KING'S College LONDON

INSTITUTE OF PSYCHIATRY,
PSYCHOLOGY & NEUROSCIENCE

Module:
Biological foundations of mental health

Week 1:
Introduction to brain anatomy

Dr John Pizzey

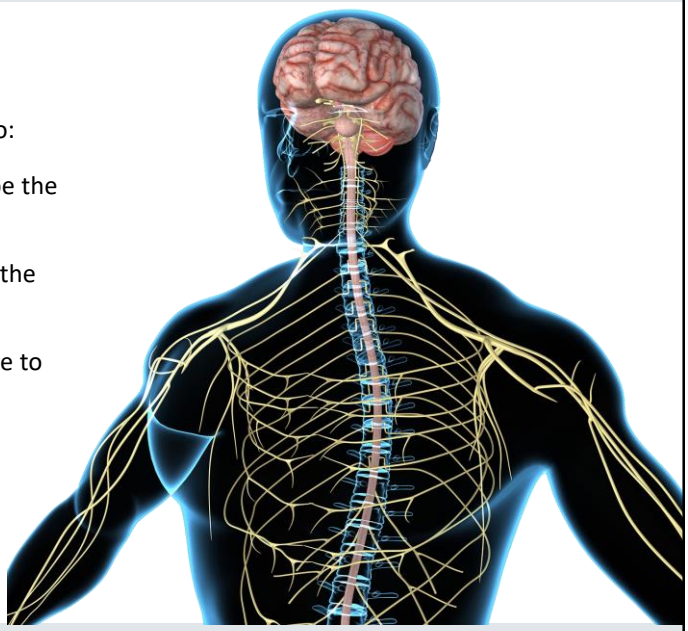
Topic 2
Neuroanatomy, neural systems and brain function

Part 1 of 3

Learning aims

By the end of the lecture, you should be able to:

1. Describe the main systems used to describe the organisation of the nervous system
2. Recognise the anatomical sub-divisions of the nervous system
3. Appreciate the mechanisms that contribute to the complex internal circuitry of the brain



Introduction

- We have approximately 100 billion neurons in our brains…. with about 100,000 trillion synapses
- This is only part of the story in why the nervous system has such massive computing potential…

The basis of neural networks

Convergence

When many pre-synaptic neurons converge on any single post-synaptic neuron

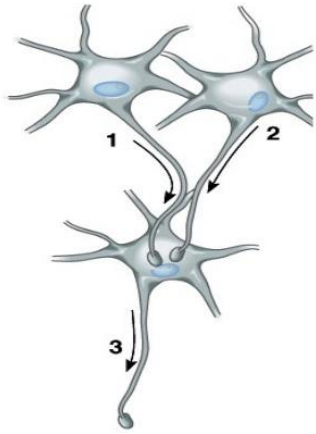


Figure 1: Convergence

Divergence

Axons of most pre-synaptic neurons divide into many branches that diverge to end on many post-synaptic neurons

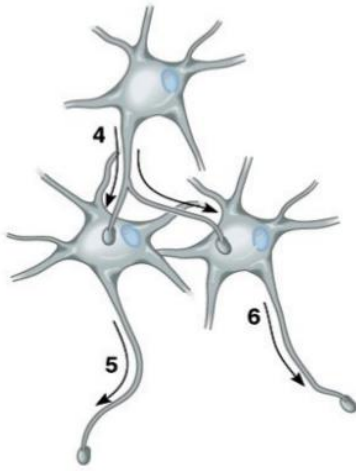
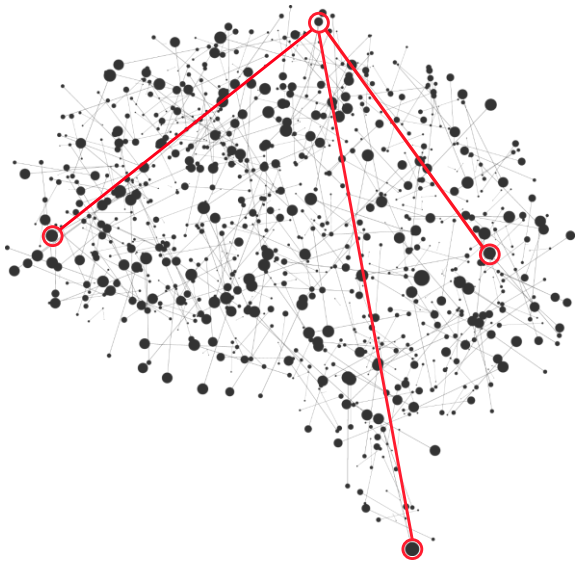


