

Cardiovascular Health and Cognitive Resilience

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Objectives

- To identify that the top risk factor of cognitive decline is impaired cardiovascular function;
- To describe ways to maintain and improve vascular and cardiac health;
- To review the importance of reducing cardiac & vascular risk factors (e.g., HTN, dyslipidemias, CHF & arrhythmias), on preserving the brain.

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Case Presentation #1

81 yo woman with HTN, MCI, hearing loss, macular degeneration, depression.

Caregivers statement: "During the past month she has become suddenly "demented". Gets "lost" in middle of a sentence & "conversation does not make any sense. Also has nausea all the time, no appetite, and she is much fatigued."

Prior functional status: Good. Prior cognitive status, MCI.

Meds: Donepezil 5mg, Omeprazole 20mg, amlodipine 10mg, citalopram 10mg

PE: Vitals wnl; Reduced respiratory excursion and reduced breath sounds; Syst M 3/5 LLSB; Pedal edema 3+ bilat; Hearing loss, too weak for cognitive test;

Lab/Imaging	Result
Hgb	13.6 / 42.5
BMP	WNL
TSH	WNL
LFTs	WNL
eGFR	52
UA	normal

Local PCP had diagnosed her as having side-effects of donepezil because of nausea, loss of appetite and had reduced donepezil dose;

Caregivers were concerned about dementia and wanted the donepezil to be increased again.

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Case #1, con'd Treatment & Outcome

Labs: Unremarkable, except **BNP = 2749**

2D-Echo: **LVEF 10%**; diffuse hypokinesis; MR; TR; PR; dilated RA and dilated LA;

Dx: **Delirium**, due to acute heart failure, with poor brain perfusion, hypoxemia; Predisposing factors: age, MCI, hearing loss, visual impairment, depression.

Outcome: With gradual diuresis, LVEF gradually improved to >20%, and cognition progressively returned to pt's baseline of MCI.

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Case # 2

92 yo woman, PMH: GERD, osteoporosis, Vit D deficiency. No h/o smoking or alcohol, father died, age 68, heart attack

One evening, started having heartburn after eating at a restaurant. Took 2 aspirins. Called the PCP, was advised to go to ER. She was alone at home - heartburn continued. Called PCP again, ambulance called.

Meds: aspirin 81 mg, Vit D 50,000 IU/mo, B12 1mg injection/mo

PE: BP 109/80mmHg, pulse 85/min, weight 103 lbs, BMI 19.5
Cardiac S1 and S2 normal, no murmur or gallop. Pulses 2+
Mental status – judgment and insight intact

In ER, EKG: ST elevation, anterior leads
CK 470, troponin 31.5, BNP 1760
Lipids 168, TG 39, HDL 53, LDL 107

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Case # 2, con'd Treatment & Outcome

Work-up:

- Cardiac Cath: LMCA patent; LAD, 100% occlusion at ostium; Left circumflex normal; RCA 100% occlusion in proximal part and fills via collaterals from the distal portion; LVEDP 22mmHg and filling defect at apex
- S/P PCI with Placement of BMS in LAD
- Echo with LVEF 25%, severe diffuse hypokinesis with only inferior wall moving well. RV pressure 50
- **Outcome:** Discharged home on Plavix, carvedilol and lasix

Follow-up:

- Currently still going strong, at age 104 years old!
- BP 150/64, Pulse 94, Temp 97.1 °F (36.2 °C), Resp 20, SpO2 99%, BMI 17 kg/m²
- Cognition – alert, oriented x3, conversation good. Has excellent insight
- Able to walk holding onto objects and using a cane (prefers no walker).

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Case #3 **Beaten by an Old Heart**

This is the first time I've gotten old (I think) ...

At night all night long love,
my heart babbles to me of gone loves,
racing with excitement and regret,
my heart is beating me to death.

On my stone, they'll write "Beaten by his heart,"
and the space between my thoughts
will be found in the closets
where they hang to dry all my tangled memories.

