Introduction.
The dissection process is similar to those of rectal cancer specimens with the emphasis being on photographs of the front and back of the removed tissue, cross sectional slices with an assessment of the mesocolon and careful sampling preferably large blocks where possible.

Grading of the quality of the surgical specimen by the plane of surgery should be performed. Histological assessment of the retroperitoneal surgical margin with involvement being defined as tumour within 1 mm of the inked margin and also measurement of the distance of extramural spread of tumour should be performed. Peritoneal involvement, extramural vascular invasion and as many node as possible should be retrieved. Undertaking a skilled assessment of the specimens is essential as it will be repaid by better patient outcome.

Specimen receipt and dissection.
If it can be received fresh and photographed then this is optimal otherwise it may be received fixed but unopened and without any interference from the surgeons.

The front and back should be digitally photographed and the retroperitoneal margin (where it exists – right colon ) painted with ink so that it can be histologically identified. The high vascular ties can also be marked with a little ink to facilitate later dissection/measurement.

The specimen may then be opened but do not open the area of the tumour where there is the highest risk of peritoneal invasion. This should be left intact to allow not only assessment of the local tumour invasion but the intactness of the mesocolon.
After 48 hours fixation the specimen should be dissected. The measurements should include all of those on the proforma. Sampling of longitudinal margins is only necessary if tumour extends to within 30 mm of the margin or the tumour has a linitis plastica appearance. Any peritoneal nodules away from the tumour should be sampled. The distance from the tumour to the nearest high vascular tie should be recorded.

Figure showing digital photographs of a right hemicolecctomy. The fresh specimen is easier to interpret than the opened fixed specimen. The cross sectional slices are laid out and photographed and then dissected.

The tumour and the area 2cm above and below it should be thinly sliced including the mesentery. The slices should be laid out in order starting with the most proximal slice at the top left of the photo and the most distal at the bottom right of the photograph. Extra photographs of those considered key should be taken e.g. extensive spread, peritoneal involvement, visible extra mural vascular invasion as this will allow comparison to MRI.

The tumour should be sampled with a minimum of 5 standard blocks but it is preferable to whole mount the key slices preferably up to 6. Again this facilitates comparison with MRI and pathological assessment. Please ensure there is an adequate assessment of the peritoneal surface where tumour approaches it. Tumour must be seen to penetrate the serosal surface for peritoneal involvement to be considered positive.
Figure  Standard blocks taken from the cross sectional slices sampling depth of tumour invasion, peritoneal involvement and mesocolic nodes. Dissection should also take place in the other parts of the colon. This can be by further cross sectional slicing.
Figure showing a large block approach as well as small blocks for lymph nodes. This will provide further evidence for the intactness of the planes of surgery.

It is possible to see extramural vascular invasion so sample areas that look suspicious. These are linear or serpiginous strand of tumour tissue and are especially easy to see where they exit the muscularis propria in the vascular bundles.

TNM version 5 should be used because of the difficulties of the newer definitions of nodal and venous invasion which are not reproducible. Areas of tumour greater than 3 mm should be considered as involved lymph nodes. The number of lymph nodes found and the number involved must be recorded. High tie lymph nodes should be identified separately to allow the assessment of Dukes stage as well as TNM.
Retroperitoneal surgical margin in right colon

The size of this area varies between individuals and has an irregular shape, usually that of a diamond or even a triangle. It can be quite extensive. It is created during surgery and it should be smooth as it arises through dissection of a fascial plane. Frequently it is irregular and may extend down onto the muscularis propria.

![Right hemicolectomy](image)

**Figure** Right hemicolectomy showing the retroperitoneal surgical circumferential marging. Top fixed and unmarked, second outlined and third fully inked. The cross sectional slivces are shown as is the slice with the greatest extent of tumour.

Judgement of the plane of dissection in colon cancer

As can be seen on the figure the colon has a mesocolon which is similar to the mesorectum but has different shape and is usually bounded by peritoneum except in the right colon where there is a retroperitoneal surgical margin. There are two important features to assess. Firstly the intactness of it. Has the dissection left the mesocolon intact if so it is a mesocolic excision, if the mesocolon is irregular but the incisions do not reach down to the muscularis propria then it is called an intramesocolic dissection. If the surgical planes disrupt the mesocolon so much that they extend down onto the muscularis propria then this is a muscularis propria plane. The second decision is the extent of the central dissection is it possible to see the arteries, veins and nodes that were close to the aortic dissection. In other words is this a high tie. Such cases can be identified as they will have a greater distance between the tumour and the nearest high vascular tie but they also look different. Many surgeons do not remove the whole of the mesentery and this may leave occult metastases behind.
Mesocolic plane with high ties
Smooth serosal/mesocolic mesentery only very minor defects. Mesentery is intact and lymph nodes and their drainage not violated.
There is full representation of the vascular supply with the appearance that the surgeon has dissected the vessels and cut them close to the aorta/cava or their origin.

P.O.Nyström

Figures showing high tie mesocolic resections from different sites. These resections contain more mesentery, lymph nodes and vasculature. Top picture from an operative specimen from PO Nyström. Below performed by Professors Hohenberger and Heald.
Mesocolic plane
Smooth serosal/mesocolic mesentery only very minor defects. Mesentery is intact and lymph nodes and their drainage not violated.

Cross sectional slices showing an intact mesocolon but the vascular supply has not been removed at the aorta/vena cava.
**Intramesocolic plane**
Into mesocolon but not down onto the muscularis propria. The lymphatic and vascular drainage may be compromised.

**Figure showing an intramesocolic resection. The mesocolon is irregular but does not extend down onto the muscularis propria**

**Muscularis propria plane**
Major defects in mesocolon and down onto muscularis propria with major disruption of the mesocolon.
Figures showing disrupted mesocolon with areas of muscularis propria/tumour exposed.

Lymph node dissection

The high tie lymph node should be separately identified. As many as possible should be identified and sampled. A running mean of 12 is the minimum acceptable but it is possible to achieve running means of 15 or even 18 with careful dissection.
Vascular invasion

Careful assessment of the cross sectional slices is required to look for vascular invasion which can be seen macroscopically as serpiginous streaks of tumour extending out from the muscularis propria. These should be sampled.

Peritoneal involvement

Careful sampling is required when the tumour impinges on the peritoneum. Tumour needs to penetrate the serosal surface and be seen on the surface to call it peritoneal invasion.