

PERSISTENCE AND ACCUMULATION IN THE HUMAN BODY

Dietary exposure to dioxins, furans and dioxin-like PCBs does not end when a meal is over. Some of these contaminants are absorbed, distributed throughout the body and may remain there for years. Understanding their health significance therefore requires distinguishing the amount ingested today from the amount accumulated over time. This explains why scientific assessments place particular emphasis on long-term exposure and sensitive periods of development.

FROM FOOD TO THE BODY: ABSORPTION

Dioxins (PCDDs), furans (PCDFs) and dioxin-like PCBs are generally lipophilic substances: they have an affinity for fats and low water solubility. Following ingestion, absorption occurs mainly in the intestine and is influenced by the congener, the food matrix, the quantity and type of lipids present and individual physiological conditions. No single absorption percentage applies to all substances in the group.

Some of the absorbed dose reaches the bloodstream through lipid transport systems. From there, the compounds are distributed to different organs and tissues. The dietary dose is therefore not necessarily the same as the amount actually absorbed or the concentration ultimately found in a particular tissue.

THE ROLE OF ADIPOSE TISSUE AND THE LIVER

Affinity for lipids favours the presence of numerous congeners in adipose tissue. The liver also plays an important role in their distribution, binding to cellular components and, for certain molecules, metabolic transformation. The distribution between fat and liver is not identical for all congeners: chemical structure, degree of chlorination and affinity for specific proteins modify their behaviour.

Adipose tissue should not be regarded as a completely isolated store. Substances can move between body compartments and, when fat mass changes, measured concentrations in different compartments may also change. Rapid weight loss, however, is not a proven method for safely eliminating these contaminants: release from stores and elimination are different processes.

WHAT IS BIOLOGICAL HALF-LIFE?

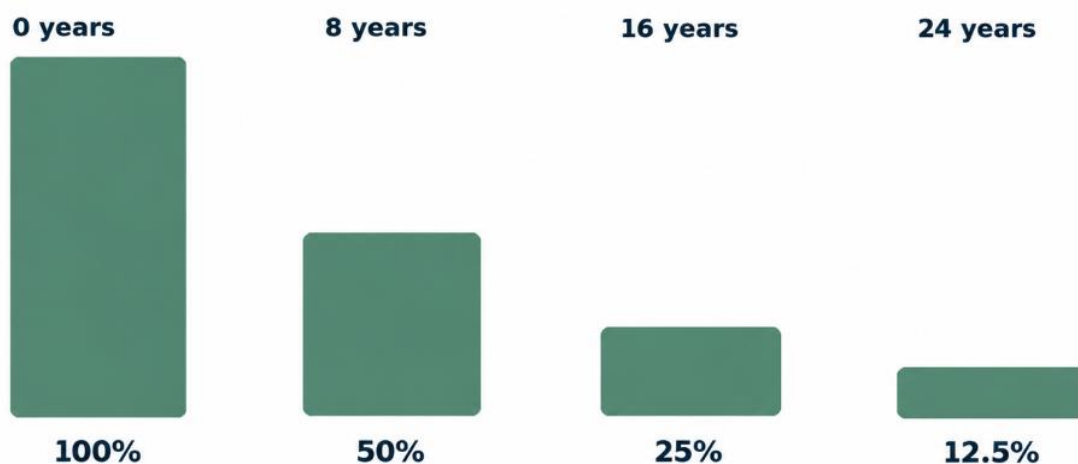
Biological half-life is the time needed, under defined conditions, for the amount of a substance in the body to fall by half. It does not mean that the substance has completely disappeared after that period. If a substance had a half-life of eight years and there were no further exposure, a simplified model would predict that about half the

original quantity remained after eight years and about one-quarter after sixteen years. In the real body, however, continuing intake, individual differences and exchanges between tissues make the dynamics more complex.

