

## Surveillance study on endocrine disrupters in Sewer

Whole term

1998.4 ~ 2001.3

### (Purpose)

At present, the problem of hormone-disruptive chemicals is attracting many people's attention in various fields. In May 1998, the "Environmental Estrogen Strategic Plan SPEED '98" was released, wherein 67 substances are enumerated as chemicals having a risk of endocrine-disrupting activity. In this examination, we examined the behavior of hormone-disruptive chemicals (what is called an environmental estrogen) in a sewage treatment plant and the incoming source of hormone-disruptive chemicals into a sewerage system. In 1998, we established a "Measure Study Committee for Environmental Estrogen in Sewerage" (chairman: Professor Tomonori Matsuo) which consists of experienced academics and officials concerned in the administration organizations and carried out the examination jointly with local public entities.

### (Result)

We carried out the examination in 48 sewage treatment plants of 15 prefectures throughout the country for three years from 1998 through 2000, and we performed the following activities.

- 1) Development and study of a analysis method in consideration of characteristics of waste water
- 2) Study of the realities of the concentrations of in-coming water and treated water in a sewage treatment plant
- 3) Grasp of behavior in water treatment and sewage treatment processes in a sewage treatment plant
- 4) Study of how we should deal with sewage treatment in the future

As a result, it has been confirmed that hormone-disruptive chemicals in in-coming waste water greatly reduce in the sewage treatment process, and 90% or more of many hormone-disruptive chemicals reduce in discharged water though the percentage differs according to the kinds of chemicals.

The outline of the examination results is as follows.

#### (1) Concerning the chemicals to be examined

We extracted 25 chemicals from those which are considered to be included in the wastewater from factories among the chemicals having a risk of endocrine-disruptive activity in the "Environmental Estrogen Strategic Plan SPEED '98" of the Environment Agency in consideration of the annual output and detected state of the chemicals, and added 5 chemicals as relevant substances.

#### (2) Concerning the analysis method in the fact-finding survey

We used for reference the "Study Manual for Hormone-Disruptive Chemicals in Sewerage (draft) (April 2000)" made in the course of this examination and some research documents. The measurement of 17  $\beta$ -estradiol was performed by two methods, i.e. ELISA method and LC/MS/MS method, and other chemicals were measured by analytical instruments such as GC/MS.

#### (3) Concerning the decrease of the concentrations of hormone-disruptive chemicals in a sludge treatment process

Almost no environmental estrogen was detected from incinerated sludge.

#### (4) Concerning the relationship between a water treatment method and reduction effects

In a water treatment facility which can secure a long residence time in a biological reaction tank as in a nitrogen-removal type advanced treatment facility, hormone-disruptive chemicals tended to decrease to a great extent.

#### (5) Concerning the existence of hormone-disruptive chemicals in a sewage treatment process according to each form of chemicals

Nonyl phenol related chemicals used for a detergent, etc., which are composed of nonyl phenol ethoxilate, nonyl phenoxi acetic acid and nonyl phenol, greatly decreased in total in discharged water. Chemicals which exist in the form of nonyl phenol ethoxilate or nonyl phenol ethoxilate acetic acid were larger in quantity than the chemical which exists in the form of nonyl phenol.

Estrogen derived from men and beasts, which consists of 17  $\beta$ -estradiol and estrone, greatly decreased in discharge water, and almost all of it changed into estrone.

This examination was such a world-unexampled scale of examination that we believe it had produced effective achievements for fulfilling research and examinations in various fields to study measures for hormone-disruptive chemicals in sewerage in the future.

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Collaborators: Tokyo, Ibaraki Prefecture, Saitama Prefecture, Shiga Prefecture, Kyoto Prefecture, Osaka Prefecture, Sapporo City, Sendai City, Kawasaki City, Yokohama City, Nagoya City, Kyoto City, Osaka City, Kobe City, Fukuoka City, Japan Institute of Wastewater Engineering Technology

Person in charge of study: Eto Takashi, Kuribayashi Sakae, Okamoto Tatsuya, Goto Masako

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Endocrine disrupters (environmental hormone), Sewer, Analysis, Behavior, Removal