individual for sufficiently large values of t. For methylmercury, the long term steady state of the individual exposure to a contaminant is reached after 5 or 6 half lives according to Dr P. Granjean, a methylmercury expert. Thus, the long term individual's exposure to methylmercury is defined as the cumulative exposure reached after say $6l_{1/2} = 36$ weeks.

The risk assessment usually consists of comparing the exposure with the so called Provisional Tolerable Weekly Intake (PTWI). This tolerable dose, determined from animal experiments and extrapolated to humans, refers to the dose an individual can ingest throughout his entire life without appreciable risk. For methylmercury, the PTWI is set to 1.6 microgram per kilogram of body weight per week (1.6 μg/kg bw, see FAO/WHO, 2003).

In our dynamic approach, the long term exposure is compared to a reference long term exposure denoted by S^{ref}, and defined as the cumulative exposure of an individual whose weekly intake is equal to the PTWI, d, such as

$$S^{ref} = \lim_{t\to\infty} S_t^{ref} = \frac{d}{1-\exp(-\eta)}, \tag{1.2}$$

where

$$S_t^{ref} = \sum_{s=0}^{t} d\exp(-\eta(t-s)) = d\frac{\exp(-\eta(t+1))-1}{\exp(-\eta)-1}. \tag{1.3}$$

For methylmercury, the reference for long term exposure S^{ref} is 14.6 μg/kg bw. An individual is then assumed to be at risk if his cumulative exposure $S_{i,h,t}$ exceeds the reference S_t^{ref} for any $t > 6l_{1/2}$.

This KDEM model requires some long surveys of individual intakes which are not monitored and can only be approximated from available consumption data and contamination data.

1.2 From household acquisition data to household intake series

Two current major consumption data sources in France are the national survey on individual consumption (INCA, CREDOC-AFSSA-DGAL, 1999) and the SECODIP panel managed by the company TNS SECODIP. Most quantitative risk assessments conducted by the French agency for food safety (AFSSA) use the 7 day individual consumption data of the INCA survey jointly with