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Cognitive Decline in Older Adults After Incident Coronary Heart Disease or After First Receipt of CABG Surgery or PCI

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Rationale and Research Questions

- Cardiovascular health and disease are important determinants of cognitive decline
- Population-based longitudinal studies of this issue are needed
- Hypotheses:
  - Incident CHD leads to faster long-term cognitive decline in older adults
  - Among older adults with CHD, treatment with CABG surgery or PCI leads to slower long-term cognitive decline

Methods

- Cardiovascular Health Study (CHS): population-based longitudinal cohort of 5,888 US adults aged 65+ at enrollment in 1989-1992
- Incident CHD is defined as diagnosis of myocardial infarction or definite angina, adjudicated by committee
- Revascularization procedures included CABG (coronary artery bypass graft) and PCI (percutaneous coronary intervention)
- Cognitive function assessed annually
  - Global cognition: Modified Mini-Mental State Exam (3MS) annually 1990-1998 (up to 9 times)
- Linear mixed models to estimate average rates of decline in 3MS scores by CHD status (incident or no CHD), adjusted for demographics, health behaviors, physiological and clinical characteristics
- We excluded participants with prevalent stroke and censored them at incident stroke

Results

Figure 1. 3MS trajectories by age and CHD

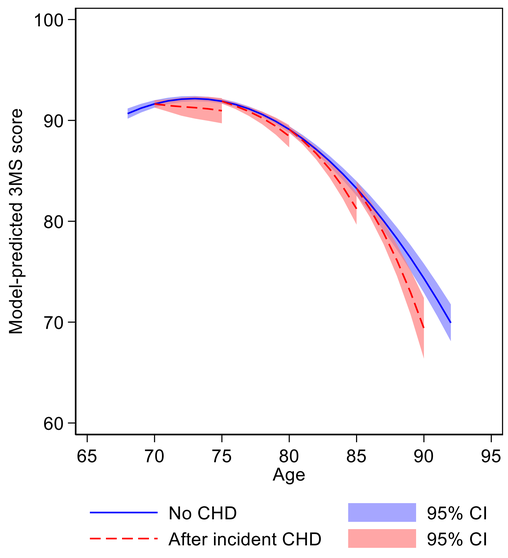
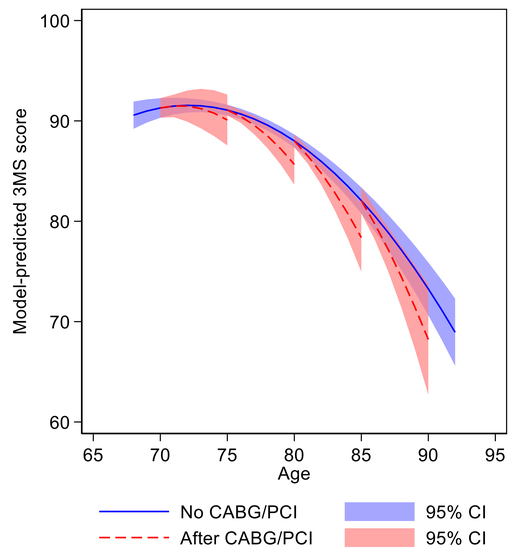


Figure 2. 3MS trajectories by age and CABG/PCI



Trajectories shown in the graphs are adjusted for baseline values of sex, race, education, smoking, alcohol use, beta blocker use, ACE inhibitor use, body mass index, hypertension, systolic blood pressure, chronic kidney disease, chronic obstructive pulmonary disease, anemia, diabetes, atrial fibrillation, and heart failure.

- 3MS analysis (global cognition) and incident CHD:
  - 4,122 older adults with no CHD, 398 with incident CHD during a mean of 5.9 years of follow-up
  - Model-predicted 3MS score declined faster after incident CHD, especially for CHD diagnosed at age 80 or later (**Figure 1** and **Table 2**)
- 3MS analysis (global cognition) and CABG surgery or PCI:
  - 1,183 older adults with incident CHD, 118 had their first CABG/PCI during a mean of 4.1 years of follow-up
  - Model-predicted 3MS score declined faster after first receipt of CABG/PCI (**Figure 2** and **Table 3)**

