The abdominal viscera are innervated, as all viscera are, by the autonomic nervous system. The parasympathetic innervation is delivered by the vagus primarily, with help from the pelvic splanchnic nerves. The sympathetic innervation comes primarily from the thoracic splanchnic nerves, greater, lesser, and least, with help from the upper lumbar splanchnic nerves.

Generally, parasympathetic innervation results in digestion, by stimulating peristalsis in the gut and secretion by associated glands. Sympathetic innervation, on the other hand, decreases blood flow to the abdominal viscera and inhibits digestion. Blood flow is diverted to the trunk and limbs, to aid the body in "flight or flight".
Sympathetic splanchnic nerves are anteriorly directed branches from the sympathetic trunk. *Greater thoracic splanchnic nerve* arises via branches from sympathetic ganglia from T5-T9. *Lesser thoracic splanchnic nerve* arises via branches from T10 & T11. *Least thoracic splanchnic nerve* arises from T12. The thoracic splanchnic nerves pass through the crura of the diaphragm (attachments to the lumbar vertebrae).
The sympathetic trunks pass under the medial arcuate ligaments of the diaphragm, on top of the psoas major muscles, to enter the abdomen. As they descend within the abdomen, they give off the lumbar splanchnic nerves anteriorly. **Lumbar splanchnic nerves** arise from ganglia at L1 to L4 level (the L5 ganglion is usually missing).

The thoracic and lumbar splanchnic nerves pass into **preaortic ganglia**, so named because they lie primarily on the abdominal aorta. There, these presynaptic fibers synapse, and postsynaptic fibers pass into **perivascular plexuses**, or autonomic plexuses associated with the arteries supplying abdominal viscera.
Parasympathetic innervation of the neck, thorax, and abdomen (down to the splenic flexure) is provided by the vagus nerve, CN X. During development, the rotation of the foregut structures results in the right vagus nerve becoming the posterior vagal trunk and the left vagus nerve becoming the anterior vagal trunk.

The hindgut, which comprises the colon from the distal third of the transverse colon to the anal canal, is innervated by the pelvic splanchnic nerves. These are parasympathetic fibers arising from the spinal cord at S2-4 levels.
The anterior vagal trunk, formed primarily from fibers of the left vagus nerve in the esophageal plexus, passes through the esophageal hiatus of the diaphragm to supply the anterior surface of the stomach. It also sends a hepatic branch, which travels within the lesser omentum to reach the liver.
The posterior vagal trunk is formed primarily by fibers of the right vagus nerve from the esophageal plexus. It passes through the esophageal hiatus to enter the abdomen, where it innervates the posterior surface of the stomach and sends an important branch to the celiac ganglia and plexus.

Presynaptic parasympathetic fibers generally synapse in the wall of the organ that they innervate. Many small, diffuse postsynaptic neurons within the organ walls then innervate smooth muscle, usually to cause peristalsis, and glandular cells, to cause them to secrete their products (secretomotor).

NOTE: The celiac branch delivers presynaptic parasympathetic for the GI tract between the stomach and splenic flexure of the colon. However, the celiac branch DOES NOT SYNAPSE in the celiac ganglion. These parasympathetic fibers will traverse the perivascular plexuses to reach organ walls before synapsing there, as is typical of parasympathetic fibers.
The pelvic splanchnic nerves are the only splanchnic nerves that are parasympathetic. They are preganglionic parasympathetic fibers that arise from the lateral horn of the spinal cord at the S2, S3, & S4 levels. They pass from the ventral primary rami of S2, S3, and S4 into the inferior hypogastic plexus, located laterally on the rectum. From there, some fibers pass upward over the left pelvic brim, through the fusion fascia on the posterior abdominal wall, to reach the distal third of the transverse colon, descending colon, and sigmoid colon. These presynaptic fibers synapse in the colon wall on postsynaptic neurons that innervate the gut smooth muscle to cause peristalsis in the hindgut.
The autonomic plexuses of the abdomen are a collection of parasympathetic and sympathetic nerve fibers that coalesce to innervate the viscera of the abdomen.

The major autonomic plexuses of the abdomen are the celiac, superior mesenteric, intermesenteric, inferior mesenteric, and superior hypogastric plexuses. The renal plexus lies along the renal vessels.

The named prevertebral or preaortic ganglia in the abdomen are the paired celiac, the superior mesenteric, paired aorticorenal, and the inferior mesenteric. These ganglia are all sympathetic, of course, since all parasympathetic fibers (below the head, that is) synapse in the wall of the target organ.
The greater thoracic splanchnic nerves synapse primarily in the celiac and superior mesenteric ganglia, but some presynaptic fibers pass directly into the suprarenal medulla, to synapse there.

Parasympathetic fibers from the celiac branch of vagus also pass through these ganglia and the celiac and superior mesenteric plexi, to reach the organ wall to synapse. It is important to understand that these preaortic ganglia are sympathetic ganglia, so no parasympathetics would synapse there. Parasympathetic fibers synapse within the walls of the organ being innervated (with some exceptions in the head).
The celiac plexus is a perivascular nerve plexus that lies along the celiac trunk and its branches. The paired celiac ganglia, which lie on the abdominal aorta beside the origin of the celiac trunk, receive presynaptic sympathetic fibers from the greater thoracic splanchnic nerves and perhaps the first lumbar splanchnic nerves. Most fibers synapse here and the postsynaptic fibers flow out along the celiac trunk and branches.

