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### The Anal Canal.

**Anal canal**, the terminal portion of the digestive tract, distinguished from the rectum because of the transition of its internal surface from a mucous membrane layer (endodermal) to one of skinlike tissue (ectodermal). The anal canal is 2.5 to 4 cm (1 to 1.5 inches) in length; its diameter is narrower than that of the rectum to which it connects. The canal is divided into three areas: the upper part, with longitudinal folds called rectal columns; the lower portion, with internal and external constrictive muscles (sphincters) to control evacuation of feces; and the anal opening itself.

The anal canal connects with the rectum at the point where it passes through a muscular pelvic diaphragm. The upper region has 5 to 10 rectal columns, each column containing a small artery and vein. These are the terminal portions of the blood vessels that furnish the rectal and anal areas; they are susceptible to enlargement, commonly known as hemorrhoids. The mucous membrane of the

upper portion is similar to that in the rest of the large intestine; it contains mucus-producing and absorptive cells.

The lower portions of the anal columns are joined by small concentric circular folds of the mucous membrane known as anal valves. Between the valves are small anal sinuses that open to lymph ducts and glands; these sometimes become abscessed and infected, especially in persons who have chronic diarrhea, constipation, or diabetes mellitus. The internal wall of the anal canal is first lined by moist, soft skin that lacks hair or glands; it then becomes a tough (keratinized) layer of skin containing hair and glands. The keratinized layer is continuous with the skin of the anal opening and external body. Both the upper and lower portions of the anal canal have circular and longitudinal muscle layers that allow expansion and contraction of the canal. The anal opening is keratinized skin that has several folds while contracted. When open, the folds allow the skin to stretch without tearing. In the skin around the anal opening but not immediately adjacent to it are glands that give off perspiration. The lower anal canal and the anal opening are composed of two muscular constrictions that regulate fecal passage. The internal sphincter is part of the inner surface of the canal; it is composed of concentric layers of circular muscle tissue and is not under voluntary control. The external sphincter is a layer of voluntary (striated) muscle encircling the outside wall of the anal canal and anal opening. One can cause it to expand and contract at will, except during the early years of life when it is not yet fully developed. Nerves in the anal

canal cause sphincter response and the sensation of pain. The lower part of the canal is very sensitive to heat, cold, cutting, and abrasion.

Waste products pass to the anal canal from the rectum. Nerve responses from the rectum cause the internal sphincter to relax while the external one contracts; shortly thereafter the external sphincter also relaxes and allows fecal discharge.

The pelvic diaphragm and longitudinal muscles draw the anus and rectum up over the passing feces so that they are not extruded (prolapsed) out of the anal opening with the feces. Numerous blood vessels surround the anal canal and may be subject to enlargement and rupture; this condition, commonly called a hemorrhoid, or pile, may cause pain, bleeding, and projection of the vessels from the anus.