

Neurofibromatosis Type 1 and Risk of Late Outcomes After a Primary Tumor: A Report from the Childhood Cancer Survivor Study

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Background: It is not known whether survivors of childhood cancer with neurofibromatosis type 1 (NF1) are at increased risk for poor long-term health outcomes.

Methods: 1,936 >5yr survivors of childhood cancer diagnosed between 1970-1999 (176 with NF1 and 1,760 non-NF1 survivors matched on diagnosis and diagnosis era) and 5,051 siblings were compared on self-reported chronic medical conditions (CTCAE v 4.0) and cognitive impairment (defined as >90th percentile of siblings on the CCSS Neurocognitive Questionnaire) using logistic and Poisson regression to adjust for age at survey, age at diagnosis, sex, race, CNS radiation and other treatment exposures.

Results: Among survivors with NF1, CNS astrocytoma was the most common primary tumor (n=142, 78%). Compared to non-NF1 survivors, NF1 survivors were more likely to report a serious health condition (grade 3-4; RR[95% CI] 2.2[1.9-2.6]) and multiple chronic conditions (grade 2-4, 1.9[1.6-2.2]). Specific health risks (grade 1-5) are shown below. Curiously, diabetes and abnormal thyroid were less common in NF1 survivors compared to non-NF1 survivors and siblings. Survivors with NF1 were more likely to report impaired organization (OR 1.9 [1.0-3.4]), task completion (1.7 [1.1-2.8]) and learning/memory (1.6 [1.3-1.8]). NF1 survivors were less likely to attend college (0.4 [0.2-0.7]) and be employed (0.6 [0.4-0.9]).

Conclusion: NF1 impacts risk of health/cognitive outcomes in adult survivors of childhood cancer. Further research should investigate the underlying mechanisms of these risks.

Condition	RR [95%CI]	RR [95%CI]
	vs nonNF1 survivor	vs Sibling
Diabetes	0.14 [0.07-0.27]	0.22 [0.12-0.43]
Abnormal Thyroid	0.25 [0.19-0.33]	0.54 [0.41-0.73]
Speech Deficit	0.38 [0.18-0.81]	0.64 [0.30-1.35]
Hearing Loss	0.57 [0.48-0.68]	1.24 [1.05-1.4]
Hyperlipidemia	0.69 [0.57-0.83]	1.71 [1.42-2.06]
Osteoporosis/Osteopenia	1.25 [1.05-1.49]	14.9 [12.4-17.9]
Epilepsy	1.71 [1.51-1.95]	7.99 [7.06-9.05]
GI Disease	1.79 [1.57-2.05]	2.80 [2.47-3.18]
Sensory impairment	1.89 [1.69-2.11]	1.66 [1.49-1.84]
Motor impairment	2.05 [1.84-2.29]	4.87 [4.41-5.38]
Heart Disease	2.07 [1.71-2.50]	1.05 [0.88-1.25]
Vision Loss	2.06 [1.81-2.35]	6.26 [5.53-7.09]