Supplementary material: General contouring instructions

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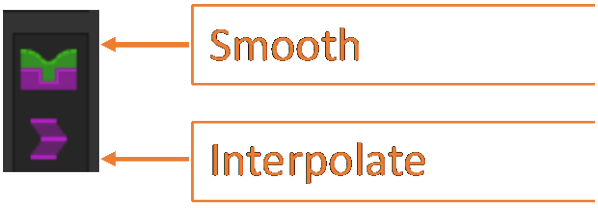
General contouring instructions

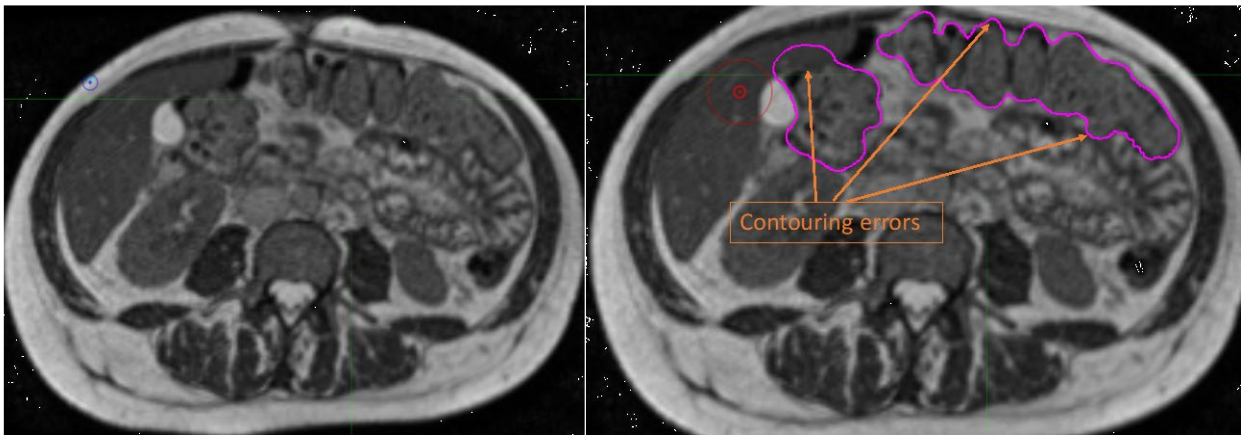
Please contour with the 2D Brush tool on every other slice to ensure accuracy. If the bowel is surrounded by bright fat, you can use the Dynamic Brush to help contour. However, do not use when the bowel is touching other structures, when there is significant heterogeneity within the bowel, or when there is significant artifact, as the Dynamic Brush will not be accurate. Before interpolating, use the smooth function. Please do not use the copilot tool unless you are certain the contours are accurate. The shovel icon is used to fill holes and could be useful for speeding up the contouring.

I find it easiest to contour the stomach, then the large intestine, then the small intestines starting with the duodenum. Contour the large intestines before the small intestines because the large intestine usually has a regular rectangular path. Once it is contoured, it can be excluded from your small bowel contour.

Please contour down to 1-2 slices above the level where the MRI dark band artifact starts to appear. Stop contours for all organs on the same slice.

For cases with multiple fractions, we can try copying over contours from previous fractions. However the OARs will have to be carefully checked and edited on every slice.





Please use the assigned contour names for consistency. Most of the cases will have the label pre-loaded but some do not have the labels. Please use the labels spelled exactly as below, using the same capitalization.

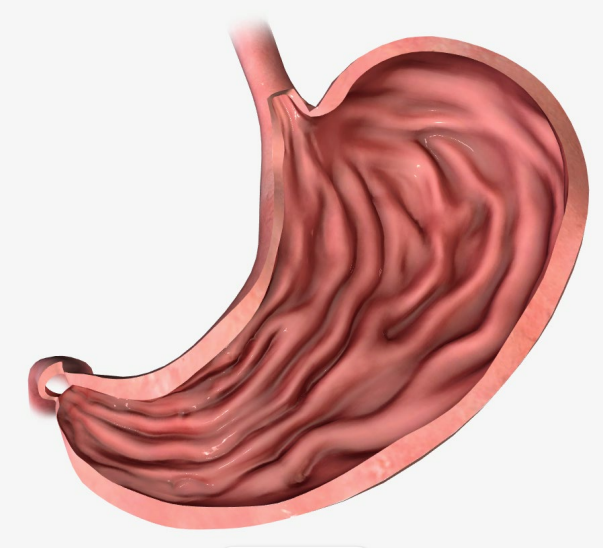
Most of the cases will have the ROIs already saved in each session. If they are not there, please follow these instructions:

