

Table SI. Diagnostic codes of comorbidities and complications according to the International Classification of Diseases, 10th revision

Conditions	ICD code
Infectious and parasitic disease	
Intestinal infectious diseases	A00-A09
Tuberculosis	A15-A19
Other bacterial diseases	A30-A49
Sepsis	A40-A41
Infections with a predominantly sexual mode of transmission	A50-A64
Viral infection	A80-A89, B00-B34, Z21
Viral infections of the central nervous system	A80-A89
Viral hepatitis	B15-B19
Human immunodeficiency virus disease	B20-B24, Z21
Mycoses	B35-B49
Parasitic infection	B50-B89
Diseases of the blood and blood-forming organs	
Anemia	D50-D64
Coagulation defects, purpura	D65-D69
Disorders involving the immune mechanism	D80-D89
Endocrine, nutritional and metabolic diseases	
Thyroid disease	E03-E07
Hyperthyroidism	E05
Hypothyroidism	E03
Diabetes mellitus	E10-E14
Type 1 diabetes mellitus	E10
Type 2 diabetes mellitus	E11
Hypoparathyroidism	E20
Hyperparathyroidism	E21.0-E21.3
Hyperfunction of pituitary gland	E22
Hypofunction of pituitary gland	E23.0
Ovarian dysfunction	E28
Testicular dysfunction	E29
Disorders of puberty, not elsewhere classified	E30
Precocious puberty	E30.1
Delayed puberty	E30.0
Lack of expected normal physiological development in childhood and adults	R62
Malnutrition	E40-E64
Obesity	E66
Disorders of lipoprotein metabolism and other lipidemias	E78
Mental and behavioral disorders	
Dementia	F00-F03, G30-G32
Mental and behavioral disorders due to psychoactive substance use	F10-F19
Schizophrenia	F20
Mood disorder	F30-F34, F38
Depressive disorder	F32-F33
Bipolar disorder	F31
Anxiety disorder	F40-F41

Social phobia	F40.1
Somatoform disorder	F45
Hypochondriacal disorder	F45.2
Eating disorder	F50
Sleep disorder	F51, G47
Mental retardation	F70-F73, F78-F79
Psychological development disorder	F80-F84, F88-F89
Attention-deficit hyperactivity disorder	F90
Diseases of the nervous system	
Meningitis	G00-G03
Encephalitis, myelitis and encephalomyelitis	G04-G05
Parkinson's disease and Parkinsonism	G20-G21
Multiple sclerosis	G35
Neuromyelitis optica	G36.0
Epilepsy	G40-G41
Headache	G43, G44.0-G44.2, G44.8, R51
Disorders of cranial nerves other than optic, acoustic nerve	G50-G52
Nerve compression	G55.8
Hydrocephaly	G91, Q03
Spinal cord compression	G95.2
Other disorders of central nervous system	G96.8-G96.9
Arnold Chiari malformation	Q07.0
Other congenital malformations of the central nervous system	Q07.8-Q07.9
Diseases of the eye and adnexa	
Inflammatory disorders of eye	H00-H01, H03-H04, H05.0-H05.1, H10, H15-16, H20, H30, H44.0-H44.1
Cataract	H25-H26, H28.0-H28.2
Retinal detachments and breaks	H33
Retinal vascular occlusions	H34
Glaucoma	H40.0-H40.2, H40.5, H40.8-H40.9
Congenital glaucoma	Q150
Optic neuritis	H46
Disorder of optic nerve	H47.0, H47.0-5, H47.7, H48.8
Strabismus	H49-H50
Disorders of refraction and accommodation	H52
Myopia	H52.1
Visual disturbances	H53
Visual impairment including blindness	H54
Malignant neoplasm of the optic nerve	C72.3
Diseases of the ear and mastoid process	
Inflammatory disorders of ear	H60-H62, H65-H67
Disorders of vestibular function	H81
Hearing loss	H90-H91
Conductive hearing loss	H90.0-H90.2
Sensorineural hearing loss	H90.3-H90.5
Disorders of acoustic nerve	H93.3
Diseases of the circulatory system	
Primary hypertension	I10
Renovascular hypertension	I15.0
Ischemic heart disease	I20-I25
Acute myocardial infarction	I21
Pulmonary arterial hypertension	I27.0, I27.2

