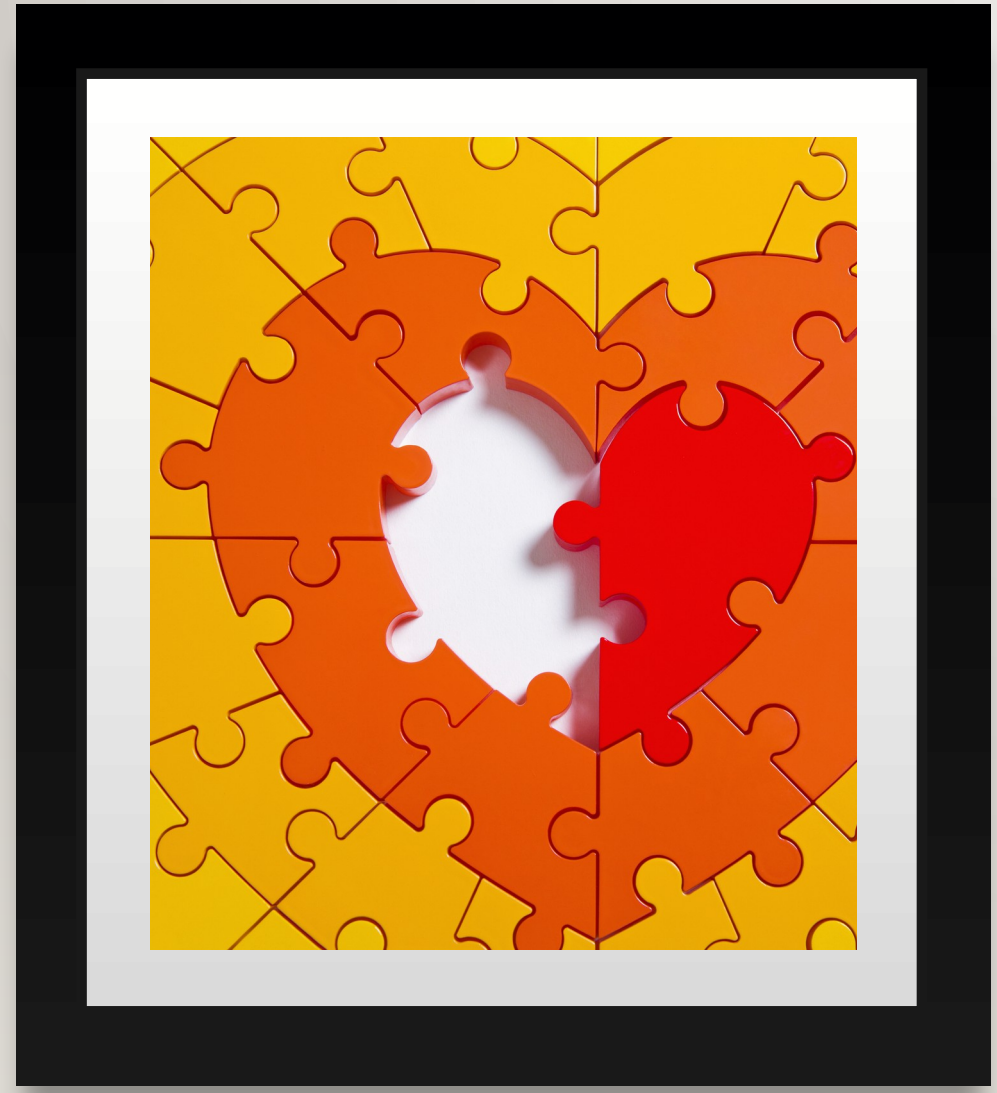


CARDIOVASCULAR RISK IN THE AGING FEMALE

STEPHEN W. PARCELL, ND, ABAAHP

EPIDEMIOLOGY

Cardiovascular disease remains the MAIN cause of morbidity and mortality for U.S. women, accounting for 1 in 4 fatalities among women. Most patients who die of an acute MI have no symptoms prior to the event. Cardiac death remains the leading killer of women at all ages!

90% of U.S. women have at least 1 major coronary risk factor. According to the Center for Disease Control 1 in 2.6 women die from CHD/IHD/CAD contrasted to 1 in 4.6 from cancer.

Every 40 seconds someone in America has a heart attack. However, the perception that women are at lower risk dying from heart disease compared to cancer still persists.

