

24 - B. Cholinergic pathways

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© SPM Course 5. Major neurochemical pathways A. Dopaminergic pathways Depending on the length of the projections, dopaminergic pathways can be classified into

1. Long paths: Nigrostriatal, mesocortical and mesolimbic pathways.
2. Short paths: Tuberoinfundibular and incertohypothalamic pathway.
3. Ultrashort paths: These are found in the amacrine cells in the retina and in the olfactory system. The nigrostriatal pathway is the extrapyramidal pathway that is crucial for motor control; this accounts for most of the brain's dopamine.

Pathway Origin and destination Effect of dopamine (DA) blockade Nigrostriatal Substantia Nigra to striatum and amygdala via medial forebrain bundle DA deficiency (e.g Parkinson's) or blockade due to antipsychotics can cause extrapyramidal side effects Mesolimbic Ventral tegmental area (VTA) to Nucleus accumbens and hippocampus via medial forebrain bundle Blockade of DA in this tract produces the desirable antipsychotic effect by controlling positive psychotic symptoms Mesocortical Ventral tegmental area (VTA) to cingulate cortex and prefrontal regions via medial forebrain bundle Low levels of DA or DA blockade in this tract is associated with negative symptoms (alogia, anhedonia, amotivation and apathy) Tuberoinfundibular Hypothalamus to the pituitary via portal vessels

Dopamine acts as PIH – prolactin inhibitory hormone. DA blockade will serve to increase prolactin levels. Incertohypothalamic Internal connections within hypothalamus Disturbed thermoregulation and possibly weight gain

B. Cholinergic pathways The two major cholinergic pathways are

1. Brainstem pathway: This forms a part of the ARAS - ascending reticular activating system that is important to maintain wakefulness and REM sleep state. It originates from pedunculopontine and laterodorsal tegmental nuclei and innervates thalamic relay neurons and reticular nuclei.
2. Basal forebrain pathway: Originates at the Nucleus Basalis of Meynert in basal forebrain and projects to the hippocampus, frontal cortex and amygdala. Degeneration of this pathway is implicated in Alzheimer's disease.

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