Thyroid Hormone, Brain Development and the Environment

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Congenital Hypothyroidism (CH)
If left untreated, causes cretinism

The “critical period” of thyroid hormone action in brain development was defined as that period after birth when TH therapy must be initiated to rescue the infant from cretinism.

Two forms of cretinism demonstrate that thyroid hormone exerts different effects at different developmental stages.

From François M. Delange, 2000
~3% of 4M children born in the USA are to women with low thyroid hormone.

Several investigators show that children of these women have lower average IQ and a higher incidence of neurological disorders.
HPT Axis

Regulation of Thyroid Status

Hypothalamus

TRH

Pit

TSH

Thyroid

T3/T4

Liver

UDP-Glucuronosyltransferases

Elimination from the body

Blood

T4 binding proteins

Target Tissues

TRα/TRβ

TRβ

Histopath

T4/TSH

T4 binding proteins

Regulation of Thyroid Status
Functional classes of thyroid toxicants

Chemicals that interfere with thyroid function.

Chemicals that interfere with thyroid hormone action
Polychlorinated Biphenyls

- PCBs are persistent environmental contaminants that are routinely found in human tissues.

- PCBs have been linked to serum thyroid hormones as well as to effects on TH signaling.