EPIDEMIOLOGY

A higher proportion of women die of sudden cardiac death prior to hospital arrival (52%) contrasted with (42%) of men. Why?: Post-menopausal women have a rapidly occurring clustering of traditional risk factors such as hypertension, diabetes, obesity, inactivity etc, that all occur in a short period of time compared to men.

Framingham heart study showed us that ischemic heart disease (IHD) typically presents itself approximately 7-10 years later and women than in men. Because of menopause and other reasons specific to women there is a significant difference in the clustering of risk factors and pathophysiology.

MENOPAUSE

- Estrogen is protective to arteries and hypothesized that men get arterial disease sooner because of this. Women can catch up to men quickly after menopause. Because of differences in clinical presentation women may be misdiagnosed. Less aggressive diagnosis using advanced imaging and medical intervention often results.
- Acute coronary syndrome before menopause is largely attributed to smoking. Smoking has a larger negative impact on a woman's risk of IHD compared to men.
- When young women smoke there is a down regulation estrogen dependent vasodilation with endothelial dysfunction as a result.

MENOPAUSE

- Younger women with estrogen deficiency have approximately 7 times the risk of coronary artery disease. Estrogen is important for regulating lipids, inflammation and coagulation. Estrogen is also involved in vasodilation through interaction with adrenergic and beta receptors in the vasculature.
- After menopause flow mediated dilation (FMD) as measured in the brachial artery declines. This technique measures the percent diameter change in the brachial artery after constriction with a blood pressure cuff. Blood flow is cut off and then reestablished and reactive dilation occurs. It is an indirect measure of endothelial function, and more dilation is better.



MENOPAUSE

- After menopause the composition of plaque changes from less vulnerable to more vulnerable including increases in inflammatory markers. The menopause transition is thus also associated with a clustering of more typical independent risk factors such as fat mass, lipids, glucose and hypertension.
- After menopause body fat distribution changes from a gynecoid to a more android pattern **(from pear to apple).** The resulting central obesity increases visceral fat and increases risk of metabolic syndrome compared to aging men. The Women's Ischemia Syndrome Evaluation (WISE) study demonstrated that metabolic syndrome is a bigger risk factor compared to body mass index in women.

STIFF ARTERIES

- Women have stiffer arteries as compared to men with a higher prevalence of increased carotid intima media thickness. Early signs of atherosclerosis seen with carotid intima media thickness may even present before menopause.
- As women age their systolic blood pressure tends to rise more compared to men in some of this is due to a decline in estrogen . Elderly women have a much higher prevalence of systolic hypertension with resulting heart failure and strokes.

STIFF ARTERIES

- Estrogen replacement therapy has been demonstrated to reduce arterial stiffness in SOME studies and should be started sooner than later. No benefit was found at 10 years or greater after menopause.
- Arterial stiffness is the main cause of increased pulse pressure.
- Premenopausally women have lower systolic blood pressure than men but a greater rise in systolic pressure with age.
- By age 70 women typically have a higher systolic blood pressure and pulse pressure than men.

HYPERTENSION

- Hypertension is a bigger risk factor in women.
- The risk-factor-adjusted hazard ratio for cardiovascular disease resulting from pre-hypertension is 2.5 in women compared to 1.6 in men.
- Hypertension can make complaints of menopause worse and can include chest pain headaches, hot flashes and palpitations. When hypertension is treated climacteric symptoms can improve!

CHANGES TO LIPIDS

- Younger women have lower lipid levels as compared to men.
- But……after menopause lipids increase in this includes lipoprotein (a). Lipoprotein a Lip(a) typically goes down with hormone replacement. The role of Lip (a) in the pathogenesis of cardiovascular disease is still under debate.
- Women typically have higher HDL levels but have higher risk of IHD with low HDL compared to men.
- This is no surprise considering the role metabolic syndrome plays increasing risk for women as compared to men.
- Estrogen acts on the liver to cause an overall reduction in the total amount of cholesterol and promotes **increased HDL and decreased LDL**. Guess what happens at menopause?

