Located in the medulla oblongata, the gracile nucleus is one of the dorsal column nuclei that participate in the sensation of fine touch and proprioception of the lower body (legs and trunk). It contains second-order neurons of the posterior column-medial lemniscus pathway, which receive inputs from sensory neurons of the dorsal root ganglia and send axons that synapse in the thalamus.

The neurons contained within the nucleus form a visible bump called the gracile tubercle on the posterior side of the closed medulla at the floor of the fourth ventricle.

The gracile nucleus and fasciculus carry epicritic, kinesthetic, and conscious proprioceptive information from the lower part of the body (below the level of T6 in the spinal cord). The counterpart to the gracile nucleus and fasciculus is the cuneate nucleus and fasciculus, which carries the same type of information, but from the upper body (above T6, excepting the face and ear - the information from the face and ear is carried by the principal sensory nucleus of trigeminal nerve).