The WHO reports prolonged persistence for dioxins, with an indicative half-life range of 7–11 years. This is a general figure for public information, not a value that applies indiscriminately to dioxins, furans and PCBs. The 2026 EFSA assessment documents substantial differences between congeners: estimates for TCDD, for example, are on the order of several years, while some PCBs may have markedly shorter or longer half-lives. Age, body composition and individual circumstances can also influence estimates.

BIOLOGICAL HALF-LIFE: AN EXAMPLE

Hypothetical model, with no new exposures; not an individual estimate



Example with an assumed half-life of 8 years. Real kinetics are more complex.

METABOLISM AND ELIMINATION: OFTEN SLOW PROCESSES

The most persistent substances are relatively resistant to metabolic transformation and are eliminated slowly. Some congeners are transformed more readily than others and may be excreted, unchanged or following transformation, mainly via bile and faeces. Structural differences therefore have important implications for persistence within the body.

With repeated exposure, even small daily doses can contribute to an amount in the body that changes only slowly. This quantity is called the body burden. It is not simply the sum of everything ever ingested: it reflects the dynamic balance between absorption, distribution, metabolism, excretion and previous exposures.

AGE, PREGNANCY AND TRANSFER TO THE CHILD

The maternal body burden warrants attention because some dioxins and dioxin-like PCBs can cross the placenta and reach the fetus. These substances may also be present in the lipid fraction of breast milk and contribute to infant exposure. Such transfer does not mean that every exposure causes harm, but it makes it necessary to consider developmental stages rather than only the dose received by an adult.



The 2026 EFSA assessment uses toxicokinetic models linking women's chronic exposure to body burden and exposure of their offspring. The new tolerable weekly intake was derived specifically to limit the risk that prolonged exposure might produce body burdens in future mothers associated with health concerns for their children. The meaning of this reference value and the effects underpinning its derivation are explored in Chapter 6.

It is essential that these findings not be interpreted as advice to stop breastfeeding. The WHO and health authorities recognise the benefits of breastfeeding; the presence of persistent contaminants primarily reinforces the need to reduce environmental and dietary exposure throughout the population, including before pregnancy. Individual decisions about infant feeding should follow healthcare professionals' advice.

HOW IS BODY BURDEN MEASURED?

The presence of dioxins and PCBs in the body can be investigated through biomonitoring, for example using blood and human milk samples. Because many congeners are lipophilic, results are often expressed relative to the sample's fat content. Comparisons between populations or periods must nevertheless consider which congeners were measured, the analytical methods used and the toxic-equivalency system adopted.

A single biomonitoring result does not normally identify the food responsible for exposure. It reflects contact with multiple sources over time and, particularly for compounds with long half-lives, exposure many years earlier. For the same reason, population monitoring can reveal the long-term effects of policies to reduce emissions and food contamination.

PERSISTENCE DOES NOT MEAN IDENTICAL RISK FOR EVERYONE

Two people with the same recent dietary intake may have different body burdens because of their exposure histories, ages, physiological characteristics and rates of congener elimination. Furthermore, presence and persistence do not automatically imply an adverse effect: risk assessment requires information on quantity, mixture composition, toxicity and windows of susceptibility.

The main conclusion is that prevention of exposure to persistent contaminants cannot focus solely on the absence of occasional peaks. Reducing overall exposure over time matters, alongside effective monitoring of the environment, animal feed and food. This is the context in which analytical results for individual products and population exposure assessments must be understood.

SCIENTIFIC REFERENCES

- [1. EFSA CONTAM Panel \(2026\). Update of the risk assessment on dioxins and dioxin-like PCBs in feed and food. EFSA Journal, 24\(6\), e10103.](#)
- [2. EFSA \(2026\). Update of the risk assessment of dioxins and dioxin-like PCBs in feed and food — Plain language summary.](#)
- [3. World Health Organization \(2026\). Dioxins — Fact sheet, 11 August 2026.](#)
- [4. EFSA \(2026\). Dioxins and PCBs — Topic overview.](#)