Pericarditis	I30-I32
Endocarditis	I33
Heart valve disorders	I34-I39
Cardiomyopathy	I40-I43
Arrhythmia	I44-I45, I47-I49, R00
Heart failure	I50
Cardiopathy	I51.6-I51.9
Hemorrhagic stroke	I60-I62
Ischemic stroke	I63
Diseases of arteries, arterioles and capillaries	I70-I79
Atherosclerosis	I70
Aneurysm and dissection	I71-I72
Diseases of veins, lymphatic vessels and lymph nodes	I80-I89
Congenital heart defect	Q20-Q24
Diseases of the respiratory system	
Acute upper respiratory infections	J00-J06
Influenza	J09-J11
Pneumonia	J12-J18
Other acute lower respiratory infections	J20-J22
Vasomotor rhinitis	J30.0
Allergic rhinitis	J30.1-J30.4
Emphysema	J43, J98.2-J98.3
Asthma	J45-J46
Bronchiectasis	J47
Adult respiratory distress syndrome	J80
Pulmonary edema	J81
Other interstitial pulmonary diseases	J84
Pneumothorax	J93
Respiratory failure	J96, J98.1
Diseases of the digestive system	
Diseases of salivary glands	K11
Stomatitis and related lesions	K12
Diseases of lips	K13.0
Granuloma and granuloma-like lesions of oral mucosa	K13.4
Diseases of tongue	K14
Diseases of esophagus	K20-K23
Gastro-esophageal reflux disease	K21
Esophageal varices	I85
Peptic ulcer	K25-K27
Gastritis and duodenitis	K29
Functional dyspepsia	K30
Polyp of stomach and duodenum	K31.7
Appendicitis	K35-K37
Hernia	K40-K46
Crohn's disease	K50
Ulcerative colitis	K51
Other noninfective gastroenteritis and colitis	K52
Paralytic ileus and intestinal obstruction without hernia	K56
Irritable bowel syndrome	K58
Constipation	K59.0
Functional diarrhea	K59.1
Diseases of anal and rectal regions	K60-K63
Hemorrhoids and perianal venous thrombosis ^a	K64
Peritonitis	K65
Diseases of liver	K70-K77

Alcoholic liver disease	K70
Toxic liver disease	K71
Disorders of gallbladder, biliary tract and pancreas	K80-K87
Cholelithiasis	K80
Cholecystitis	K81
Acute pancreatitis	K85
Gastrointestinal hemorrhage	K92.0-K92.2
Diseases of the skin and subcutaneous tissue	
Infections of the skin and subcutaneous tissue	L00-L08
Bullous disorders	L10-L14
Dermatitis and eczema	L20-L30
Papulosquamous disorders	L40-L45
Urticaria and erythema	L50-L54
Diseases of the musculoskeletal system and connective tissue	
Arthropathies	M00-M25
Infectious arthropathies	M00-M03
Rheumatoid arthritis	M05-M06
Gout	M10
Dorsopathies	M40-M54
Scoliosis	M41, Q76.3
Soft tissue disorders	M60-M79
Osteopathies and chondropathies	M80-M94
Osteoporosis	M81.5, M81.8-M81.9
Fractures	S02, S12, S22, S32, S42, S52, S62, S72, S82, S92, T02
Disorders of continuity of bone	M84
Chondropathies	M91-M94
Bone deformity	M95
Diseases of the genitourinary system	
Glomerular diseases	N00-N08
Nephrotic syndrome	N04
Renal tubule-interstitial diseases	N10-N16
Acute renal failure	N17
Chronic kidney disease	N18
Urolithiasis	N20-N23
Other disorders of kidney and ureter	N25-N29
Other diseases of the urinary system	N30-N39
Cystitis	N30
Urethritis	N34.0-N34.2
Diseases of male genital organs	N40-N51

Hyperplasia of prostate	N40
Inflammatory diseases of prostate	N41
Torsion of testis	N44
Orchitis and epididymitis	N45
Male infertility	N46
Disorders of breast	N60-N64
Inflammatory disorders of breast	N61
Inflammatory diseases of female pelvic organs	N70-N77
Salpingitis and oophoritis	N70
Inflammatory disease of uterus, except cervix	N71
Inflammatory disease of cervix uteri	N72
Other inflammation of vagina and vulva	N76
Noninflammatory disorders of female genital tract	N80-N98
Endometriosis	N80
Polyp of female genital tract	N84
Absent, scanty and rare menstruation	N91
Excessive, frequent and irregular menstruation	N92
Pain and other conditions associated with female genital organs and menstrual cycle	N94
Menopausal and other perimenopausal disorders	N95
Female infertility	N97.0-N97.3, N97.8-N97.9
Neoplasms	
Malignancies	
Lip, oral cavity, and pharynx	C00–C14
Digestive organs	C15–C26
Esophagus	C15
Stomach	C16
Small intestine	C17
Colorectum	C18-20
Anus and anal canal	C21
Liver and intrahepatic bile ducts	C22
Hepatocellular carcinoma	C22.0
Gallbladder	C23
Other and unspecified parts of biliary tract	C24
Pancreas	C25
Respiratory and intrathoracic organs	C30–C39
Bronchus and lung	C34
Bone and articular cartilage	C40, C41
Melanoma	C43
Other malignant neoplasms of the skin	C44