DISPROPORTIONATE CV RISKS IN WOMEN COMPARED WITH MEN

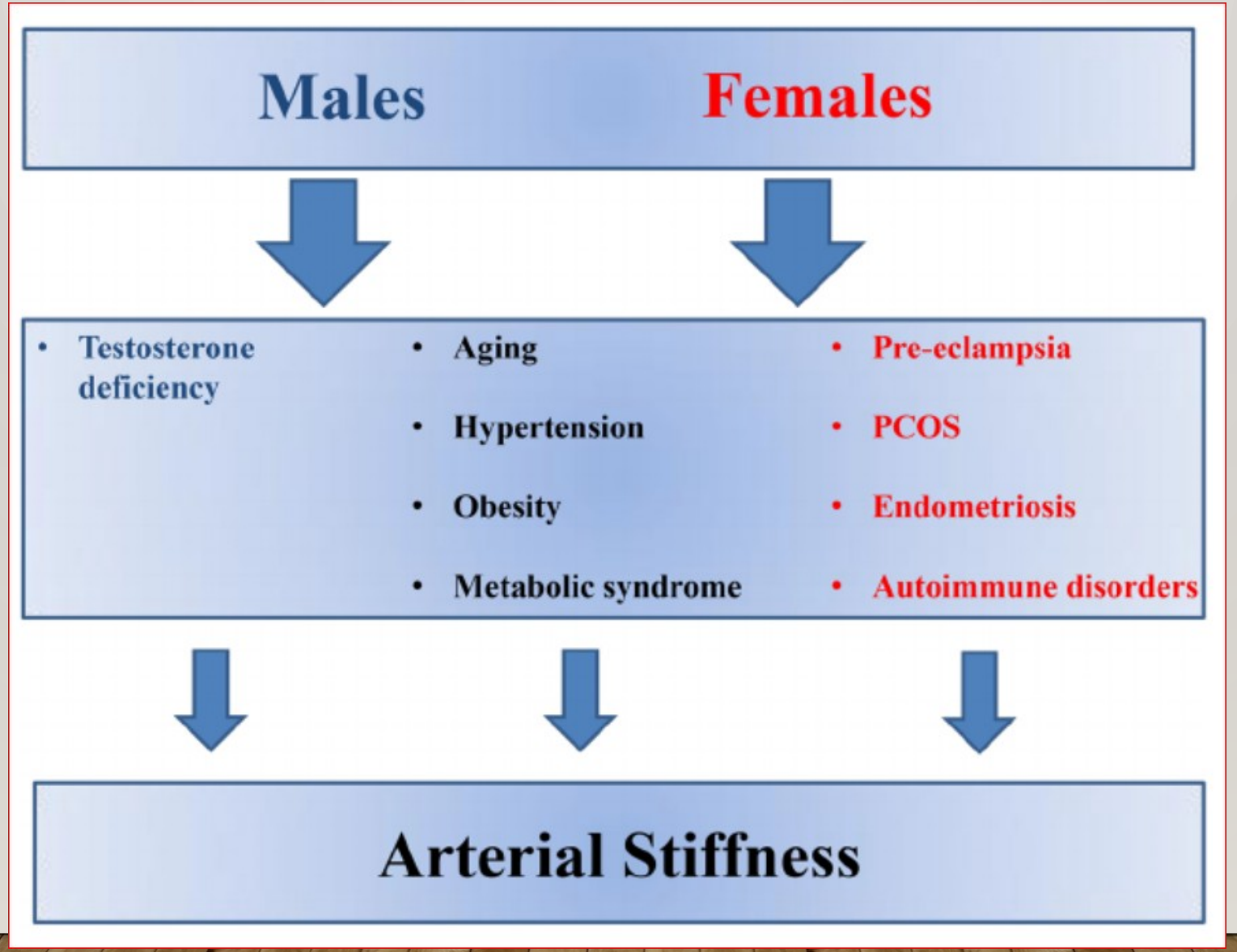
- Diabetes
- Increase cardiovascular mortality (greater chance of not surviving the first myocardial infarction compared to men)
- Increased risk of heart failure out of proportion compared to men
- More coronary microvascular dysfunction, hypercoagulability and metabolic syndrome

DISPROPORTIONATE

- Hypertension
  - Increased cardiovascular mortality
    - Less likely to be treated aggressively
- Obesity
  - Higher prevalence
    - More of a independent risk factor

DISPROPORTIONATE

- Both early and late menarche is also related to IHD. Almost 4.5% for women with early menarche and 2.5% for late menarche.
- Autoimmune disease disproportionately affects females. Women get rheumatoid arthritis 3 times more often than men and are 9 times more likely to develop lupus. The inflammation associated with these diseases is an independent risk factor for atherosclerosis and microvascular dysfunction.


