

## SOME AROMATIC AMINES AND RELATED COMPOUNDS

VOLUME 127

This publication represents the views and expert opinions of an IARC Working Group on the Identification of Carcinogenic Hazards to Humans, which met remotely, 25 May–12 June 2020

LYON, FRANCE - 2021

IARC MONOGRAPHS  
ON THE IDENTIFICATION  
OF CARCINOGENIC HAZARDS  
TO HUMANS

**Table S2.3 Individual case reports and case series on cancer and exposure to aniline**

Reference <sup>a</sup>	Country, site	Exposure, production	Cases	Co-exposures
Rehn (1895)	Germany	Aniline dye production	3 bladder tumour cases among 45 employees: No. 1: papillary fibroma at age 40 yr; 15 yr of employment No. 2. oedematous papilloma at age 29 yr; duration of employment unknown No. 3. carcinoma/sarcoma at 49 yr; 20 yr of employment	Toluidine, nitrobenzene, basic fuchsin-ferric chloride
Thiess (1969)	Germany	Dye/colouring departments, including aniline book-binding department, department for tri-colouring, and indigo, aniline, and alizarin departments	2 lung cancer cases among 185 workers: No. 1: unspecified type, diagnosed at age 53 yr No. 2: undifferentiated carcinoma, diagnosed at age 53 yr	Possibly 1,2-hydroxyanthraquinone; smoking status unknown
Anon. (1904)	Germany and England	Production of aniline and “its homologues and allied substances”	23 bladder tumours: 17 carcinomas, 1 sarcoma, 5 papillomas	No data on specific co-exposures
Anon. (1921)	Basel, Switzerland	Aniline production	6 deaths from bladder tumours among 840 aniline factory workers during 1901–1910; in comparison, 12 additional deaths from bladder cancer occurred among all 56 500 male workers in the city during the same period  16 cases of bladder tumour seen at surgical clinic during 1901–1910: 10 in aniline workers, 2 in dyers; in comparison, 6 cases of bladder tumour were seen at the same clinic during 1860–1900, before aniline production started	Benzidine, $\beta$ -naphthylamine [2-naphthylamine]
Gehrmann (1934)	USA	Dye industry	No bladder tumours observed in group of workers exposed to aniline only systematically screened by cystoscopy since 1931	No occupational co-exposures
Gehrmann (1936)	USA	Aniline production	63 bladder tumours diagnosed by routine cystoscopy: 24 carcinomas, 39 papillomas	Benzidine, $\beta$ -naphthylamine [2-naphthylamine], $\alpha$ -naphthylamine [1-naphthylamine]
Orts (1948)	Spain	Consumption of red wine containing aniline as colourant	2 bladder cancer cases in heavy-drinking men, aged 60 and 75 yr at diagnosis	No data on specific co-exposures

**Table S2.3 Individual case reports and case series on cancer and exposure to aniline**

Reference <sup>a</sup>	Country, site	Exposure, production	Cases	Co-exposures
Goldblatt (1949)	United Kingdom	Chemical industry	3 bladder papillomas reported in workers exposed to aniline only  3 bladder papillomas and 13 bladder carcinomas in workers exposed to aniline and three other specific substances	No occupational co-exposures  Benzidine, $\beta$ -naphthylamine [2-naphthylamine] and $\alpha$ -naphthylamine [1-naphthylamine]
Pujol (1950)	Spain	Hat factory where aniline-based dyes were used	12 bladder carcinomas in workers exposed to aniline and one or two of the three specific substances; periods of work in various processes were not known	Benzidine and/or $\beta$ -naphthylamine [2-naphthylamine] and/or $\alpha$ -naphthylamine [1-naphthylamine]
Aboulker & Smaghe (1953)	France	Dye industry	1 case of bladder tumour in a worker employed for 26 yr; Dermal and inhalation exposure, no PPE	Alizarin Safirol; tartrazine and many other colourants
			Of 21 cases of bladder tumour diagnosed in 1941–52, 3 were exposed to aniline:  No. 5: diagnosed at age 57 yr in 1947; exposed for 17 yr	No occupational co-exposure
			No. 6: diagnosed at age 47 yr in 1947; employed for 24 yr; exposed for 13 yr	$\alpha$ -Naphthylamine [1-naphthylamine] (for 13 yr)
			No. 9: diagnosed at age 69 yr in 1949; employed for 38 yr; exposed for 26 yr	$\alpha$ -Naphthylamine [1-naphthylamine] (for 26 yr)
Pujol (1954)	Spain	Preparation of tints, using water/alcohol and oil-based anilines	1 case of bladder tumour, employed for 30 years, no PPE	Potassium bichromate, “other series of tints”
Link (1961)	Switzerland	Aniline and toluidine plant	1 case of bladder carcinoma; employed for 21 yr	Toluidine
Vigliani & Barsotti (1961)	Italy	Six dyestuff factories	1 case of bladder papilloma	No occupational co-exposure
Temkin (1963)	Former Soviet Union	Aniline dye industry	208 cases of bladder disease during 25 yr, among these:  5 malignant bladder tumours among 125 cases of bladder disease annually or biannually examined by cystoscopy	Co-exposures not mentioned

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Reference <sup>a</sup>	Country, site	Exposure, production	Cases	Co-exposures
Nakano et al. (2018)	Japan	Production of organic dye and pigment intermediates	83 bladder tumours, of which 32 were malignant, in a group not systematically examined	
			Altogether, of the 208 patients, 56 had malignant bladder tumours and 47 died from bladder cancer	
			Of 10 cases of bladder cancer, 9 were exposed to aniline:	
			No. 1	<i>ortho</i> -Toluidine, 2,4-xylylidine, 32 pack-years tobacco
			No. 2	<i>ortho</i> -Toluidine, 2,4-xylylidine, 36 pack-years tobacco
			No. 3	<i>ortho</i> -Toluidine, 2,4-xylylidine, 0 pack-years tobacco
			No. 4	<i>ortho</i> -Toluidine, 2,4-xylylidine, <i>ortho</i> -chloraniline, 33 pack-years tobacco
			No. 5	<i>ortho</i> -Toluidine, 2,4-xylylidine, 15 pack-years tobacco
			No. 6	<i>ortho</i> -Toluidine, 2,4-xylylidine, <i>ortho</i> -anisidine, 39 pack-years tobacco
			No. 7	<i>ortho</i> -Toluidine, 2,4-xylylidine, 29 pack-years tobacco
No. 8	<i>ortho</i> -Toluidine, 2,4-xylylidine, 10 pack-years tobacco			
No. 9	<i>ortho</i> -Toluidine, 2,4-xylylidine, <i>ortho</i> -anisidine, <i>ortho</i> -chloraniline, 45 pack-years tobacco			

PPE, personal protective equipment; yr, year.

<sup>a</sup> Reviews by Berenblum (1932) and Hueper (1938) do not appear in the Table.

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