Mesothelial and soft tissue	C45–C49
Mesothelioma	C45
Peripheral nerves and autonomic nervous system	C47
Breast	C50
Female genital organs	C51–C58
Cervix uteri	C53
Corpus uteri	C54
Ovary	C56
Male genital organs	C60–C63
Prostate	C61
Testis	C62
Urinary tracts	C64–C68
Kidney, except renal pelvis	C64
Renal pelvis	C65
Bladder	C67
Eye, brain, and other parts of the central nervous system	C69–C72
Eye and adnexa	C69
Meninges	C70
Brain	C71
Spinal cord	C72.0-C72.1
Cranial nerves	C72.2-C72.5
Optic nerve	C72.3
Other cranial nerves	C72.2, C72.4-C72.5
Thyroid and other endocrine glands	C73–C75
Thyroid gland	C73
Ill-defined, other secondary and unspecified sites	C76–C80
Lymphoid, hematopoietic and related tissue	C81–C96
Hodgkin lymphoma	C81
Non-Hodgkin lymphoma	C82-85
Multiple myeloma	C90.0
Leukemia	C91-95
Multiple independent sites	C97
Benign	
In situ neoplasms	D00–D09
Benign neoplasms	D10–D36
Mouth, pharynx and major salivary glands	D10-D11
Colon, rectum, anus, anal canal, other and ill-defined parts of digestive system	D12-D13
Middle ear, respiratory system, other and unspecified intrathoracic organs	D14-D15
Bone and articular cartilage	D16

Breast	D24
Leiomyoma of uterus, other benign neoplasms of uterus, ovary, other and unspecified female genital organs	D25-D28
Male genital organs	D29
Urinary organs	D30
Eye and adnexa	D31
Brain and other parts of central nervous system	D33
Thyroid gland, other and unspecified endocrine glands	D34-D35
Neoplasms of unspecified behavior	D37-D48

^aDesignated code was I84 in Korea until Dec 31, 2015.

ICD : International Classification of Diseases

Table SII. Hospital use patterns in 15 main diagnostic groups

Disease category	Number of outpatient clinic visit			Number of hospitalizations			Length of hospitalizations per admission			Total length of hospitalization per patient		
	NF1	Control	AER (95% CI) ^a	NF1	Control	AER (95% CI) ^a	NF1	Control	p-value	NF1	Control	p-value
Infectious and parasitic disease	9.57±1 2.46	10.49± 14.27	-838.98 (- 865.91, - 812.06)	1.74 ±2. 17	1.55± 1.31	30.27 (25.98, 34.56)	5.55±7. 25	5±4.8 9	<0.001	11.26± 33.83	8.5±16. 24	<0.001
Malignant neoplasm	42.01± 101.15	38.84± 59.54	1726.87 (1704.96, 1748.78)	7.21 ±12 .27	5.12± 10.20	316.89 (309.15, 324.64)	9.24±7. 25	7.58± 5.56	<0.001	68.24± 143.49	42.01± 110.13	<0.001
In situ and benign neoplasm	7.06±1 2.29	5.41±8. 31	1033.86 (1015.14, 1052.57)	1.62 ±2. 46	1.31± 1.20	86.63 (82.21, 91.04)	5.86±5. 42	4.32± 3.85	<0.001	12.01± 58.32	6.2±19. 92	<0.001
Blood and blood-forming organs	5.07±2 4.63	4.53±2 5.49	90.16 (82.23, 98.09)	2.17 ±3. 48	2±3.6 9	6.00 (4.66, 7.34)	6.9±10. 82	5.63± 5.80	0.062	16.63± 48.67	13.79± 61.31	0.455
Endocrine, nutritional and metabolic disease	18.01± 33.94	20.11± 36.98	-987.10 (- 1014.66, - 959.53)	2.45 ±6. 50	2.16± 4.08	10.00 (7.48, 12.51)	6.05±8. 55	6.02± 6.73	0.928	21.21± 100.84	18±73. 95	0.392
Mental and behavioral disorders	22.84± 45.81	22.18± 46.70	580.85 (555.95, 605.76)	14.5 5±3 0.26	11.79 ±27.1 4	136.94 (130.97, 142.92)	15.18± 10.79	14.1± 9.90	0.012	335.17 ±784.8 8	268.51 ±710.0 9	0.033
Nervous system	12.26± 48.01	9.51±3 3.23	986.67 (965.85, 1007.49)	5.34 ±26 .70	3.15± 14.44	148.41 (142.86, 153.95)	8.18±9. 12	6.09± 7.52	<0.001	76.62± 293.63	37.4±1 76.84	<0.001
Eye and adnexa	14.55± 21.28	15.06± 21.86	-384.23 (- 418.04, - 350.42)	1.69 ±0. 73	1.75± 0.77	6.01 (1.90, 10.13)	1.49±1. 47	1.34± 1.26	<0.001	2.58±6. 24	2.35±9. 06	0.104
Ear and mastoid process	9.83±1 8.27	9.49±1 8.85	118.04 (94.26, 141.82)	1.35 ±0. 89	1.31± 0.80	1.12 (-0.83, 3.06)	4.48±4. 08	4.11± 3.84	0.017	6.56±1 0.30	5.42±6. 21	0.002
Circulatory system	37.1±5 2.09	36.79± 50.89	-196.42 (- 234.71, -	3.07 ±7.	2.35± 5.69	88.27 (82.27, 94.28)	6.21±6. 82	4.85± 5.48	<0.001	40.42± 184.56	21.26± 120.16	<0.001

