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ORIGINAL ARTICLE

Mendelian Randomization Analyses Explore the Relationship between Trace Elements and Prostate Cancer

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SUMMARY

Background: **Trace elements indeed play a significant role in the occurrence and development of cancers, but it remains ambiguous whether a causal relationship exists between trace elements and prostate cancer. This study employed Mendelian randomization analyses to investigate such a causal link between trace elements (Co, Fe, Mg, Se, and Zn) and prostate cancer.**

Methods: **The analyses primarily utilized the inverse variance weighted (IVW) method, supplemented by MR-Egger, weighted median, simple mode, and MR-PRESSO.**

Results: **The results of IVW (OR = 1.005, 95% CI: 1.001 - 1.009, p = 0.014) and MR-PRESSO (OR = 1.005, 95% CI: 1.002 - 1.008, p = 0.015) analyses demonstrated a significant causal effect of Mg on genetically predicted prostate cancer. However, the IVW analysis did not reveal any causal associations between prostate cancer and Co, Fe, Se, or Zn.**

Conclusions: **Our study provided compelling evidence of a causal relationship between magnesium and prostate cancer within the European population. Therefore, maintaining magnesium balance may emerge as a potent strategy for prostate cancer prevention.**

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Supplementary Data

Table S1. Mendelian randomization analysis of the levels of five common mineral elements and the occurrence of prostate cancer.

MR info							Cochran's Q			Horizontal pleiotropy		
Exposures	nSNP	Method	β	SE	OR [95% CI]	p	Q	Q _df	p	Intercept	SE	p
Calcium	16	MR Egger	0.0128	0.0157	1.0129 [0.9821 - 1.0446]	0.4296	16.5521	14	0.2808	-0.0004	0.0005	0.4324
		IVW	0.0002	0.0018	1.0002 [0.9966 - 1.0037]	0.9270	17.3246	15	0.2998	-	-	-
		Weighted median	0.0024	0.0023	1.0024 [0.9978 - 1.007]	0.3008	-	-	-	-	-	-
		Simple mode	0.0037	0.0046	1.0037 [0.9948 - 1.0128]	0.4279	-	-	-	-	-	-
		MR-PRESSO	0.0002	0.0018	1.0002 [0.9966 - 1.0037]	0.9282	-	-	-	-	-	-
Iron	11	MR Egger	0.0245	0.0212	1.0248 [0.9831 - 1.0683]	0.2777	14.6160	9	0.1020	-0.0007	0.0006	0.2650
		IVW	-0.0005	0.0027	0.9995 [0.9943 - 1.0047]	0.8474	16.9104	10	0.0763	-	-	-
		Weighted median	0.0029	0.0028	1.0029 [0.9975 - 1.0083]	0.2897	-	-	-	-	-	-
		Simple mode	0.0037	0.0035	1.0037 [0.9969 - 1.0105]	0.3092	-	-	-	-	-	-
		MR-PRESSO	-0.0005	0.0027	0.9995 [0.9943 - 1.0047]	0.8513	-	-	-	-	-	-
Magnesium	13	MR Egger	-0.0096	0.0228	0.9904 [0.9471 - 1.0357]	0.6810	8.6207	11	0.6569	0.0004	0.0006	0.5404
		IVW	0.0047	0.0019	1.0047 [1.0010 - 1.0085]	0.0136	9.0200	12	0.7012	-	-	-
		Weighted median	0.0043	0.0025	1.0043 [0.9993 - 1.0093]	0.0938	-	-	-	-	-	-
		Simple mode	0.0046	0.0042	1.0046 [0.9963 - 1.0130]	0.3006	-	-	-	-	-	-
		MR-PRESSO	0.0047	0.0017	1.0047 [1.0015 - 1.0080]	0.0147	-	-	-	-	-	-
Selenium	8	MR Egger	5.28e-06	0.0015	1.0000 [0.9971 - 1.0029]	0.9973	3.5649	6	0.7353	8.92e-05	0.0002	0.7126
		IVW	0.0006	0.0004	1.0006 [0.9997 - 1.0014]	0.2049	3.7141	7	0.8121	-	-	-
		Weighted median	0.0002	0.0006	1.0002 [0.9991 - 1.0014]	0.6983	-	-	-	-	-	-
		Simple mode	-9.76e-05	0.0009	0.9999 [0.9982 - 1.0016]	0.9147	-	-	-	-	-	-
		MR-PRESSO	0.0002	0.0004	1.0002 [0.9994 - 1.0010]	0.6006	-	-	-	-	-	-
Zinc	5	MR Egger	0.0003	0.0017	1.0003 [0.997 - 1.0036]	0.8616	31.8313	3	0.8639	-0.0002	0.0003	0.6531
		IVW	-0.0005	0.0005	0.9995 [0.9986 - 1.0005]	0.3114	32.5952	4	0.9118	-	-	-
		Weighted median	-0.0004	0.0006	0.9996 [0.9985 - 1.0008]	0.5444	-	-	-	-	-	-
		Simple mode	-0.0004	0.0007	0.9996 [0.9982 - 1.0011]	0.6456	-	-	-	-	-	-
		MR-PRESSO	-0.0005	0.0002	0.9995 [0.9991 - 0.9999]	0.0762	-	-	-	-	-	-