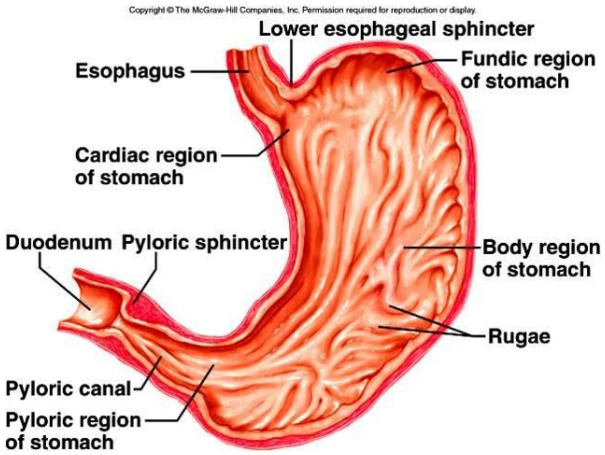
- Download the file “roi_template_py.research.xml” from the shared folder and save locally
- In MIM, click "Settings" then "Import Manager..."
- In the top right corner, click the middle "Open File" icon. Navigate to the file and select it.
- On the left side of the Import Manager, select all files (ctrl+click or shift+click if needed).
- Underneath that, click "Import Selected."
- In the bottom right corner, hit "Apply" to accept the import, then "OK" to close the Import Manager.
- If not already imported, these ROIs will have to be imported to the image of each fraction.

Label
Stomach
Small Bowel
Large Bowel
Pyloric Sphincter
Ampulla of Vater

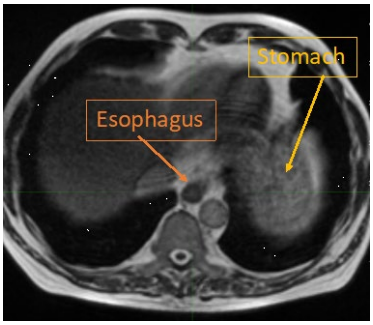
Please note, the colonic flexure annotations have been removed to improve consistency.

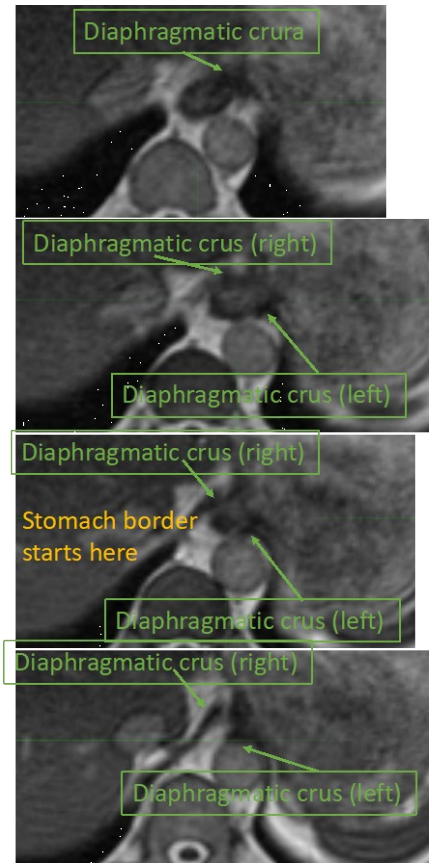
Stomach (S)





The stomach starts at the gastro-esophageal junction (GEJ). For the purposes of ensuring consistency, we will define the border of the stomach as the point where **the left and right diaphragmatic crura form a 180-degree cut through the GEJ.**