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Respiratory system	53.04± 62.33	53.97± 60.88	-324.39 (- 391.91, - 256.87)	2.45 ±3. 88	2.08± 2.92	64.07 (57.90, 70.24)	5.97±5. 26	5.08± 4.30	<0.001	17.25± 46.99	12.41± 40.77	<0.001	
Digestive system	15.36± 23.62	16.46± 25.91	-716.70 (- 751.96, - 681.45)	1.78 ±2. 35	1.75± 2.51	12.14 (6.72, 17.57)	4.8±4.8	4.39± 4.22	<0.001	10.15± 26.93	9.41±3 0.06	0.091	
Skin and subcutaneous tissue	14.86± 28.46	17.45± 27.83	-2005.60 (- 2040.80, - 1970.40)	1.52 ±2. 24	1.42± 1.67	8.28 (6.25, 10.30)	7.33±8. 38	6.55± 6.56	0.011	13.72± 39.88	10.52± 26.48	0.025	
Musculoskeletal system and connective tissue	50.94± 115.50	50.57± 110.29	352.42 (290.70, 414.13)	2.79 ±6. 08	2.51± 3.97	26.63 (19.93, 33.33)	8.61±7. 18	7.72± 6.81	<0.001	29.48± 91.33	23.18± 60.37	<0.001	
Genitourinary system	17.2±5 5.54	19.31± 61.53	-1655.61 (- 1687.55, - 1623.66)	1.78 ±2. 94	1.82± 3.55	-8.73 (- 12.68, -4.77)	4.94±4. 66	4.29± 4.37	<0.001	11.21± 49.65	11.21± 63.26	0.998	

^aAER per 10,000 person-years

NF1 : neurofibromatosis type 1, AER : absolute excess risk, 95% CI : 95% confidence interval

Table SIII. Three main diagnostic groups with high absolute excess risk of hospital use by age group

Age group	Outpatient clinic				Inpatient hospitalization			
	Category	NFI	Control	AER (95% CI) ^a	Category	NFI	Control	AER (95% CI) ^a
0-9	Respiratory system	148,206.10	145,572.50	2,633.52 (2,183.56, 3,083.47)	Malignant neoplasms	437.05	52.94	384.11 (362.49, 405.72)
	Nervous system	3,667.05	1,354.08	2,312.97 (2,247.90, 2,378.04)	Respiratory system	1,535.29	1,243.62	291.68 (246.88, 336.47)
	Mental and behavioral disorders	2,803.65	1,239.04	1,564.61 (1,507.09, 1,622.12)	Nervous system	455.24	225.41	229.83 (206.47, 253.18)
10-14	Respiratory system	45,030.97	39,515.67	5,515.30 (5,190.34, 5,840.27)	Nervous system	454.44	24.46	429.98 (400.99, 458.97)
	Mental and behavioral disorders	5,494.40	2,222.21	3,272.19 (3,165.80, 3,378.58)	Malignant neoplasms	297.44	33.40	264.05 (240.37, 287.72)
	Eye and adnexa	8,798.41	7,547.94	1,250.47 (1,107.19, 1,393.75)	Respiratory system	282.31	173.57	108.74 (83.89, 133.59)
15-19	Respiratory system	27,958.71	25,964.44	1,994.27 (1,746.70, 2,241.85)	Malignant neoplasms	462.20	45.24	416.96 (388.67, 445.24)
	Malignant neoplasms	1,820.01	227.52	1,592.48 (1,536.11, 1,648.86)	Nervous system	277.58	32.38	245.20 (223.22, 267.19)
	Mental and behavioral disorders	4,147.17	2,706.85	1,440.32 (1,348.36, 1,532.28)	Benign neoplasms	151.45	41.05	110.40 (93.76, 127.03)
20-29	Benign neoplasms	2,703.54	1,172.13	1,531.41 (1,483.27, 1,579.55)	Malignant neoplasms	251.47	33.71	217.77 (203.73, 231.80)
	Malignant neoplasms	1,867.12	398.26	1,468.86 (1,430.14, 1,507.57)	Benign neoplasms	164.20	53.78	110.42 (98.74, 122.10)
	Nervous system	2,418.68	1,081.11	1,337.58 (1,291.96, 1,383.20)	Nervous system	110.31	38.40	71.91 (62.31, 81.51)
30-39	Malignant neoplasms	2,968.13	942.86	2,025.27 (1,977.94, 2,072.60)	Malignant neoplasms	444.15	79.85	364.30 (346.37, 382.23)
	Benign neoplasms	3,167.96	1,855.41	1,312.55 (1,261.75, 1,363.36)	Benign neoplasms	191.47	93.14	98.33 (86.01, 110.65)
	Nervous system	2,372.90	1,564.69	808.21 (763.80, 852.62)	Nervous system	133.28	52.57	80.71 (70.57, 90.85)