Figure 2: Divergence

- As a result of convergence and divergence there are multiple ways of getting from one cell to another.
- Different cells will be excited according to the route chosen
- Different neural consequences

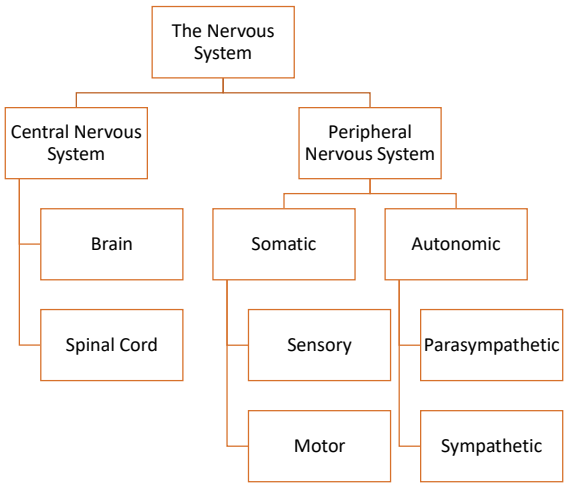


Multiple routes

How many different ways from Bayswater to Arsenal?

Functional divisions of the nervous system

General Organisation of the Nervous System



The autonomic nervous system

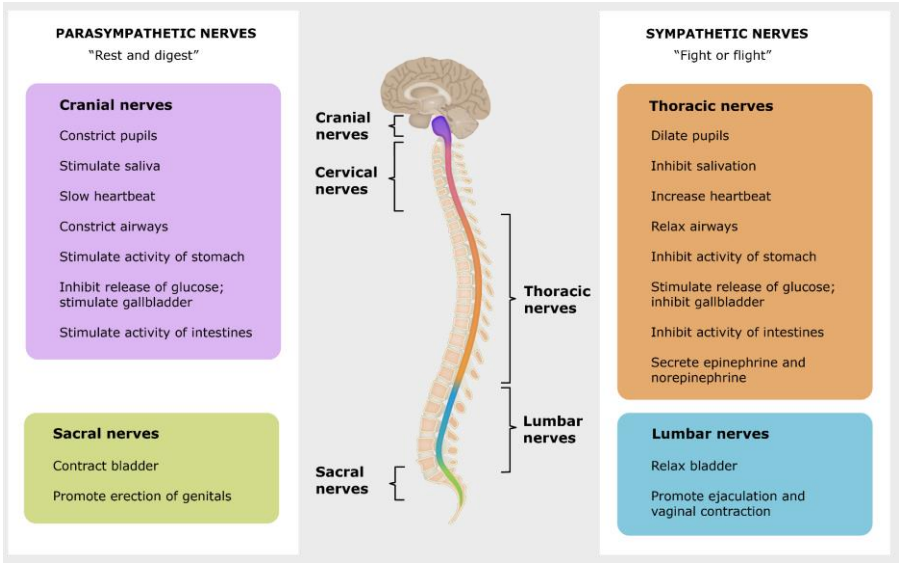


Figure 3: The autonomic nervous system

CNS or PNS?

Organisation of the Nervous System

A better definition would be:

If a neuron is entirely contained within the brain and/or spinal cord, it is a CNS neuron.

If any part of it (dendrites, axon or cell body) projects outside of these structures, it is a PNS neuron.

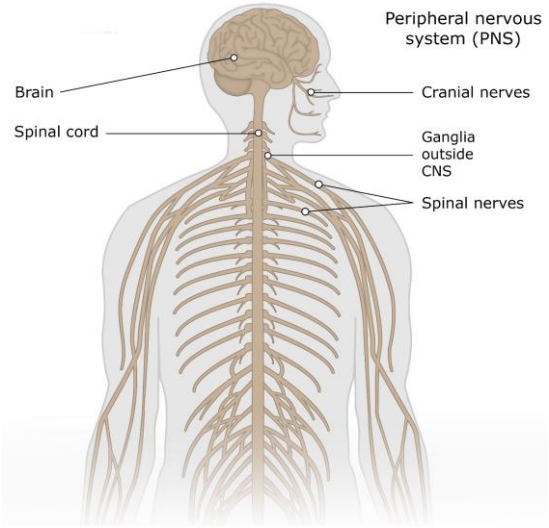


Figure 4: The Central Nervous System (CNS)