Males
Females
• Testosterone deficiency
• Aging
• Hypertension
• Obesity
• Metabolic syndrome
• Pre-eclampsia
• PCOS
• Endometriosis
• Autoimmune disorders
Arterial Stiffness

DIFFERENCES IN CLINICAL PRESENTATION

- Generally the typical clinical presentation is not as clear and diagnostic testing is less reliable in women compared to men. This appears to be worse in women under 55 .
- Angiography will often be normal and women discharged and told they do not have coronary artery disease.
- Women typically get less invasive testing and less aggressive treatment because of this. However, women diagnosed with noncardiac chest pain can have up to double the risk of developing IHF and acute coronary syndrome in the next 5-7 years.

DIFFERENCES

- Women are more likely to experience chest pain symptoms without identifiable obstructive coronary artery disease often due to coronary microvascular dysfunction. Also, women have higher prevalence small vessel disease, and more complicated chest pain syndromes that are not related to the large coronary arteries.
- Despite negative findings on angiograms there is still increased risk a major adverse cardiovascular event (MACE) in women who experience these chest pain syndromes.
- Differences in the response of the female autonomic nervous system and more sensitive cardiac nociception in women help explain this but the mechanisms and pathophysiology are still not completely understood.

PLAQUE MORPHOLOGY CAN BE DIFFERENT

- In a study looking at the coronary arteries of women with nonobstructive disease the female plaques were different. They had more plaque erosion, less cholesterol and calcium content.
- Women tend to have less obstruction and more diffuse artery disease as compared to men. Women also have different vascular biological factors in play.
- Women tend to have smaller plaques and slower progression, smaller arteries in general, less collateral circulation, less coronary flow reserve, stiffer arteries and differences in how plaques grow and are remodeled.

HOW DO MEN AND WOMEN DIFFER IN THEIR PRESENTATION OF OBSTRUCTIVE DISEASE?

- Chest pain is the most frequent symptom in both genders. Typical angina presents with retrosternal pain worse with exertion and better with nitroglycerin.
- Women more often present with atypical angina. Atypical angina includes not only pain or discomfort in the chest but also in the arms, jaw, neck, stomach and interscapular area. Women more often will experience fatigue, anxiety, cold sweats, SOB, dyspepsia, and nausea. Sometimes the only symptom in a female is fatigue.
- Symptoms may not occur with exertion but can arise after exertion or be triggered by mental stress or even occur at rest. It may be intermittent or over several hours.

SPONTANEOUS CORONARY ARTERY DISSECTION

- Another cause of chest pain and acute coronary syndrome in younger woman is spontaneous coronary artery dissection (SCAD). SCAD effects women more than men. It most commonly affects younger women in their 40s and 50s but can happen at any age.
- At presentation patients commonly will have minimal risk factors such as hyperlipidemia, hypertension diabetes etc., SCAD will not show up on an angiogram because the arterial wall is not imaged with this test. As a result, conditions like SCAD are often missed and told to go home. SCAD, though infrequent, is an important cause of myocardial infarction targeting young to middle aged women.
- Women in this cohort who present with chest pain but without traditional risk factors, or any other cause that can be found should be referred for MRA, Cardiologist.

CORONARY ARTERY CALCIUM SCORING/CANCER

- Heart attack and stroke cause far more deaths in the US than all cancers combined. Despite this, screening for asymptomatic cancer is widely accepted, but screening for asymptomatic ASCVD is not.
- As a nation we spend over 20 times more on screening for asymptomatic cancer than for asymptomatic atherosclerotic cardiovascular disease (ASCVD), the underlying cause of heart attacks.
- CAC testing cost less than $200 compared to $3,000 (colonoscopy and mammogram) for cancer screening.

MORE ON CAC

- CAC measures the amount of calcium in the walls of coronary arteries.
- Because plaque contains a relatively predictable amount of calcium it can be used as a surrogate to estimate total plaque burden.
- High quality data supports the use of CAC and risk stratification. The amount of calcium is highly predictive of cardiovascular death and the chances MI or stroke.
- A score of 400 or more is particularly concerning. Score 400 is correlated with a 10-year risk of heart attack, stroke or death of 25%. Rate of growth matters.
- Coronary calcium scoring depends on calcium content to determine plaque burden. It will not show new uncalcified plaque, does not evaluate the vulnerability of plaque and does not indicate percent occlusion. It is very helpful in the diagnosis of coronary artery disease and useful for tracking plaque progression or regression.

