

Supplementary Materials

# The Incidence Risk for Primary Glaucoma and Its Subtypes following Chronic Exposure to Ionizing Radiation in the Russian Cohort of Mayak Nuclear Workers

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**Table S1.** Variables used in the model for analyses.

Type	Variable	Description	
Fixed	Sex	1: Males	2: Females
Fixed	Period of hire	1: 1948–1953	4: 1964–1972
		2: 1954–1958	5: 1973–1978
		3: 1959–1963	6: 1979–1982
Fixed	Age at hire	1: <30	3: ≥40
		2: 30–40	
Fixed	Cohort of birth	1: <1910	4: 1930–1939
		2: 1910–1919	5: 1940–1949
		3: 1920–1929	6: ≥1950
Fixed	Smoking status	1: never smoker	3: smoker
		2: ever smoker	4: unknown
Fixed	Alcohol drinking habit status	1: never-drinker	4: heavy-drinker
		2: seldom-drinker	
		3: moderate-drinker	
Fixed	Arterial hypertension	1: unknown	
		2: hypertension-free	
		3: hypertension	
Fixed	Body mass index	1: unknown	4: > normal
		2: < normal	5: obesity
		3: normal	
Time-dependent	Attained age	1: <40	7: 65–70
		2: 40–45	8: 70–75
		3: 45–50	9: 75–80
		4: 50–55	10: 80–85
		5: 55–60	11: ≥85
		6: 60–65	
Time-dependent	Calendar period	1: 1946–1950	8: 1981–1985
		2: 1951–1955	9: 1986–1990
		3: 1956–1960	10: 1991–1995
		4: 1961–1965	11: 1996–2000
		5: 1966–1970	12: 2001–2005
		6: 1971–1975	13: 2006–2010
		7: 1976–1980	14: 2011–2015

		15: 2016–2019	
Time-dependent	Smoking index	1: 0 2: 0–10 3: 10–20	4: ≥20 5: unknown
Time-dependent	Cataract before glaucoma was diagnosed	1: cataract-free 2: diagnosed cataract	
Time-dependent	Cataract surgery before glaucoma was diagnosed	1: cataract surgery free 2: cataract surgery	
Time-dependent	Diabetes mellitus (DM)	1: DM-free 2: DM	
Time-dependent	Brain absorbed gamma dose from external exposure (Gy), lagged for 0, 5, 10, 15, 20 years	1: 0–0.25 2: 0.25–0.5 3: 0.5–0.75 4: 0.75–1.00	5: 1.00–1.25 6: 1.25–1.50 7: 1.50–2.00 8: ≥2.00
Time-dependent	Brain absorbed neutron dose (Gy), lagged for 0, 5, 10, 15, 20 years	1: unmeasured 2: 0.00–0.0001 3: 0.0001–0.001 4: 0.001–0.0025	5: 0.0025–0.005 6: 0.005–0.01 7: ≥0.01
Estimated	Attained age	Person-years weighted by mean age (in years)	
	Cumulative brain absorbed gamma dose from external exposure (Gy), lagged for 0, 5, 10, 15, 20 years	Person-years weighted by cumulative brain absorbed gamma dose lagged for 0, 5, 10, 15, 20 years	
	Cumulative brain absorbed neutron dose (Gy), lagged for 0, 5, 10, 15, 20 years	Person-years weighted by cumulative brain absorbed neutron dose lagged for 0, 5, 10, 15, 20 years	
	Person-years	at risk	
Cases		1: POAG – primary open-angle glaucoma. (ICD-9 code 365.1) 2: HTG – high-tension glaucoma. (ICD-9 code 365.1 with high intraocular pressure) 3: NTG – normal-tension glaucoma. (ICD-9 code 365.1 with normal intraocular pressure) 4: PACG – primary angle-closure glaucoma. (ICD-9 code 365.2)	

**Table S2.** Non-linear dose-responses for incidence of glaucoma in relation to cumulative brain absorbed gamma dose of external exposure.

	<b>LQ:</b> model parameters; <i>p</i> -value; <i>dev</i> L/ <i>dev</i> LQ	<b>LE:</b> model parameters; <i>p</i> -value; <i>dev</i> L/ <i>dev</i> LE	<b>Q:</b> model parameters; $\Delta$ AIC; <i>dev</i> L/ <i>dev</i> Q
POAG	$0.14 \cdot D - 0.03 \cdot D^2$ <i>p</i> > 0.5 7157.308/7157.098	$0.24 \cdot D \cdot \exp(-0.48 \cdot D)$ <i>p</i> > 0.5 7157.308/7156.966	$0.02 \cdot D^2$ $\Delta$ AIC = 0.487 7157.308/7157.795
HTG	$0.12 \cdot D - 0.06 \cdot D^2$ <i>p</i> = 0.22 6025.676 / 6024.156	$-0.0006 \cdot D \cdot \exp(0.81 \cdot D)$ <i>p</i> > 0.5 6025.676 / 6025.434	$-0.03 \cdot D^2$ $\Delta$ AIC = 0.6 6025.676 / 6025.076
NTG	$0.41 \cdot D + 0.05 \cdot D^2$ <i>p</i> > 0.5 1347.683/1347.625	$0.35 \cdot D \cdot \exp(0.17 \cdot D)$ <i>p</i> > 0.5 1347.683/1347.578	$0.18 \cdot D^2$ $\Delta$ AIC = 0.492 1347.683/1348.175
PACG	$0.27 \cdot D - 0.08 \cdot D^2$ <i>p</i> > 0.5 427.302/427.199	$6.01 \cdot D \cdot \exp(-2.47 \cdot D)$ <i>p</i> = 0.25 427.302/425.961	$0.0001 \cdot D^2$ $\Delta$ AIC = 0.017 427.302/427.319

POAG, primary open-angle glaucoma. HTG, high-tension glaucoma. NTG, normal-tension glaucoma. PACG, primary angle-closure glaucoma. LQ, linear-quadratic; LE, linear-exponential; Q, quadratic; dev, deviation; *p*-value, statistical significance of the difference compared to a linear mode;  $\Delta$ AIC, difference between Akaike information criteria for linear and quadratic models.