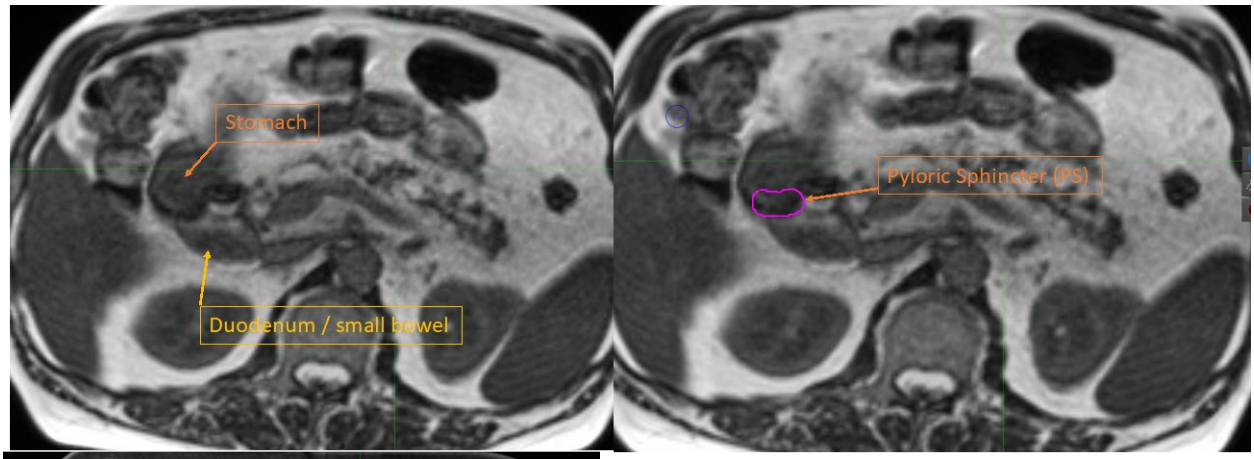


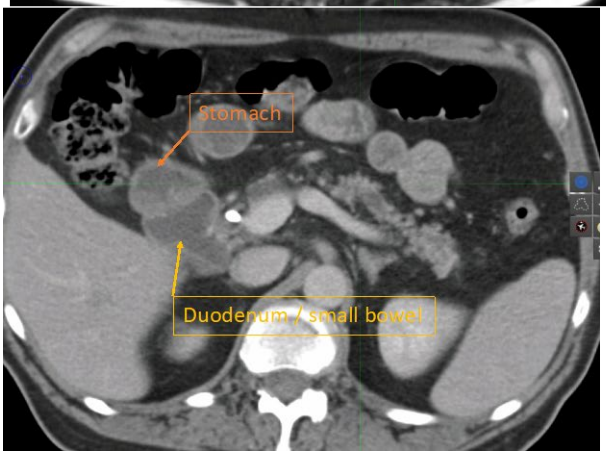


The stomach can have a few folds depending on the degree of stomach filling. The pyloric sphincter is the valve that separates the stomach from the small bowel. It has a thicker wall than the duodenum, the first part of the small bowel. The distal end of the stomach has a thick wall that distinguishes it from the duodenum. On MRI the stomach wall appears in dark black. The location of the pyloric sphincter can be checked on the CT by checking the thickness of the stomach compared to the duodenum.

Using a 1cm diameter brush, contour the pyloric sphincter (PS) on **the side of the stomach**.

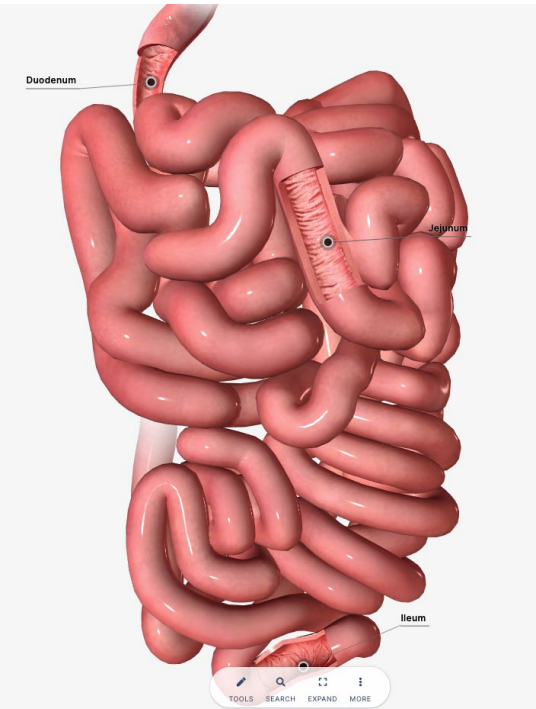
Laurence will contour the pyloric sphincter on the first fraction of all patients in a series. Please use this as a guide for your stomach/small intestine border and for subsequent fractions.