WOMEN CAN HAVE DIFFERENT KINDS OF PLAQUE

- Women can have more vulnerable, soft, noncalcified, diffuse plaque that is not identified as well with calcium scoring. Women tend to have more diffuse disease affecting smaller vessels that is often nonobstructive. Women are better candidates for cardiac MRI, CTA.
- In women of all ages calcium scores are typically lower than in men. Still the absence of coronary calcium is an excellent negative predictive factor for the presence of obstructive disease.
- However, the cumulative radiation exposure in women over 50 makes it less suitable for serial measurements. I have found that carotid intima media thickness with evaluation of lesions with a resolution of one thousands of a millimeter for serial plaque analysis for the purpose of determining effectiveness of treatment!

SUMMARY

- Women have more coronary microvascular dysfunction, vasospasm, increased cardiac pain sensitivity, plaque erosions and scad.
- They are more likely to experience stress related pain syndromes
- Vasoconstriction and microvascular dysfunction during stress with resulting ischemia in symptoms is more pronounced among women.
- Women have higher rates of cardiac related exercise intolerance, decreased quality of life and fatigue but a lower prevalence of obstructive coronary disease with angiography than men.
- They get the clustering of risk factors

SUMMARY

- Chest pain in Women should be taken seriously and given a complete workup.
- Stress echocardiography, cardiac MRI, and CT angiography may be better suited for the detection of nonobstructive coronary artery disease. Unexplained chest pain in younger women it is worse with exercise can be caused by microvascular disease, vasoreactivity coronary artery dissection.
- Women will not have the same symptoms of acute coronary syndrome from or ischemic heart disease as men.
- Postmenopausal women have higher prevalence of hypertension as compared to men
- Ischemic heart disease in women often gets missed

SUMMARY

- Structurally, women's coronary vessels are smaller in size and often contain more diffuse atherosclerosis, their aortas are stiffer (fibrosis, remodeling, and so on), and their microvessels appear to be more frequently dysfunctional compared with men. Functionally, women's vessels frequently show impaired vasodilator responses.
- The data on hormone replacement is mixed but the general agreement is that estradiol started earlier rather than later has a protective effect. Using bioidentical estrogen is more physiologically natural than horse derived estrogen. Progestins do not seem to help with cardiovascular risk but protect the uterus. Benefits for menopausal symptoms and cardiovascular risks must also be discussed. I do not see any reason to wait until years after menopause.

CASE 1 70-YEAR-OLD FEMALE IN FOR HYPERTENSION

- Significant Family CVD Hx: MI Father (55 - 59), Grand Mother (55 - 59), Grand Father (55 - 59) HTN Father, Brother Stroke Father (55 - 59)
- Osteopenia 2002
- HTN 150s/90s unclear how many years she was untreated
- HX tia/stroke 2002, also 2020
- She has a husband who drives her crazy
- As usual she is the caretaker and the family

CASE 1

- Health Goals: *“Good cardiovascular health, including stable blood pressure. Accurate use of supplements and prescriptions. That's pretty much it! “*
- She was getting bounced around between her PCP and cardiologist with changes in medication, poor follow-up and an unclear plan. She was averse to medications.
- After her first CIMT I started her on vitamin D, vitamin K2, endothelial defense. She was already on red yeast rice. After that I added more.
- Occasional heart flutter. TSH was .8 and she felt edgy, so I took her off thyroid support product TSH went to 1.7 and flutter went away

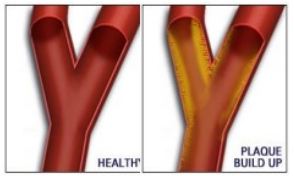
CASE 1

- BP 158/97 but better at home a dental assistant told her she had very high blood pressure.
- 2018 TC 209, HDL 96, LDL 98, TGs 67, TC 209 Other labs unremarkable except for A1c of 5.8 it is currently 5.6 but took 2 years to get there.
- Lipids now HDL 70, LDL 52, Tgs 86, TC138
- CIMT done starting in 2018 and every 6 mo after
- Starting in 2020 after HCTZ, lisinopril and amlodipine pressures were finally good. I wrote a letter to her PCP to make this happen. What is the lesson here?
- Also started progesterone cream 2020 on her own, Getting a DEXA soon.