Conclusions

- Older adults diagnosed with incident CHD experienced faster average cognitive decline than those without CHD
- Treatment with CABG/PCI did not slow cognitive decline among older adults with CHD
- This may be due to adverse effects of CABG/PCI on brain health or CABG/PCI recipients having more severe CHD

Funding

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Additional Results

Table 1. Participant baseline characteristics

Characteristic	Participants diagnosed with incident CHD during follow-up (N = 398)	Participants not diagnosed with incident CHD during follow-up (N = 3,724)	Participants with CHD who had first receipt of CABG/PCI during follow-up (N = 118)	Participants with CHD who did not have CABG/PCI during follow-up (N = 1,065)
Age, y, mean (SD)	73.4 (5.1)	72.8 (5.3)	72.0 (4.2)	74.1 (5.7)
Male, %	52.0	37.6	56.8	48.0
Black race, %	11.1	15.1	14.4	13.2
Years of education through 12th grade, mean (SD)	11.0 (2.0)	11.0 (1.9)	11.3 (1.7)	10.8 (2.1)
Any education beyond 12th grade, %	44.0	44.6	44.9	38.1
Former smoking, %	46.0	39.9	48.3	44.5
Current smoking, %	10.6	12.2	14.4	11.1
Any current alcohol use, %	49.3	51.8	50.9	47.9
Among drinkers: drinks/week, mean (SD)	4.7 (8.2)	5.2 (8.6)	3.4 (5.3)	4.3 (7.5)
Beta-blocker use, %	11.8	9.1	14.4	21.7
Angiotensin converting enzyme inhibitor use, %	6.3	6.2	5.1	7.9
Systolic blood pressure, mm Hg, mean (SD)	141.0 (21.6)	135.6 (21.4)	136.1 (20.1)	137.0 (22.5)
Body mass index, kg/m^2, mean (SD)	27.0 (4.6)	26.5 (4.7)	27.1 (4.2)	27.0 (4.8)
Chronic kidney disease, %	41.7	35.5	32.2	45.6
Chronic obstructive pulmonary disease, %	16.3	12.0	15.3	17.0
Anemia, %	7.3	7.5	5.9	8.4
Diabetes, %	18.3	12.8	20.3	18.9
Hypertension, %	63.6	54.5	57.6	64.0
Heart failure, %	2.8	1.6	2.5	8.3
Atrial fibrillation, %	1.8	2.2	1.7	2.6

Table 2. Model-predicted 5-year declines in mean 3MS score by age and incident CHD status

	Model-predicted 5-year decline (95% CI)			
CHD	**70 to 75 y of age**	**75 to 80 y of age**	**80 to 85 y of age**	**85 to 90 y of age**
No CHD diagnosed before or during the 5-year interval	-0.3 (-0.6, 0.0)	2.8 (2.5, 3.1)	5.9 (5.4, 6.3)	8.9 (8.1, 9.7)
Incident CHD diagnosed at beginning of the 5-year interval	0.7 (-0.6, 1.9)	3.5 (2.4, 4.6)	7.9 (6.3, 9.4)	13.9 (11.0, 16.7)
Difference (incident CHD minus no CHD)	0.9 (-0.3, 2.2)	0.7 (-0.4, 1.8)	2.0 (0.5, 3.6)	5.0 (2.1, 7.8)

Table 3. Model-predicted 5-year declines in mean 3MS score by age and CABG/PCI status

	Model-predicted 5-year decline (95% CI)			
CABG/PCI	**70 to 75 y of age**	**75 to 80 y of age**	**80 to 85 y of age**	**85 to 90 y of age**
No receipt of CABG/PCI before or during the 5-year interval	0.2 (-0.6, 1.0)	3.1 (2.5, 3.6)	6.0 (5.0, 6.8)	8.8 (7.3, 10.3)
First receipt of CABG/PCI at beginning of the 5-year interval	1.2 (-1.4, 3.8)	5.4 (3.4, 7.4)	9.6 (6.3, 13.0)	13.8 (8.6, 19.1)
Difference (CABG/PCI minus no CABG/PCI)	1.0 (-1.6, 3.5)	2.3 (0.3, 4.4)	3.7 (0.3, 7.1)	5.0 (-0.3, 10.4)