimen confirms a 1.3-cm adenocarcinoma
- Isolated tumour cells are identified only by immunohistochemistry
- Subsequent staging investigations are normal

Her stage: cT2N0M0 pT1pN0(i+)(sn)M0

Axillary-node dissection

Of 18 nodes examined, 5 contain metastases > 2 mm in diameter.

Her stage: cT2N0M0 pT1pN2aM0

DOI:10.1503/cmaj.045113

Table 1: Summary of changes to TNM classifications for some major cancer sites

Tumour site	Topic	Change
Breast	Regional nodes	cN and pN redefined
Colorectal	Subdivision of stage III	Stages IIIa, IIIb, IIIc defined
Prostate	Histology	Gleason score used to define grade
	Subdivision of T2	T2a, T2b and T2c defined
Pancreas	Identification of potentially resectable disease	T3, T4 and stage groupings defined

Note: TNM = the tumour, node, metastases staging system.

as a conduit for proposals for changes to the TNM classification. Any such proposals for change or comments about the changes in the sixth edition can be directed to the Committee on Cancer Staging, National Cancer Institute of Canada, 10 Alcorn Ave., Ste. 200, Toronto ON M4V 3B1.

Competing interests: None declared.

James Brierley
Department of Radiation Oncology
Princess Margaret Hospital
Department of Radiation Oncology
University of Toronto
for the National Cancer Institute of Canada Committee on Cancer Staging
Toronto, Ont.

REFERENCES

1. Sobin LH. TNM, sixth edition: new developments in general concepts and rules. *Semin Surg Oncol* 2003;21:19-22.
2. Greene FL, Brierley J, O'Sullivan B, Sobin LH, Wittekind C; International Union Against Cancer and American Joint Committee on Cancer. On the use of X in the TNM classification. *Cancer* 2005;103:647-9.
3. Gospodarowicz MK, Miller D, Groome PA, et al. The process for continuous improvement of the TNM classification. *Cancer* 2004;100:1-5.

Prevalence of class I, II and III obesity in Canada

Obesity places a substantial burden on public health in Canada, and people with more extreme levels of obesity are at substantially increased risk of premature death. In 2003, Health Canada issued updated guidelines for body weight classification in adults (available at www.hc-sc.gc.ca/fn-an/nutrition/weights-poids/guide-ld-adult/index_e.html). Within this framework, adults are considered overweight if their body mass index (BMI, kg/m^2) is 25 or greater, and obese if their BMI is 30 or greater. Obesity is further separated into 3 classes according to the increased health risks associated with increasing BMI levels: class I (BMI 30–34.9), class II (BMI 35–39.9) and class III (BMI ≥ 40). The obesity class guides treatment options: therapeutic lifestyle changes (e.g., increases in physical activity and reductions in dietary intake) should be considered for all obese people, whereas the use of more aggressive approaches to weight loss (e.g., pharmacotherapy or bariatric surgery) are generally reserved for people with more extreme obesity (class II or III) and those with additional risk factors.

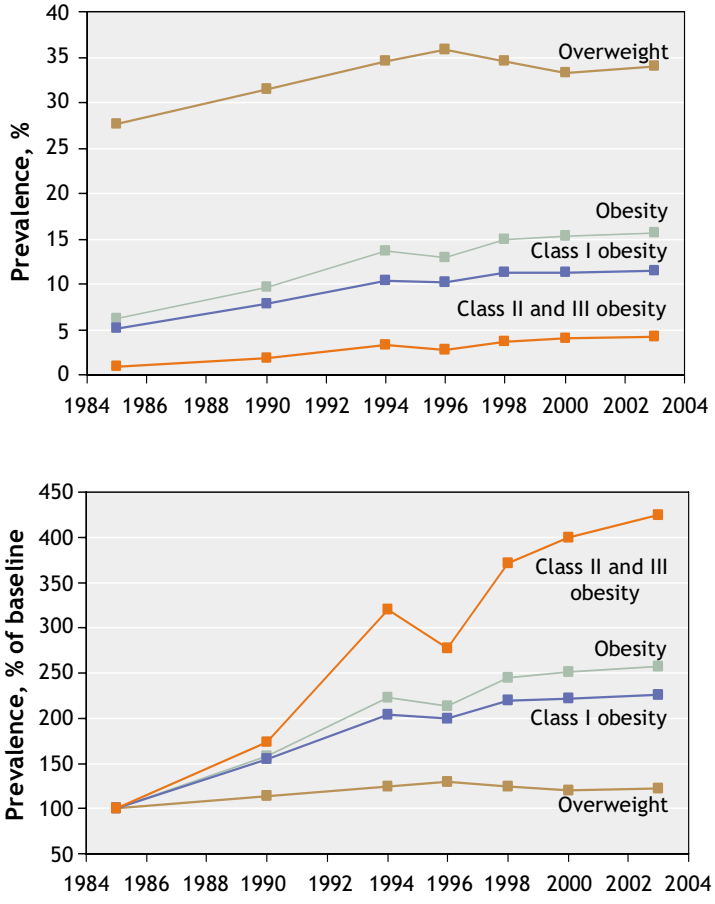

Fig. 1: Prevalence of overweight and obesity (classes I–III) in Canada, 1985–2003. Top: Changes in absolute prevalence. Bottom: Changes relative to baseline (1985 = 100%).

DOI:10.1503/cmaj.050806