Dioxins in Our Food Supply and Their Effect on Human Health

What are dioxins? Why are they important?

Dioxins are environmental contaminants released into the air from combustion processes, that remain in the environment for many years. They are highly toxic chemical compounds harmful to human health.

Where do dioxins come from?

Dioxins are released into the air from combustion processes:\n\begin{itemize}
  \item commercial or municipal waste incineration
  \item burning fuels, such as wood, coal or oil
  \item burning of household trash
  \item forest fires
\end{itemize}

\textbf{Natural}

\textbf{Man-made}

Released into the environment during industrial processes:\n\begin{itemize}
  \item metallurgy
  \item chlorine bleaching pulp & paper
  \item cement production
  \item pesticide manufacturing
  \item waste incineration
\end{itemize}
How are humans exposed to dioxins?

Dioxins accumulate in the food chain²

**Fatty tissues**: beef, dairy cattle, pigs, poultry, seafood

Human exposure is from the food of animal origin²

What is the impact of dioxins on human health?

Scientists and health experts are concerned about dioxins because exposure may result in a variety of adverse health effects.³

**Health risks may include:**
- reproductive and development problems
- immune system damage
- cancer

Once in the human body, it may take 7-11 years for dioxin toxicity to fall to half original level
What measures are being taken to monitor and reduce dioxins?

Strict regulations are in place regarding food samples testing to detect dioxins (at very low levels).\(^4\)

There is a need for greater testing capacity in control labs because of increasingly global nature of the food supply chain, and especially when a crisis occurs.\(^5\) For example:

- **2003**
  - **Animal Feed**
  - Dioxins were found in animal feed that was contaminated with bakery waste that had been dried by firing with waste wood.

- **2008**
  - **Irish Pork**
  - Irish pork and pork products exported to 23 countries was traced, and much recalled, when animal feed was contaminated with dioxins in the feed drying process.

- **2008**
  - **Buffalo Milk**
  - In Italy, dioxin was found in buffalo milk from farms in Caserta. The probable source was groundwater contamination from illegal waste dumping in the Triangle of Death (Italy).

- **2011**
  - **Meat and Eggs**
  - Meat, eggs and egg products in Germany contaminated from animal feed containing fat contaminated with dioxins. 4,700 German farms were affected. 8,000 hens and hundreds of pigs were culled. Imports from Germany to China were banned.

- **2013**
  - **Chicken Eggs**
  - More than a quarter of a million chicken eggs were recalled in Germany after in-house testing discovered ‘excessive levels’ of dioxin.
How are dioxins monitored and analyzed?

Government regulatory bodies worldwide are increasingly more concerned about dioxins in our food, and are strictly monitoring specific foods with the goal of identifying ways to reduce dietary exposure.¹

**Sampling and Analysis**
Increased sampling and analysis of human foods and animal feeds that contribute most significantly to human dietary exposure to dioxins.

**Field Staff**
Expand the capabilities of field staff to collect and analyze increased numbers of food and feed samples for dioxins.

**Trace-back Investigations**
Perform trace-back investigations of unusually high levels in food and feeds to determine if the source of contamination can be reduced or eliminated.

**Research**
Enhance research into new or modified methods for dioxin analysis so less time consuming and less expensive methods become available.

Technology solutions for the detection and analysis of dioxins

Because dioxin analysis is costly and time-consuming, there is an increasing need for technology solutions. Agilent has technology solutions for the detection and analysis of dioxins.

**Food Testing**
Provide the capability to perform dioxin testing on food samples including meat, dairy and fish, according to national or international regulations, where such testing needs to detect these compounds at very low levels.

**Greater Testing Capacity**
Enable greater testing capacity in control labs because of the increasingly global nature of the food supply chain and especially when a crisis occurs.

**GC/MS/MS Technology**
Agilent solutions include triple quadrupole GC/MS/MS technology.
Sources: