Risk of cancer associated with cardiac catheterization procedures during childhood: a cohort study in France

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Context

- Congenital heart disease in children is often diagnosed with the aid of cardiac catheterization procedures (CCP) which are known to give higher radiation doses to patients than other procedures in conventional radiology.

- Since children are particularly sensitive to the carcinogenic effects of ionizing radiation, it is important to know whether cancer risk is affected among children who undergo CCP for diagnosis or therapeutic purpose.

- In this context, the Institute of Radioprotection and Nuclear Safety (IRSN) has launched a cohort study, named COCCINELLE, in collaboration with the French national network for Complex Congenital Cardiac Defects-M3C network (Necker Enfants malades hospital, Paris, and surgical center Marie Lannelongue, Le Plessis-Robinson)

A cardiac catheterization lab

Objectives

The study aim is to set-up a cohort of paediatric patients exposed to ionizing radiation through CCP with prospective follow up for cancer incidence. The specific objectives are:

- To characterize the pediatric population who underwent CCP in the selected centers.
- To reconstitute organ-absorbed doses according to the procedure used and according to the dosimetric data available for the period considered.
- To evaluate the risk of solid tumors and the risk of leukemia associated with CCP in children

Material and Methods

- All children who underwent at least one CCP before the age of 10 years, from 2000 through 2013 will be included in the cohort.

- Individual CCP-related doses will be assessed for each child included in the cohort. The DAP (Dose Area Product) will be retrieved from the dose-recording system and will be used as a surrogate for radiation exposure.

- Follow-up of cancer incidence will be performed through cross linkage with the paediatric cancer registries, which since 1990 and 2000, respectively, have recorded all cases of childhood leukaemia and cancers in France.

Results

- The two centres coordinating the French national network for Complex Congenital Cardiac Defects-M3C network (Necker Enfants malades hospital, Paris, and surgical center Marie Lannelongue, Le Plessis-Robinson) which treated most of the children in France, already agreed to participate and confirmed the possibility to retrieve individual clinical and dosimetric data.

- A total of 4,500 children have been already included in the cohort. The recruitment of children is ongoing for these two centres and will be then extended at the national level. The study is expected to finally include a total of 8,000 children.

Conclusions

- This French cohort study is specifically designed to provide further knowledge about the potential cancer risks associated with paediatric CCP.

- It will also provide new information on typical dose levels associated with these procedures in France.

- Finally, it should help improve awareness of the importance of radiation protection in these procedures.

General overview of the study design


The study was approved by the national ethical committee (Commission Nationale Informatique et Liberté (CNIL) opinion n° 911112 of December 12, 2011.

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