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

Neurological cretinism

Myxedematous cretinism
Conclusions
~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

TRβ

Histopath

Elimination from the body

UDP-Glucuronosyltransferases

Liver

Blood

Thyroid

T3/T4

T4/TSH

TRα/TRβ

Target Tissues

T4 binding proteins

T4 binding proteins

Histopath
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