Additional information

Power calculations

Within the EC funded feasibility study CHILD-MED-RAD [46], power was calculated for different risk scenarios and preliminary distributions (from the UK cohort) of number of scans and body parts scanned per child based on the NIH “Power” software (http://dceg.cancer.gov/tools/design/power).

For childhood leukaemia, assuming an average follow up of 11 years; an average incidence rate of 5 cases per 100,000 persons-years at risk; 7% of the cohort with little or no dose to the bone-marrow; an average dose of 5 mGy to the red bone marrow per scan; 1.2% of patients receiving 10 scans or more and 3.4% receiving 5-9 scans, a multinational cohort of 1,000,000 subjects, would have 80% power to observe a relative risk (RR) of 1.75 for 10 scans (i.e. 50 mGy) in the first 10 years of follow-up. In a cohort of 500,000 persons, the power would be 95% for a RR of 2.5.

For brain tumours in young people (below the age of 35 years), assuming the same follow-up time; an average incidence rate of 3 cases per 100,000 persons-years at risk; 32% of cohort members with little or no dose to the head; an average dose of 30 mGy to the brain per head scan, a cohort of over 1.3 million persons would be needed to reach 80% power to observe a RR of 2.0 for 10 CT scans (300 mGy) in the first 10 years of follow-up; a cohort of 500,000 persons would have more than 80% power to find an increased risk if the RR was 3.

The use of continuous dose rather than the categorical approach used for power calculation is expected to substantially increase the power of the study, though power will be reduced by dose misclassification.