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Press release

**Study of leukaemias in children living close to heavily used roads
*Results of the GEOPCAP programme 2002-2007***

Inserm researchers from CRESS (Epidemiology and Biostatistics Sorbonne Paris Cité Research Centre, Inserm – Paris Descartes University – University of Paris 13 – Paris Diderot University – INRA) studied the risk of acute leukaemia in children living close to heavily used roads. To address this question, the research team considered all 2,760 cases of leukaemia diagnosed in children under 15 years of age in metropolitan France over the 2002-2007 period. The results show that the incidence of new cases of myeloblastic leukaemia (418 of 2,760 cases of leukaemia) was 30% higher in children in the population whose residence was located within 150 m of heavily used roads, and had a combined length of over 260 m within this radius. In contrast, this association was not observed for the more common, lymphoblastic type of leukaemia (2,275 cases). The researchers particularly studied the case of the Île-de-France region of Paris with the help of data modelled by Airparif, which is responsible for the monitoring of air quality in Île-de-France.

These results are published in the [*American Journal of Epidemiology*](#).

Cancer affects over 1,700 children under 15 years of age every year in France, which has a population of a little over 11 million children. Surveillance of these cancers has been provided by the French National Registry of Childhood Haematopoietic Malignancies since 1990, and by the French National Registry of Childhood Solid Tumours since 2000. With 470 new cases each year, leukaemias (blood cancers) are the most common childhood cancers, and are mainly acute lymphoblastic leukaemias. “Myeloblastic” or “myeloid” leukaemia is another type of leukaemia, and affects myeloid stem cells, which give rise to the red blood cells. Today, 5-year survival following childhood leukaemia is over 80%.

The general objective of the GEOCAP programme (GEOlocation Study of Paediatric Cancers) is to study the role of environmental exposures in the occurrence of cancer in children under 15 years.

One of the hypotheses of the research community is that there is an increased risk of leukaemia in children living close to heavily used roads. The increased risk of myeloblastic leukaemia for adults with a history of occupational exposure to benzene has long been known.

The EPICEA (Epidemiology of Childhood and Adolescent Cancers) team, directed by Jacqueline Clavel, Inserm Research Director, at CRESS, has reported the results of

a study on the incidence of leukaemias in children living close to heavily used roads. It is a case-control study that allowed the assessment of exposure level to one or more risk factors. All 2,760 cases of childhood leukaemia diagnosed in metropolitan France between 2002 and 2007 were included in the study, and compared to a contemporary sample of 30,000 control children representative of the metropolitan population, and constituted in collaboration with the French National Institute of Statistics and Economic Studies (INSEE).

“The frequency of myeloblastic type leukaemias was 30% higher in children living within a 150 m radius of heavily used roads, and where the combined length of road sections within this radius exceeded 260 m,” explains Jacqueline Clavel, Inserm Research Director.

In contrast, there was no association between acute lymphoblastic leukaemias – the most common – and the atmospheric concentration of nitrogen dioxide, distance or combined length of heavily used roads in the vicinity of dwellings.

The researchers particularly studied the case of the Île-de-France region of Paris, the most urbanised region, for which the mean annual concentration of benzene, mainly from road traffic, was estimated in the vicinity of each residence in the study in a particularly precise manner with the help of data modelled by Airparif, which is responsible for the monitoring of air quality in Île-de-France. They observed that the risk of childhood acute myeloblastic leukaemia was double in Île-de-France children whose residences were the most exposed to traffic, i.e. when, *simultaneously*, the combined length of road sections within a 150 m radius of the residence exceeded 300 m, and the estimated mean annual concentration of benzene in the vicinity of the residence was above the median value observed in Île-de-France ($1.3 \mu\text{g}/\text{m}^3$).

In keeping with the hypotheses on which the study is based, exposure to benzene related to car traffic might be one of the explanations for this association.

The GEOCAP programme (GEOlocation Study of Paediatric Cancers)

The general objective of the GEOCAP programme is to study the role in the occurrence of cancers in children under 15 of environmental exposures estimated by geocoding, especially:

- high voltage power lines, causing exposure to extremely low-frequency magnetic fields
- road traffic and atmospheric pollution from benzene and polycyclic aromatic hydrocarbons,
- service stations, a source of exposure to benzene
- nuclear sites
- and some industrial plants.

It also relates to other factors, particularly demographic trends and socioeconomic disparities between residential areas.

More about GEOCAP: <http://rnce.inserm.fr/geocap.php>

The addresses of the children included in the study were geolocated with the help of a geographic information system based on French National Geographic Institute (IGN) data, exploited in collaboration with the Géocible company.

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Source

Vicinity of heavy-traffic roads, benzene exposure, and Childhood leukemia

The Geocap study, 2002-2007

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