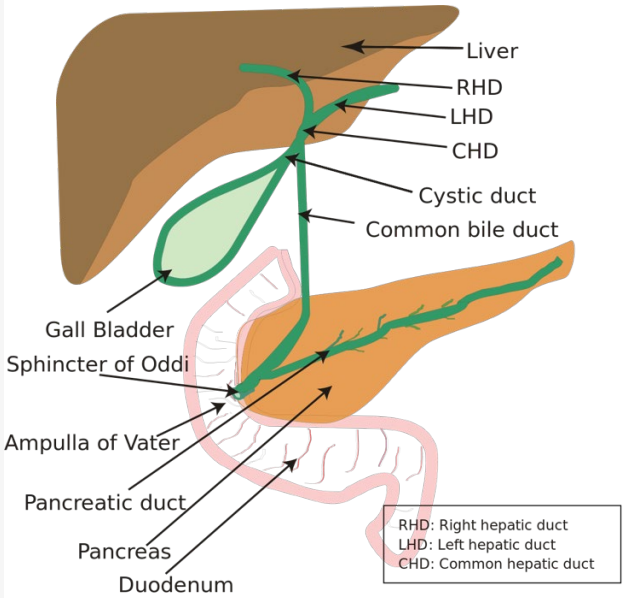




Here is a 3D model of the stomach for your reference:
https://human.biodigital.com/view?id=production%2FmaleAdult%2Fstomach_cross_section_v02&lang=en

Small bowel (SB)



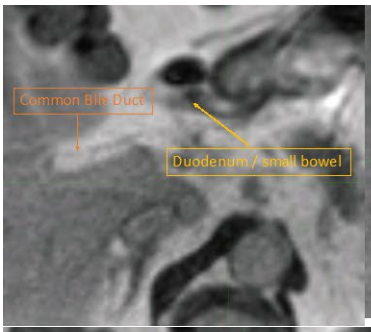


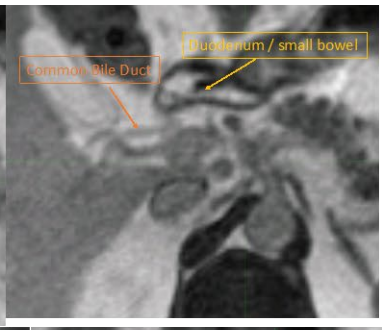
For this project, we will contour the whole small bowel including the duodenum, jejunum and ileum as one structure. The small bowel starts after the pyloric sphincter, wraps around the pancreas, then has several folds before connecting with the large bowel at the ileal cecal valve. The diameter of the small bowel is smaller (around 3 cm max) compared to the large bowel (6-9 max). The small bowel has a smooth outer wall compared to the large bowel which has outpouching called haustra.

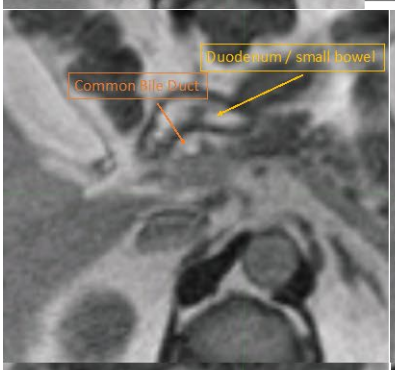
The liver secretes bile into the small bowel through the common bile duct. This connects with the pancreatic duct and then enters the small bowel via the Ampulla of Vater (AV). This usually appears as a small white signal on MRI and a dark grey on CT. In patients with a biliary stent, the CBD will appear as a black signal on MRI and white on CT.

Using a 1cm diameter brush, contour the Ampulla of Vater (AV) on the side of the small bowel. It is usually on 1 or 2 slices close to where the CBD is last seen in the pancreas.

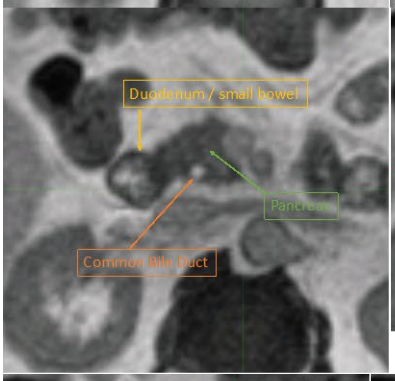
Laurence will contour the ampulla of Vater on the first fraction of all patients in a series. Please use this as a guide for subsequent fractions.