40-49	Malignant neoplasms	5,120.84	2,284.17	2,836.67 (2,776.43, 2,896.91)	Malignant neoplasms	641.47	223.14	418.34 (397.32, 439.36)
	Benign neoplasms	4,237.20	2,612.50	1,624.70 (1,568.58, 1,680.82)	Nervous system	217.05	83.35	133.70 (121.41, 145.99)
	Nervous system	3,293.67	2,149.17	1,144.50 (1,094.78, 1,194.22)	Benign neoplasms	280.00	148.95	131.05 (116.79, 145.31)
50-59	Malignant neoplasms	6,566.51	3,919.26	2,647.28 (2,577.72, 2,716.83)	Malignant neoplasms	760.41	356.75	403.67 (380.41, 426.92)
	Musculoskeletal system and connective tissue	45,166.30	42,562.33	2,603.97 (2,413.16, 2,794.77)	Mental and behavioral disorders	464.60	219.58	245.02 (226.84, 263.21)
	Benign neoplasms	4,108.63	2,857.52	1,251.11 (1,195.36, 1,306.86)	Circulatory system	416.10	277.53	138.57 (120.90, 156.25)
60+	Malignant neoplasms	7,741.16	6,857.04	884.12 (812.88, 955.36)	Mental and behavioral disorders	807.23	474.75	332.49 (310.35, 354.63)
	Mental and behavioral disorders	9,690.26	9,020.80	669.47 (589.32, 749.61)	Circulatory system	883.00	656.91	226.10 (202.46, 249.73)
	Nervous system	6,933.26	6,386.78	546.48 (478.77, 614.19)	Malignant neoplasms	858.90	635.49	223.41 (200.11, 246.71)

^aAER per 10,000 person-years

NF1 : neurofibromatosis type 1, AER : absolute excess risk, 95% CI : 95% confidence interval

Table SIV. Incidence of non-neoplastic comorbidities and complications that did not show a high rate ratio in patients with neurofibromatosis type 1 compared with that in the control group

Conditions	NF1	Control	RR (95% CI)
Infectious and parasitic disease			
Intestinal infectious diseases	13,562	43,348	0.93 (0.91, 0.95)
Infections with a predominantly sexual mode of transmission	2,146	9,555	0.67 (0.64, 0.71)
Viral infections	11,044	38,042	0.84 (0.83, 0.86)
Viral infections of the central nervous system	88	279	0.97 (0.76, 1.23)
Viral hepatitis	1,565	5,495	0.87 (0.82, 0.92)
Human immunodeficiency virus disease	19	51	1.14 (0.67, 1.93)
Mycoses	10,668	37,528	0.82 (0.80, 0.83)
Parasitic infection	706	2,304	0.94 (0.86, 1.02)
Diseases of the blood and blood-forming organs			
Disorders involving the immune mechanism	65	181	1.10 (0.83, 1.46)
Endocrine, nutritional and metabolic diseases			
Thyroid disease	7,532	23,180	0.98 (0.96, 1.01)
Hyperthyroidism	907	2,734	1.02 (0.94, 1.10)
Hypothyroidism	2,296	7,292	0.96 (0.92, 1.01)
Diabetes mellitus	6,091	19,312	0.95 (0.93, 0.98)
Type 1 diabetes mellitus	293	977	0.92 (0.81, 1.05)
Type 2 diabetes mellitus	4,882	16,002	0.92 (0.89, 0.95)
Hyperparathyroidism	114	295	1.18 (0.95, 1.47)
Ovarian dysfunction	241	1,070	0.69 (0.60, 0.79)
Testicular dysfunction	84	289	0.89 (0.70, 1.13)
Disorders of puberty, not elsewhere classified	400	1,105	1.11 (0.99, 1.24)
Precocious puberty	347	974	1.09 (0.97, 1.23)
Delayed puberty	7	9	2.38 (0.89, 6.40)
Obesity	95	442	0.66 (0.53, 0.82)
Disorders of lipoprotein metabolism and other lipemias	12,488	38,034	0.99 (0.97, 1.01)
Mental and behavioral disorders			
Social phobia	80	267	0.92 (0.71, 1.18)
Somatoform disorder	1,590	4,886	1.00 (0.94, 1.05)
Hypochondriacal disorder	39	139	0.86 (0.60, 1.23)
Eating disorder	75	196	1.17 (0.90, 1.53)
Diseases of the nervous system			

