

A Comparison of Blood Dioxin Levels In Pass Christian, Mississippi and Two Louisiana Parishes

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Introduction

Pass Christian, MS is the location of the Dupont chemical company's DeLisle titanium dioxide plant, which has been in operation for many years. The plant used the chloride-ilmenite process and heated the ore in a coke-fired oven in order to produce the product. Because of design and operations characteristics, this plant has released dioxins and furans into the surrounding community and water bodies, leading to concerns about human health effects including cancer.¹ In one report of U.S. Environmental Protection Agency (U.S. EPA) Toxic Release Inventory information, this plant was the second leading emitter of dioxins and dioxin-like compounds in the U.S.²

As a result of a petition by a community member in 2001, the Agency for Toxic Substances and Disease Registry conducted a health consultation.³ This consultation included an assessment of sources of dioxin and dioxin-like compounds from the DuPont DeLisle plant, potential routes of exposure including air dispersion and food chain contamination, including consumption of fish and shellfish from a bay (St. Louis Bay) adjacent to the plant. The draft report concluded that current air emissions and fish consumption pose no apparent public health hazard, but recommend further testing of crab in St. Louis Bay and further testing of surface soil on the plant grounds. This report failed to consider other routes of exposure and accumulation of dioxin and related compounds in house dust or other environmental media.

During the past two years, residents near the DeLisle plant have sought legal representation and filed a lawsuit. The clients in this lawsuit include 494 individuals who lived in Zip Code 39571, where the DeLisle plant is located, for at least five years and were between the ages of 15 and 59. From these, 45 were selected randomly and agreed to have their blood drawn and analyzed for dioxin and dioxin-like compounds. These results were compared to other recently published results in the same age groups in two communities in Louisiana, Calcasieu and Lafayette, one of whose residents were also potentially exposed to airborne dioxin emissions.⁴ The age groups and selection criteria for the comparison communities in Louisiana were the same as in this study.

Materials and Methods

This comparison consisted of drawing a stratified random sample of 45 participants from a database of clients in a lawsuit who resided in Zip Code 39571 for at least five years. The sampling was done in order to select 15 individuals in three age groups: 15-29, 30-44, and 45-59. The blood samples were analyzed at a commercial laboratory meeting all relevant quality assurance criteria (ERGO Lab, Hamburg, Germany) and presented as both lipid based congener specific concentrations and WHO Toxic Equivalent values (TEQ). The methods used by the laboratory have been described elsewhere.⁵

The mean and 95% confidence intervals for the Dioxin TEQ values of the three age groups in Pass Christian participants were calculated, along with the 95th percentiles of the distributions and their attendant confidence intervals. As there were 15 individuals in each age group, confidence intervals were calculated using 14 degrees of freedom.

Results and Discussion

The results of the equivalent WHO TEQ analyses for Pass Christian and the two Louisiana communities are presented in Table 1. The results indicate that Pass Christian participants mean dioxin levels were higher than both comparison communities in all age groups. In particular, the older Pass Christian residents had significantly higher

mean dioxin levels in their blood than those in the older age groups in both Calcasieu and Lafayette, Louisiana.

Table 1 - Dioxin TEQ in Pass Christian, Calcasieu and Lafayette Parishes, Louisiana

Age Group	Parish	N	Arithmetic Mean (95% CI)	95 th Percentile (95% CI)
45-59	Pass Christian	15	29.8 (23.0 – 36.6)	50.0 (43.2 – 56.8)
	Calcasieu	79	19.1 (16.9 – 21.3)	35.2 (30.5 – 55.4)
	Lafayette	31	19.1 (15.3 – 22.8)	32.4 (29.4 – 46.4)
30-44	Pass Christian	15	16.5 (11.8 – 21.3)	32.9 (28.2 – 37.7)
	Calcasieu	70	11.6 (9.6 – 13.6)	24.5 (21.1 – 50.4)
	Lafayette	31	13.6 (10.8 – 16.4)	30.4 (21.0 – 32.0)
15-29	Pass Christian	15	9.5 (6.9 – 12.1)	19.0 (16.3 – 21.6)
	Calcasieu	75	5.9 (4.4 – 7.4)	14.0 (10.9 – 53.9)
	Lafayette	26	5.8 (4.3 – 7.3)	11.7 (10.1 – 12.2)

Furthermore, the specific congeners in the blood of Pass Christian participants were a mixture of dioxins, furans and other dioxin-like compounds. The percentage of the TEQ contributed by furans varied between 10% and 21% in the three age groups, with the largest percent contribution from furans in those aged 30-44 (data not shown). This is a higher percentage than in the Calcasieu participants and is consistent with exposure from a high temperature production process.^{6,7}

These results suggest an unusual exposure to dioxin and dioxin-like compounds in long-term residents of Zip Code 39571, Pass Christian, MS. Further studies are underway to determine whether there are unusual patterns of cancer and other adverse health effects in this population.

References

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