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**Glomerular hyperfiltration is associated with high risk of dementia:
Nationwide population-based study**

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Objectives: Because prevention of dementia is critical before it occurs, identifying the risk factor of dementia is important. The object of this study is to identify the risk of dementia in people with glomerular hyperfiltration.

Methods: Using Korean National Health Insurance Database (NHID), we retrospectively reviewed total of 2,259,502 people, excluding ESRD patients and people with dementia before taking national health screening. Study population was divided into gender and age of five-years interval group. All eGFR \geq 95 percentile subjects in each group which was divided into sex and age of five-years were defined as hyperfiltration group. All 50 percentile \leq eGFR $<$ 65 percentile subjects in each group which was divided into sex and age of five-years were defined as reference group. The hazard ratios (HR) for all type dementia, vascular dementia and Alzheimer's dementia were calculated based on the estimated glomerular filtration rate group after adjustment for multiple variables.

Results: The corresponding eGFR values of hyperfiltration group were \geq 114 mL/min/1.73m² in 45-49 years old male, \geq 83 mL/min/1.73m² in \geq 90 years old male and \geq 117 mL/min/1.73m² in 45-49 years old female, \geq 85 mL/min/1.73m² in \geq 90 years old female. The hyperfiltration group (eGFR \geq 95percentile) showed a higher risk of all type dementia compared with the reference group (50percentile \leq eGFR $<$ 65percentile), with the following HRs: 1.07 (95% CI: 1.014–1.130). The hyperfiltration group had higher risk of vascular dementia with the following HR: 1.20 (95% CI: 1.027–1.392). The relationship between hyperfiltration and Alzheimer's dementia was not statistically significant, with the following HRs: 1.029 (95% CI: 0.967–1.096).

Conclusions: Glomerular hyperfiltration is associated with increased risk of dementia, especially vascular dementia.

Figure 1. HR of all type dementia, Alzheimer's dementia, Vascular dementia

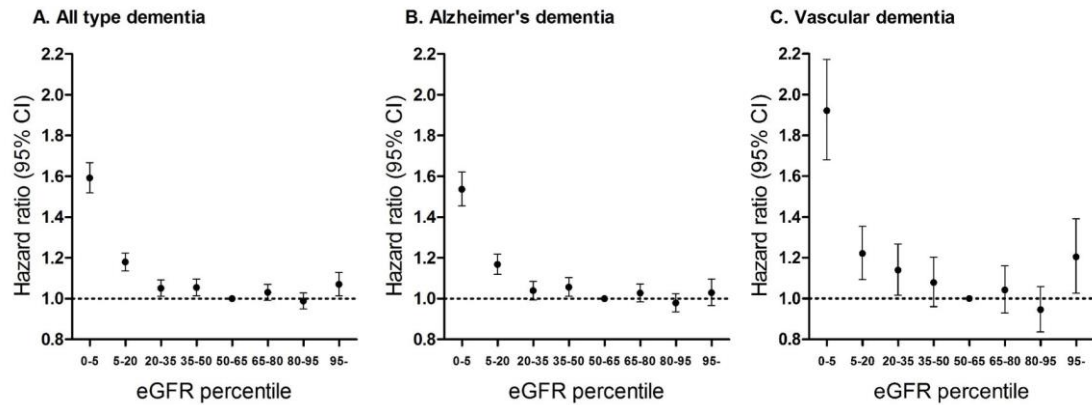


Table 1. Baseline characteristics, Table 2. Incidence of all type dementia, AD, VD

Table 1. Baseline characteristics of the study groups according to eGFR percentile

Baseline characteristics	eGFR percentile group								p-value
	<5p (n=113906)	5p≤ <20p (n=336179)	20p≤ <35p (n=361746)	35p≤ <50p (n=315280)	50p≤ <65p (n=351498)	65p≤ <80p (n=327244)	80p≤ <95p (n=335592)	95p≤ (n=118057)	
Age (years old)	58.9±9.5	58.9±9.8	58.9±9.3	58.7±9.9	57.9±9.1	59.3±10.1	57.8±9.4	57.6±9.5	<.0001
Male (%)	48.02	47.42	46.45	51.98	47.92	48.09	48.90	46.72	<.0001
Smoker									<.0001
Never smoker (%)	65.94	66.51	66.80	62.97	64.74	64.53	62.94	63.77	
Ex-smoker (%)	18.59	18.07	17.39	18.69	17.84	17.19	17.11	15.15	
Current smoker (%)	15.47	15.41	15.81	18.34	17.43	18.28	19.95	21.08	
Drinker									<.0001
Non drinker (%)	66.9	63.91	63.45	60.11	60.22	60.89	58.28	58.33	
Mild drinker (%)	28.33	30.81	30.91	33.15	33.19	32.13	33.83	32.95	
Heavy drinker (%)	4.77	5.28	5.65	6.74	6.59	6.97	7.89	8.72	
Exercise (%)	21.73	22.52	22.68	22.28	22.32	21.6	21.47	20.35	<.0001
Income (Q1) (%)	24.05	21.89	21.55	20.94	21.81	21.12	22.2	23.33	<.0001
BMI (kg/m ²)	24.6±3.24	24.34±3.09	24.22±3.06	24.14±3.05	23.97±3.07	23.94±3.09	23.82±3.13	23.66±3.24	<.0001
DM (%)	24.21	15.91	14.45	14.25	13.76	14.64	14.7	16.09	<.0001
HTN (%)	54.32	43.05	40.72	39.83	37.67	40.1	37.84	38.61	<.0001
Hyperlipidemia (%)	42.69	35.35	33.65	31.79	30.34	30.97	29.06	28.22	<.0001
Creatinine (mg/dL)	1.57±1.29	1.03±0.16	0.92±0.13	0.86±0.14	0.8±0.1	0.72±0.12	0.66±0.11	0.55±0.1	<.0001
eGFR (mL/min/1.73m ²)	52.77±15.39	70.24±9.26	79.39±7.09	88.43±9.53	94.85±6.8	97.71±7.24	102.09±6.96	109.77±8.35	<.0001
waist circumference (cm)	82.83±9.17	82.1±8.87	81.85±8.73	82.02±8.6	81.32±8.73	81.54±8.64	81.17±8.71	80.78±8.8	<.0001
Glucose (mg/dL)	105.13±31.05	101.88±25.24	101.18±24.4	101.03±24.67	100.6±24.66	100.74±25.07	100.75±25.88	101.43±27.65	<.0001

eGFR, estimated glomerular filtration rate; BMI, body mass index; DM, diabetes mellitus; HTN, hypertension;

Table 2. The incidence of all, Alzheimer's, vascular dementia according to eGFR

	<5p (n=113906)	5p≤ <20p (n=336179)	20p≤ <35p (n=361746)	35p≤ <50p (n=315280)	50p≤ <65p (n=351498)	65p≤ <80p (n=327244)	80p≤ <95p (n=335592)	95p≤ (n=118057)
All type Dementia	2802 (2.46%)	6540 (1.95%)	5658 (1.56%)	5640 (1.79%)	4775 (1.36%)	6042 (1.85%)	4748 (1.41%)	1779 (1.51%)
Vascular dementia	399 (0.35%)	786 (0.23%)	728 (0.20%)	658 (0.21%)	571 (0.16%)	698 (0.21%)	536 (0.16%)	236 (0.20%)
Alzheimer's dementia	2101 (1.84%)	5052 (1.50%)	4341 (1.20%)	4428 (1.40%)	3705 (1.05%)	4716 (1.44%)	3660 (1.09%)	1332 (1.13%)

eGFR, estimated glomerular filtration rate