The celiac ganglia also receive presynaptic parasympathetic fibers from the celiac branch of the posterior vagal trunk. These fibers will NOT synapse in the celiac ganglia, which are sympathetic ganglia. These parasympathetic fibers merely pass through the celiac ganglia and plexus to reach the organ walls, where they synapse.

Some fibers from the celiac ganglia, both sympathetic and parasympathetic, pass down on the surface of the aorta to reach the adjacent superior mesenteric ganglion and plexus.
The lesser thoracic splanchnic nerves pass to the aorticorenal ganglia, located at the branching of the renal arteries from the abdominal aorta. Postsynaptic fibers pass laterally to form the renal plexus along the renal vessels, and also inferiorly, to enter the intermesenteric plexus lying on the aorta between the superior and inferior mesenteric arteries.

The least thoracic splanchnic nerve does not pass to an identifiable ganglion, but rather enters the renal plexus and synapses on diffuse ganglion cells there.

Parasympathetic fibers also enter the renal plexus after passing down through the celiac ganglia.
The superior mesenteric ganglion is located along the abdominal aorta at the root of the superior mesenteric artery. It receives presynaptic sympathetic AND parasympathetic fibers from the celiac ganglia. The sympathetic fibers are some presynaptic fibers from the greater thoracic splanchnic nerves, and they synapse in the superior mesenteric ganglion. The parasympathetic fibers are from the celiac branch of the posterior vagal trunk, and they pass through the ganglion without synapsing. The postsynaptic sympathetic fibers and presynaptic parasympathetic fibers constitute the superior mesenteric plexus, a perivascular plexus extending along the branches of the superior mesenteric artery.
The intermesenteric plexus lies along the abdominal aorta between the superior and inferior mesenteric arteries. It is primarily formed by the upper lumbar splanchnic nerves (L1 and L2), but also receives fibers from the aortorenal and superior mesenteric ganglia. However, it is important to note that it does not contain any vagal parasympathetic fibers - vagal fibers do not descend, on the surface of the aorta, below the superior mesenteric and renal plexuses. That is why the hindgut, supplied with blood by the inferior mesenteric artery, is also supplied with parasympathetic nerves via the pelvic splanchnic nerves.
The inferior mesenteric plexus extends along the inferior mesenteric artery. It contains sympathetic fibers only. An inferior mesenteric ganglion is not often seen, and instead preganglionic sympathetic fibers from the intermesenteric plexus synapse on diffuse ganglion cells near the origin of the inferior mesenteric artery, and postsynaptic fibers follow the artery and its branches. No parasympathetic fibers are found in this plexus. Parasympathetics from the pelvic splanchnic nerves innervate the colon from the splenic flexure to the anal canal. These fibers travel through the fusion fascia on the left side of the posterior abdominal wall to reach the colon walls, synapsing there.
The superior hypogastric plexus lies on the abdominal aorta below the inferior mesenteric artery, and passes over the common iliac arteries to enter the pelvis. It is continuous above with the intermesenteric plexus, and it receives the lower lumbar splanchnic nerves (L3 and L4). It contains preganglionic and postganglionic sympathetic fibers, but no parasympathetics. After passing over the common iliac arteries and into the pelvis, the superior hypogastric plexus aggregates into two bundles, the right and left hypogastric nerves, that continue inferiorly to form the inferior hypogastric plexus.
Summary
Sympathetic supply (vasoconstriction and inhibition of peristalsis):

- greater thoracic splanchnic n. (T5-9) - synapses in celiac and superior mesenteric ganglia, some presynaptic fibers reach suprarenal medulla; postsynaptic fibers supply caudal foregut and midgut
- lesser thoracic splanchnic n. (T10-11) - synapses in aorticorenal ganglion; postsynaptic fibers pass primarily into renal plexus
- least thoracic splanchnic n. (T12) - passes into renal plexus
- lumbar splanchnic nn. - L1-2 pass into intermesenteric plexus primarily, synapsing in inferior mesenteric ganglion and supplying hindgut; L3-4 pass into superior hypogastric plexus and into pelvis
- gray rami communicantes - L1-5 pass into lumbar ventral primary rami to innervate vascular smooth muscle, arrector pili muscles, and sweat glands in portions of the body wall and lower limb supplied by L1-5

Parasympathetic supply (stimulates peristalsis and secretomotor to glands):

- anterior vagal trunk - gastric and hepatic branches; supplies stomach and liver/gall bladder
- posterior vagal trunk -
gastric and celiac
branches; supplies
stomach and
remainder of caudal
foregut and midgut
(distribution of
superior mesenteric
a.)
- pelvic splanchnic nn. -
send branches
through fusion fascia
to reach hindgut (from
distal one-third of
transverse colon to
anal canal)