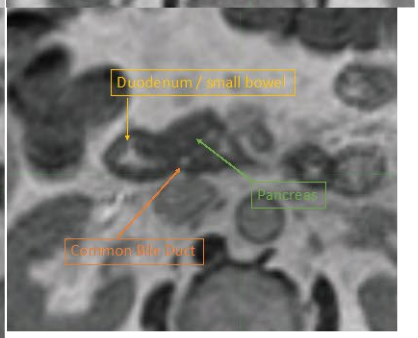

Common Bile Duct
Duodenum / small bowel

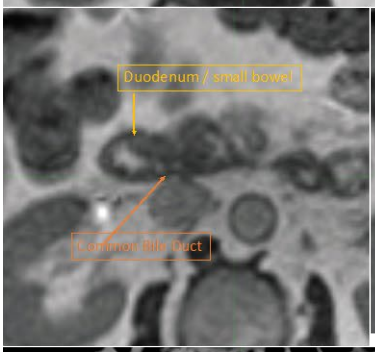

Common Bile Duct
Duodenum / small bowel

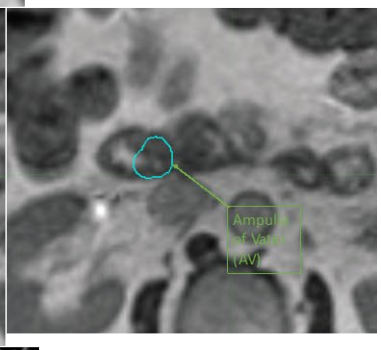

Duodenum / small bowel
Common Bile Duct

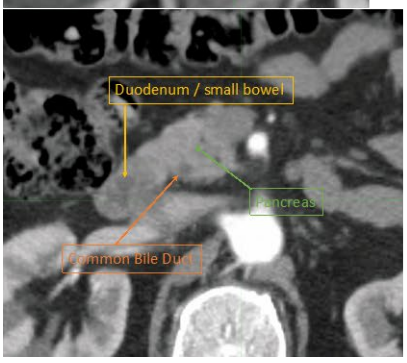
Duodenum / small bowel
Pancreas
Common Bile Duct


Duodenum / small bowel
Pancreas
Common Bile Duct


Duodenum / small bowel
Pancreas
Common Bile Duct

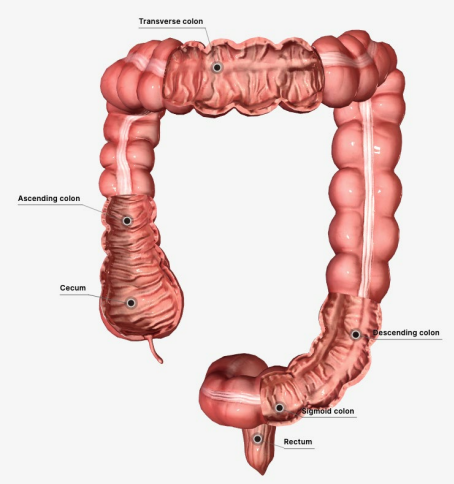

Duodenum / small bowel
Common Bile Duct

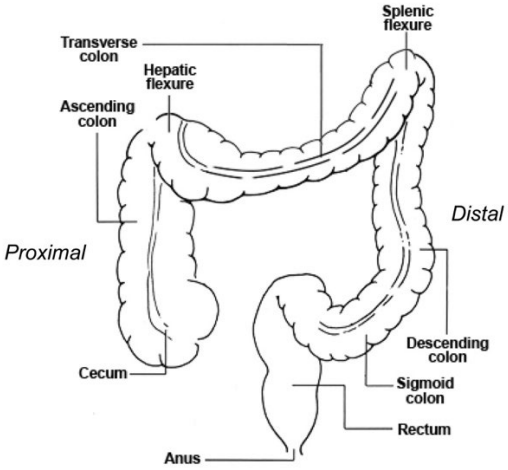

Ampulla of Vater (AV)


Duodenum / small bowel
Pancreas
Common Bile Duct

Here is a 3D model of the small bowel for your reference:
https://human.biodigital.com/view?id=production%2FmaleAdult%2Fsmall_intestine_cross_section&lang=en

Large bowel (LB)





The large bowel starts in the right lower quadrant of the abdomen with the ileal-cecal valve, goes up the ascending colon in the right abdomen, turns left at the hepatic flexure, goes across the transverse colon toward the left, turns down at the splenic flexure, does down the descending colon, and then turns inferiorly and medially to the pelvis through the sigmoid colon, and then goes inferiorly through the rectum and anus.

Here is a 3D model of the large bowel for your reference:
https://human.biodigital.com/view?id=production%2FmaleAdult%2Flarge_intestine_cross_section&lang=en