Meningitis	167	449	1.14 (0.95, 1.36)
Neuromyelitis optica	3	7	1.31 (0.34, 5.08)
Disorders of cranial nerves other than optic, acoustic nerve	974	2,791	1.07 (0.99, 1.15)
Nerve compression	26	52	1.53 (0.96, 2.45)
Diseases of the eye and adnexa			
Inflammatory disorders of eye	21,953	69,015	0.91 (0.89, 0.92)
Cataract	4,538	14,102	0.98 (0.95, 1.02)
Retinal vascular occlusions	308	950	0.99 (0.87, 1.13)
Glaucoma	6,543	20,566	0.96 (0.94, 0.99)
Congenital glaucoma	15	25	1.84 (0.97, 3.49)
Diseases of the ear and mastoid process			
Inflammatory disorders of ear	12,447	38,785	0.98 (0.96, 0.99)
Disorders of vestibular function	5,142	15,544	1.01 (0.98, 1.05)
Hearing loss	2,416	7,702	0.96 (0.92, 1.00)
Conductive hearing loss	130	427	0.93 (0.77, 1.13)
Sensorineural hearing loss	1,305	3,980	1.00 (0.94, 1.07)
Disorders of acoustic nerve	6	27	0.68 (0.28, 1.65)
Diseases of the circulatory system			
Acute myocardial infarction	337	1,050	0.98 (0.87, 1.11)
Endocarditis	17	33	1.58 (0.88, 2.83)
Heart valve disorders	227	682	1.02 (0.88, 1.18)
Cardiomyopathy	142	366	1.19 (0.98, 1.44)
Diseases of arteries, arterioles and capillaries	5,660	16,931	1.02 (0.99, 1.06)
Atherosclerosis	1,310	4,083	0.98 (0.92, 1.04)
Diseases of veins, lymphatic vessels and lymph nodes	6,346	19,850	0.97 (0.95, 1.00)
Congenital heart defect	303	866	1.07 (0.94, 1.22)
Diseases of the respiratory system			
Acute upper respiratory infections	25,954	80,000	0.90 (0.89, 0.91)
Influenza	3,465	10,853	0.97 (0.94, 1.01)
Other acute lower respiratory infections	24,689	76,431	0.94 (0.92, 0.95)
Vasomotor rhinitis	2,039	6,783	0.92 (0.87, 0.96)
Allergic rhinitis	24,859	77,201	0.90 (0.89, 0.92)
Bronchiectasis	386	1,183	1.00 (0.89, 1.12)
Other interstitial pulmonary diseases	137	379	1.11 (0.91, 1.35)
Diseases of the digestive system			
Diseases of salivary glands	315	1,325	0.73 (0.64, 0.82)
Stomatitis and related lesions	3,244	9,832	1.01 (0.97, 1.05)
Diseases of lips	77	373	0.63 (0.49, 0.81)
Granuloma and granuloma-like lesions of	8	48	0.51 (0.24, 1.08)

oral mucosa			
Diseases of tongue	346	1,225	0.86 (0.77, 0.97)
Diseases of esophagus	19,479	59,878	0.96 (0.95, 0.98)
Gastro-esophageal reflux disease	19,430	59,719	0.96 (0.95, 0.98)
Esophageal varices	51	248	0.63 (0.47, 0.85)
Gastritis and duodenitis	26,186	79,132	0.96 (0.95, 0.98)
Functional dyspepsia	19,207	61,073	0.90 (0.88, 0.91)
Appendicitis	811	2,488	1.00 (0.92, 1.08)
Hernia	466	1,356	1.05 (0.95, 1.17)
Crohn's disease	62	152	1.25 (0.93, 1.68)
Ulcerative colitis	124	357	1.06 (0.87, 1.30)
Other noninfective gastroenteritis and colitis	6,438	19,939	0.98 (0.96, 1.01)
Irritable bowel syndrome	9,787	31,734	0.92 (0.90, 0.94)
Diseases of anal and rectal regions	4,494	14,761	0.92 (0.89, 0.95)
Diseases of liver	10,850	33,710	0.97 (0.95, 0.99)
Alcoholic liver disease	776	2,806	0.84 (0.78, 0.91)
Disorders of gallbladder, biliary tract and pancreas	3,369	10,277	1.00 (0.96, 1.04)
Cholelithiasis	1,293	4,161	0.95 (0.89, 1.01)
Cholecystitis	361	1,039	1.06 (0.94, 1.20)
Diseases of the skin and subcutaneous tissue			
Infections of the skin and subcutaneous tissue	16,394	53,587	0.90 (0.88, 0.91)
Bullous disorders	146	495	0.90 (0.75, 1.09)
Dermatitis and eczema	21,616	70,773	0.80 (0.79, 0.82)
Papulosquamous disorders	693	3,040	0.69 (0.64, 0.75)
Urticaria and erythema	10,696	36,126	0.87 (0.85, 0.89)
Diseases of the musculoskeletal system and connective tissue			
Arthropathies	18,217	55,083	1.01 (0.99, 1.02)
Infectious arthropathies	306	827	1.13 (0.99, 1.29)
Rheumatoid arthritis	1,880	5,886	0.98 (0.93, 1.03)
Gout	1,752	6,457	0.83 (0.78, 0.87)
Soft tissue disorders	21,576	67,069	0.94 (0.92, 0.95)
Osteopathies and chondropathies			
Fractures	6,932	21,056	1.01 (0.98, 1.03)
Chondropathies	403	1,502	0.82 (0.74, 0.92)
Diseases of the genitourinary system			
Glomerular diseases	845	2,899	0.89 (0.82, 0.96)
Nephrotic syndrome	112	367	0.93 (0.76, 1.15)
Acute renal failure	443	1,228	1.11 (0.99, 1.23)
Chronic kidney disease	489	1,666	0.90 (0.81, 0.99)

