

Supplementary Table S1. Literature search syntax.

✓ The 'date' filter was utilized for this search (Jan 2012-Jan 2023)

✓ The PubMed 'Human' filter was utilized for this search

✓ For the review of research papers:

(leather tanning OR stainless steel OR cement OR concrete OR welding OR metal plating OR chrome pigment production OR chromate production OR chrome plating OR chrome electroplating OR ferrochrome OR abrasive blasting OR painter OR copying machines OR battery maker OR candle maker OR dye maker OR printers OR rubber maker OR brazing OR soldering OR torch OR "Cr(VI)" OR chromium OR chrome* OR chromi* OR "toxic metal" OR "trace metal" OR "carcinogenic metal" OR "heavy metal" OR "toxic metals" OR "trace metals" OR "heavy metals" OR "carcinogenic metals") AND (stomach cancer OR GI cancer OR Anal cancer OR Bile duct cancer OR Colon cancer OR Esophageal cancer OR Gallbladder cancer OR Gastrointestinal stromal tumors OR Liver cancer OR Pancreatic cancer OR Rectal cancer OR Small intestine cancer OR gastric cancer OR stomach tumor OR GI tumor OR Anal tumor OR Bile duct tumor OR Colon tumor OR Esophageal tumor OR Gallbladder tumor OR Liver tumor OR Pancreatic tumor OR Rectal tumor OR Small intestine tumor OR Stomach tumor OR gastric tumor OR gastrointestinal OR gastritis OR Gastroesophageal reflux disease OR GERD OR ulcer OR IBS OR irritable bowel syndrome OR hemorrhoids OR Crohn OR ulcerative colitis OR constipation OR Gastrointestinal bleeding OR Diverticulitis OR celiac disease OR Gallstones OR Cholelithiasis OR Cirrhosis) NOT (Meta-Analysis OR metaanalysis OR review)

✓ For the review of reviews, systematic reviews and meta-analysis we used the PubMed 'Article type' filter (we selected 'review', 'systematic review', 'meta-analysis'), with the syntax reported above (except 'NOT (Meta-Analysis OR metaanalysis OR review)')

Supplementary Table S2. Office of Health Assessment and Translation Risk-of-Bias Tool [10].

Bias Domains and Questions	Experimental Animal ¹	Human Controlled Trials ²	Cohort, Case- control ³ , Cross sectional	Case Series
Selection Bias				
Q1. Was administered dose or exposure level adequately randomized?	X	X		
Q2. Was allocation to study groups adequately concealed?	X	X		
Q3. Did selection of study participants result in appropriate comparison groups?			X	
Confounding Bias				
Q4. Did the study design or analysis account for important confounding and modifying variables?			X	X
Performance Bias				
Q5. Were experimental conditions identical across study groups?	X			
Q6. Were the research personnel and human subjects blinded to the study group during the study?	X	X		
Attrition/Exclusion Bias				
Q7. Were outcome data complete without attrition or exclusion from analysis?	X	X	X	
Detection Bias				
Q8. Can we be confident in the exposure characterization?	X	X	X	X
Q9. Can we be confident in the outcome assessment?	X	X	X	X
Selective Reporting Bias				
Q10. Were all measured outcomes reported?	X	X	X	X
Other Sources of Bias				

Q11. Were there no other potential threats to internal validity (e.g., statistical methods were appropriate and researchers adhered to the study protocol)?

X

X

X

X

Classification of each study

Tier 1: A study must be rated as “definitely low” (++) or “probably low” (+) risk of bias for key elements AND have most other applicable items answered “definitely low” (++) or “probably low” (+) risk of bias.

Tier 2: Study meets neither the criteria for 1st or 3rd tiers.

Tier 3: A study must be rated as “definitely high” (--) or “probably high” (-) risk of bias for key elements AND have most other applicable items answered “definitely high” (--) or “probably high” (-) risk of bias.

¹Experimental animal studies are controlled exposure studies. Non-human animal observational studies could be evaluated using the design features of observational human studies such as cross-sectional study design.

²Human Controlled Trials (HCTs): studies in humans with a controlled exposure, including Randomized Controlled Trials (RCTs) and non-randomized experimental studies.

³Cross-sectional studies include population surveys with individual data (e.g., NHANES) and population surveys with aggregate data (i.e., ecological studies)

Supplementary Table S3. Risk-of-bias assessment for each study.

	Chen et al., 2015	DeBono et al., 2020	García-Pérez et al., 2015	Gerosa et al., 2013	Gibb et al., 2015	Girardi et al., 2015	Ilychova and Zaridze, 2012	Kaneko et al., 2020	Kendzia et al., 2022	Koh et al., 2013	Núñez et al., 2016	Salerno and Cucciniello, 2019	Sciannameo et al., 2019	Shah et al., 2020	Wu et al., 2013	Yang et al., 2013
Q3. Did selection of study participants result in appropriate comparison groups?	-	+	-	+	+	+	+	++	++	-	--	+	++	++	+	+
Q4. Did the study design or analysis account for important confounding and modifying variables?	--	-	-	-	-	-	-	++	++	--	--	-	+	++	-	-
Q7. Were outcome data complete without attrition or exclusion from analysis?	-	-	-	--	+	-	-	-	-	-	-	+	-	-	-	-
Q8. Can we be confident in the exposure characterization?	-	-	--	++	++	+	--	+	++	-	--	--	+	+	--	+
Q9. Can we be confident in the outcome assessment?	--	+	--	++	++	+	--	+	+	+	-	+	+	+	+	-
Q10. Were all measured outcomes reported?	++	++	+	-	++	+	+	+	+	++	+	++	++	++	+	+
Q11. Were there no other potential threats to internal validity (e.g., statistical methods were appropriate and researchers adhered to the study protocol)?	-	+	-	-	+	-	+	+	+	-	-	+	+	+	-	-
<i>Key elements rated as "low" or "probably low" risk of bias</i>	0/3	1/3	0/3	2/3	2/3	2/3	0/3	3/3	3/3	1/3	0/3	1/3	3/3	3/3	1/3	1/3
<i>Other elements rated as "low" or "probably low" risk of bias</i>	1/4	3/4	1/4	1/4	4/4	2/4	3/4	3/4	3/4	1/4	1/4	4/4	3/4	3/4	2/4	2/4
Overall Tier	3	2	3	2	2	2	2	1	1	2	3	2	1	1	2	2

Notes. Across all human observational studies, we classified exposure (Q8), outcome (Q9), and confounding (Q4) assessment as “key items”, as these are the most frequently included elements for human observational studies [10].