1955, The Estate of Leslie L. Scovann

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2022-2023 Cardiology Advances

- 2022 AHA/ACC/HFSA Guideline for the Management of Heart Failure:
- Prevention of HF;
- Management strategies in stage C HF, including: New treatment strategies in HF, including SGLT2i, GLP-1 and ARNi; Management of HF and atrial fibrillation (AF), including ablation of AF; Management of HF and AS and secondary MR, including TAVR and TMVR transcatheter repairs;

Specific management strategies, including: Cardiac amyloidosis; Cardio-oncology; Implantable devices. Left ventricular assist device (LVAD) use in stage D HF;

IV iron (ferric carboxymaltose or ferric derisomalotose) for HFREF & HFmrEF and IDA

JACC May 2022; JACC Aug 2023; Circ 2021

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CLINICAL PRACTICE GUIDELINE 2023:
AHA/ACC/ACCP/ASPC/NLA/PCNA Guideline for the Management of Patients With Chronic Coronary Disease (CCD):

- Team-based, shared decision making;
- Non-Pharm therapies, including diet and exercise;
- Reduce sitting time, aerobic & resistance; cardiac rehab;
- Use SGLT2 I and GLP-1;
- BB or CCB, for shorter duration;
- Statin or adjunct agents (ezetimibe, PCSK9I, bempedoic acid);
- Antiplatelet RX for shorter duration if needed;
- No clear benefit of omega-3 or other supplements;
- No routine testing if no clinical/functional change; No e-cigs
- PCI = Med mgmt; PCI Radial ?= Femoral; BMS ?=DES
- TAVR = SAVR; TMVR ?=SMVR

Circulation, Aug 2023; JACC Sept 2023

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CVD and ADRD, Common Risk Factors

<p><u>Known</u></p> <ul style="list-style-type: none"> • Family history • Age • Atherosclerosis • Hypertension • Dyslipidemia • Head injury • Arrhythmia • LVH • Diabetes • Thyroid disorder 	<p><u>Emerging</u></p> <ul style="list-style-type: none"> • ApoEε4 • Metabolic syndrome • Fibrinogen • Hepatic Lipase • Oxidative stress • C-reactive protein • Homocysteine • Inflammation • Hyperinsulinemia • Other polymorphisms
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Age-related continuum from HTN to HFpEF

Wei, '92, 2004; Abbate et al., 2015; Buford, 2016; Azhar et al., 2017; Kario, 2018; Huang et al., 2019; Wilson et al., 2020

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HTN, LVH Linked to Early Brain Changes

Normal gray and white matter tracts

Brain MRI fiber-tracking reveals white matter alterations in hypertensive patients without damage under conventional neuroimaging; HTN in middle-age (40's-50's) predicts cognitive decline in old age (70's-80's).

This approach could identify patients at initial stages of brain damage and could gain benefit of therapies aimed at limiting the transition to cognitive decline and neurodegeneration.

A. Fiber-tracking of major white matter tracts

B. Tracts with impaired integrity in HTN

- Anterior Thalamic Radiation
- Superior Longitudinal Fasciculus
- Fornix Mtx

Moore et al., 2018; Carnevale et al., 2018, 2019; Wilson, 2020; Zhao et al., 2023

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Cognitive Resilience: Pearls

Learning Opportunities:

- Being resilient is not a trait, but a dynamic learning process.
- Focus on Progress, not Goals
- Perceive Obstacles as Challenges Rather Than Hindrances.
Challenges are what make life interesting; overcoming them is what makes life meaningful.

Social Markers:

- Higher listening support from others gives greater cognitive resilience
- Feeling valued by others
- Listening to favorite music

Molecular Markers:


- Current: APOe4; Abeta 42/40; NFL; p-Tau 217 & 181; a-synuclein
- New: MEF2, SARE & TFs, microRNAs; BDNF; ADRD proteins

Dowling et al., 2019; Law et al., 2020; Jitani et al., 2021; Sakuma et al., 2021; Barker et al., 2021; Fannin et al., 2022


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CV health & Cognitive resilience: Pearls


1/2 - 2/3 of Alzheimer's & related dementias are preventable.

Before 65: HTN, HF, vascular disease, dyslipidemia, T2DM, homocysteine, inactivity, sleep disruption, depression, heart disease, arrhythmias, hearing loss, head trauma, pollution, isolation. 

Social interactions: need listening support, feeling valued

After 65: Exercise and strength training: boost memory, maintain health and enhance longevity 

Diet: MIND, veggies & fruit (eat the rainbow); low-fat, salt low carb, antioxidants, vitamins, proteins 

Naps & Sleep: Boosts memory and cognition 

PPositive

Levy et al., 2008; Coker et al., 2015; Larson-Prior, 2018; Kim et al., 2019; UC Berkeley, 2019; Lancet, 2020; Wilson et al., 2020; Mize et al., 2021; Blach et al., 2023


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