Urolithiasis	1,083	3,964	0.83 (0.78, 0.89)
Other disorders of kidney and ureter	903	2,874	0.96 (0.89, 1.04)
Other diseases of the urinary system	10,782	35,253	0.90 (0.88, 0.92)
Cystitis	5,215	18,169	0.86 (0.83, 0.89)
Urethritis	1,511	6,416	0.71 (0.67, 0.75)
Diseases of male genital organs	4,333	14,388	0.91 (0.88, 0.94)
Hyperplasia of prostate	3,390	10,318	1.00 (0.96, 1.04)
Inflammatory diseases of prostate	1,516	5,750	0.80 (0.76, 0.85)
Torsion of testis	4	25	0.49 (0.17, 1.41)
Orchitis and epididymitis	204	911	0.68 (0.59, 0.80)
Male infertility	78	353	0.68 (0.53, 0.86)
Disorders of breast	2,247	8,296	0.82 (0.78, 0.86)
Inflammatory disorders of breast	81	345	0.72 (0.56, 0.92)
Inflammatory diseases of female pelvic organs	6,621	24,022	0.80 (0.78, 0.83)
Salpingitis and oophoritis	131	522	0.77 (0.63, 0.93)
Inflammatory disease of uterus, except cervix	488	2,259	0.66 (0.60, 0.72)
Inflammatory disease of cervix uteri	3,510	14,197	0.74 (0.71, 0.76)
Other inflammation of vagina and vulva	5,291	20,059	0.77 (0.75, 0.80)
Noninflammatory disorders of female genital tract	6,128	21,665	0.84 (0.81, 0.86)
Endometriosis	562	1,780	0.97 (0.88, 1.06)
Polyp of female genital tract	592	2,010	0.90 (0.82, 0.99)
Absent, scanty and rare menstruation	760	2,760	0.84 (0.78, 0.91)
Excessive, frequent and irregular menstruation	611	2,348	0.79 (0.73, 0.87)
Pain and other conditions associated with female genital organs and menstrual cycle	484	1,903	0.78 (0.70, 0.86)
Menopausal and other perimenopausal disorders	1,940	7,103	0.83 (0.79, 0.87)
Female infertility	417	1,716	0.74 (0.67, 0.83)

NF1 : neurofibromatosis type 1, RR : rate ratio, 95% CI : 95% confidence interval

Table SV. Age-specific incidence of malignant neoplasms in patients with neurofibromatosis type 1

Conditions	Age group	NF1	Control	RR (95% CI)
Lip, oral cavity, and pharynx	0-9	0.27	0.00	-
	10-14	0.47	0.16	3.02 (0.19, 48.22)
	15-19	0.44	0.15	3.02 (0.19, 48.27)
	20-29	0.78	0.19	4.05 (0.91, 18.08)
	30-39	1.07	0.18	6.11 (1.53, 24.42)
	40-49	0.81	0.53	1.53 (0.52, 4.47)
	50-59	1.45	1.78	0.81 (0.39, 1.70)
	60+	2.93	2.79	1.05 (0.65, 1.70)
Digestive organs	0-9	0.27	0.09	2.98 (0.19, 47.65)
	10-14	0.00	0.47	-
	15-19	0.87	0.15	6.04 (0.55, 66.60)
	20-29	3.91	0.77	5.06 (2.47, 10.35)
	30-39	11.03	5.01	2.20 (1.59, 3.05)
	40-49	28.82	13.16	2.19 (1.81, 2.65)
	50-59	49.46	29.84	1.66 (1.44, 1.90)
	60+	76.30	63.95	1.19 (1.08, 1.31)
Respiratory and intrathoracic organs	0-9	0.80	0.09	8.94 (0.93, 85.97)
	10-14	1.42	0.31	4.52 (0.76, 27.07)
	15-19	2.18	0.15	15.10 (1.76, 129.22)
	20-29	2.93	0.39	7.59 (2.94, 19.56)
	30-39	4.09	0.76	5.40 (2.74, 10.66)
	40-49	6.76	2.26	2.99 (1.95, 4.57)
	50-59	12.3	7.73	1.62 (1.23, 2.13)
	60+	30.23	21.92	1.38 (1.18, 1.61)
Bone and articular cartilage	0-9	0.80	0.36	2.24 (0.50, 9.99)
	10-14	1.89	0.31	6.03 (1.10, 32.93)
	15-19	3.49	0.43	8.05 (2.14, 30.35)
	20-29	2.34	0.52	4.55 (1.86, 11.14)
	30-39	2.49	0.58	4.27 (1.90, 9.62)
	40-49	1.93	0.63	3.06 (1.37, 6.81)
	50-59	3.21	0.68	4.73 (2.35, 9.50)
	60+	1.73	1.02	1.70 (0.87, 3.35)
Melanoma	0-9	0.27	0.27	0.99 (0.10, 9.55)
	10-14	0.00	0.16	-
	15-19	0.44	0.58	0.75 (0.08, 6.75)

