Diencephalon

forebrain component

“‘tween brain”

mostly hidden by expansion of telencephalon

modest size

lies on either side of the third ventricle

extensive reciprocal connections with telencephalon

crucial involvement in sensory, motor, limbic and association functions

connections with brain stem and spinal cord

several major parts and a number of subdivisions
Diencephalon
four major parts
1)
2)
3)
4)

from figure 16-2
Diencephalon
epithalamus

two major structures
1)
2)
	pineal gland
unpaired structure on midline
seat of the soul!
pinealocytes secrete melatonin

melatonin actions

clinical usefulness of pineal
with calcium deposits
Diencephalon

- epithalamus
  - habenula

- dorsal thalamus
  - habenula

- basal ganglia
  - LIMBIC

- ventral thalamus

- hypothalamus

**dorsal thalamus**

- 4/5ths of the diencephalon
- profound partnership with cerebral cortex
- relays sensory information to sensory cortices
- links with motor, limbic and association areas in cerebral cortex
- conveys some outputs of cerebellum and basal ganglia to cerebral cortex
- cerebral cortex provides loads of input to thalamus

midbrain reticular formation

SNC AND VTA (DOPAMINE)

RAPHE SEROTONIN

EMOTION / REWARD

from figure 16-5
Diencephalon
dorsal thalamus

boundaries
  anterior -
  posterior -
  medial -
  lateral -

structure

internal medullary lamina
  divide dorsal thalamus into major regions
  1)
  2)
  3)

external medullary lamina

from figure 16-8
diencephalon

dorsal thalamus

structure

regions divided into multiple nuclei

looking down on dorsal thalamus

internal medullary lamina

third ventricle

DM dorsomedial nucleus

IL intralaminar nuclei

VPM ventral posteriomedial nucleus

P pulvinar

LGN medial geniculate nucleus

LGN lateral geniculate nucleus

VA ventral anterior nucleus

VL ventral lateral nucleus

VPL ventral posteriolateral nucleus

RN reticular nucleus of thalamus

nuclei within medullary lamina

A anterior nucleus
Diencephalon
dorsal thalamus
connections
general pattern

specific inputs

within each thalamic nucleus

output

thalamic projection neurons
thalamic interneurons

dorsal thalamic nuclei and cerebral cortex
cortex
“relay nuclei”

LGN

MGN
Diencephalon
dorsal thalamus
connections
dorsal thalamic nuclei and cerebral cortex cortex
“relay nuclei”
Diencephalon
dorsal thalamus
connections
dorsal thalamic nuclei and cerebral cortex cortex
“relay nuclei”

function:
Diencephalon

dorsal thalamus

connections

dorsal thalamic nuclei and cerebral cortex cortex

“association nuclei”

function:
Diencephalon
dorsal thalamus
cconnections
dorsal thalamic nuclei and cerebral cortex cortex
intralaminar nuclei
specific input: diffusely from basal ganglia and limbic structures
output: areas of cerebral cortex, limbic structures and basal ganglia

function:
Diencephalon
dorsal thalamus
connections
general pattern

specific inputs

regulatory inputs

output

note
corticothalamic
projections

thalamocortical
projections

reticular thalamic nucleus role

regular thalamic nucleus

internal capsule

cerbral cortex

function: