Handout 5.1 (PATIENT VERSION)

The role of the autonomic nervous system (ANS) on peripheral targets, such as the digestive system

During times of stress, the body needs to maintain functions that are critical to survival, including providing oxygen to the brain and heart, and minimising those bodily functions not immediately critical to survival such as the digestion of food. Changes in bodily functions are primarily controlled by the autonomic nervous system (ANS), which has an extensive and important role in the control of body functions not under conscious control. The ANS can be divided into two primary (and apposing) systems (see Figure 5.1 for an overview of how the ANS acts on peripheral targets, such as the digestive system), the sympathetic nervous system (SNS) and the parasympathetic nervous system (PNS).

In a relaxed state, the PNS is in control and conserves energy by maintaining a basal level of activity – breathing (around 12 breaths per minute), heart rate (around 60–100 beats per minute), blood pressure around 120 (systolic pressure; blood vessel pressure during a heartbeat) over 80 (diastolic pressure; blood vessel pressure between beats). During this time, the digestion processes are active, including the production and release of saliva and digestive enzymes, the movement of food, update of nutrients, and removal of waste. During times of stress (and distress such as anxiety, depression), the control of and functions of the ANS are dominated by the SNS. An active SNS increases breathing (often in the form of shallow and rapid breathing) and heartrate.

In relation to the SNS and gastrointestinal tract, stress causes a *delay of gastric emptying and intestinal transit.*[1] SNS upregulation stimulates muscle tension around the body, facilitating the reduction of oxygen in the gastrointestinal tract. Due to these processes, patients often report gastrointestinal symptoms (e.g., 'butterflies in the tummy', indigestion, and/or nausea). Stress also *promotes the stimulation of the large bowel* in the form of increased colonic motor function,[1] commonly reflected in patients reporting stress associated with urgency and the need to defecate (and/or urinate).

The actions of the ANS are largely not under conscious/voluntary control; however, breathing can be controlled through conscious action. A key to promoting a relaxed body state and in turn normal gastrointestinal processes is activating the PNS through monitoring and engaging in slow-relaxed breathing (see Chapters 13 and 14, Handout 13.1).

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The autonomic nervous system

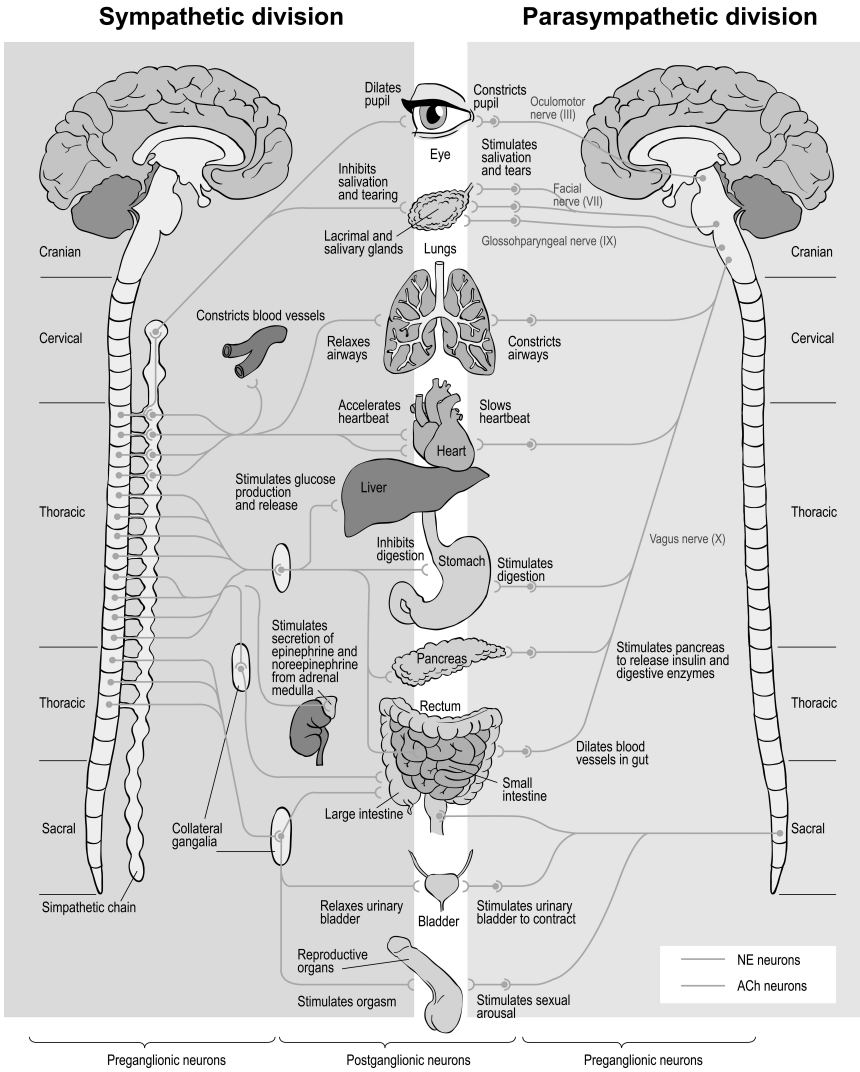


Figure 5.1 The ANS and its influence on peripheral bodily processes (*Source*: Vasilisa Tsoy/shutterstock.com).

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References for Handout 5.1

1. Bhatia V, Tandon RK. Stress and the gastrointestinal tract. J Gastroenterol Hepatol. 2005;20(3):332–9.

This handout was written by Dr Greg Sayuk based upon his chapter entitled "Stress and the brain-gut-axis across the spectrum of digestive disorders" (Chapter 5) from Knowles, S.R., Keefer, L., & Mikocka-Walus, A. (2019). Psychogastroenterology with Adults: A Handbook for Mental Health Professionals. Oxon, UK: Routledge Press.

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