	20-29	0.00	0.39	-
	30-39	0.18	0.41	0.44 (0.05, 3.54)
	40-49	1.29	0.74	1.75 (0.73, 4.17)
	50-59	1.45	1.36	1.06 (0.50, 2.27)
	60+	4.00	2.71	1.47 (0.96, 2.28)
Non-melanoma skin cancer	0-9	0.80	0.72	1.12 (0.30, 4.21)
	10-14	0.00	0.47	-
	15-19	0.00	0.43	-
	20-29	1.37	1.03	1.33 (0.55, 3.23)
	30-39	1.78	1.57	1.13 (0.55, 2.34)
	40-49	3.22	2.21	1.46 (0.86, 2.48)
	50-59	4.34	4.49	0.96 (0.63, 1.49)
	60+	15.31	20.65	0.74 (0.61, 0.91)
Mesothelial and soft tissue	0-9	7.22	1.44	5.03 (2.71, 9.34)
	10-14	7.09	0.94	7.54 (2.93, 19.43)
	15-19	20.51	0.72	28.38 (11.29, 71.36)
	20-29	22.84	1.67	13.66 (8.93, 20.89)
	30-39	24.73	1.12	22.34 (13.83, 36.07)
	40-49	20.61	2.21	9.32 (6.58, 13.21)
	50-59	19.59	2.46	7.98 (5.70, 11.17)
	60+	18.11	7.49	2.42 (1.93, 3.02)
Breast	0-9	0.27	0.00	-
	10-14	0.00	0.00	-
	15-19	0.00	0.00	-
	20-29	2.15	1.09	1.96 (0.92, 4.19)
	30-39	9.97	4.26	2.34 (1.65, 3.32)
	40-49	29.30	16.80	1.74 (1.45, 2.09)
	50-59	24.25	13.59	1.78 (1.46, 2.18)
	60+	10.79	9.61	1.12 (0.87, 1.45)
Female genital organs	0-9	0.54	0.09	5.96 (0.54, 65.74)
	10-14	1.89	0.16	12.06 (1.35, 107.93)
	15-19	0.44	0.29	1.51 (0.14, 16.65)
	20-29	1.76	1.74	1.01 (0.48, 2.15)
	30-39	3.74	3.38	1.11 (0.67, 1.82)
	40-49	7.57	5.42	1.40 (0.99, 1.97)
	50-59	9.31	5.17	1.80 (1.30, 2.49)
	60+	5.73	5.54	1.03 (0.73, 1.46)
Male genital organs	0-9	0.00	0.00	-
	10-14	0.47	0.00	-
	15-19	0.44	0.00	-

	20-29	0.39	0.52	0.76 (0.16, 3.57)
	30-39	0.89	0.47	1.91 (0.62, 5.83)
	40-49	1.45	0.84	1.72 (0.76, 3.89)
	50-59	3.69	3.55	1.04 (0.65, 1.67)
	60+	26.63	22.43	1.19 (1.01, 1.40)
Urinary tracts	0-9	0.54	0.27	1.99 (0.33, 11.89)
	10-14	0.95	0.00	-
	15-19	0.44	0.00	-
	20-29	0.78	0.52	1.52 (0.46, 5.04)
	30-39	1.25	1.22	1.02 (0.43, 2.39)
	40-49	2.58	2.26	1.14 (0.64, 2.02)
	50-59	5.78	5.44	1.06 (0.73, 1.55)
	60+	11.45	13.50	0.85 (0.67, 1.08)
Eye, brain, and other parts of the CNS	0-9	25.68	0.72	35.77 (17.39, 73.58)
	10-14	14.66	0.47	31.17 (9.53, 101.94)
	15-19	20.08	0.43	46.30 (14.40, 148.86)
	20-29	13.47	0.45	29.92 (13.75, 65.10)
	30-39	12.63	0.76	16.67 (9.23, 30.12)
	40-49	10.47	1.00	10.46 (6.28, 17.44)
	50-59	9.31	1.52	6.15 (3.94, 9.60)
	60+	7.32	2.79	2.62 (1.83, 3.75)
Thyroid and other endocrine glands	0-9	4.55	0.27	16.89 (4.95, 57.64)
	10-14	1.89	0.47	4.02 (0.90, 17.97)
	15-19	3.06	1.59	1.92 (0.74, 4.96)
	20-29	4.88	6.69	0.73 (0.47, 1.13)
	30-39	16.19	15.04	1.08 (0.85, 1.37)
	40-49	23.03	22.64	1.02 (0.84, 1.23)
	50-59	25.86	24.72	1.05 (0.87, 1.25)
	60+	17.18	14.43	1.19 (0.97, 1.46)
Lymphoid, hematopoietic and related tissue	0-9	6.42	1.26	5.11 (2.64, 9.88)
	10-14	4.73	1.41	3.35 (1.36, 8.25)
	15-19	5.24	1.30	4.03 (1.70, 9.55)
	20-29	2.93	1.54	1.90 (1.00, 3.62)
	30-39	3.20	2.16	1.49 (0.85, 2.61)
	40-49	3.70	3.42	1.08 (0.67, 1.74)
	50-59	6.91	4.96	1.39 (0.97, 1.99)
	60+	9.59	8.30	1.16 (0.88, 1.51)

NF1 : neurofibromatosis type 1, RR : rate ratio, 95% CI : 95% confidence interval, CNS : central nervous system