DOB 6/29/1951 Gender F

Carotid-IMT (Carotid Intima Media Thickness)

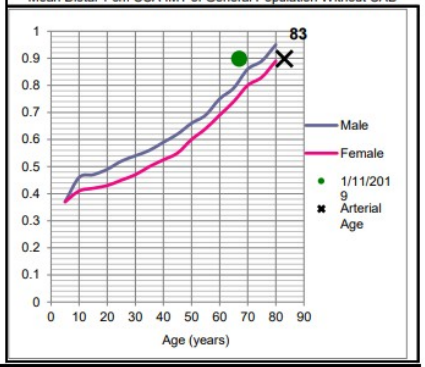
Your Carotid-IMT was significantly abnormal, at > 0.800 mm. Talk with your doctor about treating this abnormal Carotid-IMT with medications that may reverse arterial wall thickness. Lifestyle adjustments may help support this effort, as well. A C-IMT of >1.000mm is most significant from a preventive cardiology perspective, and should receive aggressive medical attention.



Notes:

	Date	1/11/2019	7/20/2018	
	CIMT	✕ 0.898	✕ 0.854	
An IMT measurement of less than 0.600 mm is generally considered healthy				
	Age	67	67	
	Arterial Age	83	79	

Mean Distal 1 cm CCA IMT of General Population Without CAD



Carotid Plaque Assessment and Characterization

Left Carotid	Plaque		Right Carotid	No Plaque
Max Velocity	56.9 cm/s		Max Velocity	30.4 cm/s

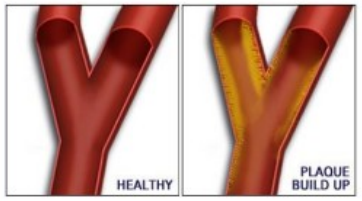
Atherosclerotic plaque was present in the carotid arteries of your neck. Medication strategies to treat this atherosclerotic plaque will need to be considered. Optimal exercise, nutrition, weight control, and stress management strategies will also help. Also, please discuss the use of daily Aspirin therapy with your doctor. The presence of carotid artery plaque is to be taken seriously, as it places you at higher risk for serious cardiovascular disease during the next 10 years.

Plaque	Current Test			Last Test			Previous Test		
Year-to-Year Comparison	1/11/2019			7/20/2018					
Plaque Location	Type	Ht(mm)	Approx %	Type	Ht(mm)	Approx %	Type	Ht(mm)	Approx %
LT BULB	Soft	2.206	23%	Soft	2.015				
				Soft	1.607				

Was at this point in February 2020 that I started treating her more aggressively. She had been going on and off her various pills. Family stress really peaked in 2019 and blood pressure was not controlled well.

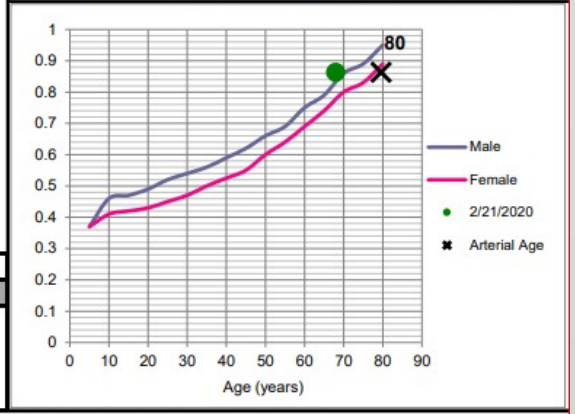
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Date	2/21/2020	6/21/2019	1/11/2019
CIMT	✖ 0.863	✖ 0.912	✖ 0.898
An IMT measurement of less than 0.600 mm is generally considered healthy			
Age	68	67	67
Arterial Age	80	84	83

Mean Distal 1 cm CCA IMT of General Population Without CAD



Thyroid Incedental Findings

Location	Type	Notes

Carotid Plaque Assessment and Characterization

Left Carotid	Plaque		Right Carotid	Plaque
Max Velocity	41.7	cm/s	Max Velocity	35.3 cm/s

Atherosclerotic plaque was present in the carotid arteries of your neck. Medication strategies to treat this atherosclerotic plaque will need to be considered. Optimal exercise, nutrition, weight control, and stress management strategies will also help. Also, please discuss the use of daily Aspirin therapy with your doctor. The presence of carotid artery plaque is to be taken seriously, as it places you at higher risk for serious cardiovascular disease during the next 10 years.

Plaque	Current Test			Last Test			Previous Test		
Year-to-Year Comparison	2/21/2020			6/21/2019			1/11/2019		
Plaque Location	Type	Ht(mm)	Approx %	Type	Ht(mm)	Approx %	Type	Ht(mm)	Aprrox %
RT BULB	Soft	1.102	10%	Soft	2.034		Soft	2.206	
LT BULB	Soft	1.717	16%						
LT BULB	Soft	1.455	X						

During this time her inflammatory biomarkers went down. She had started counseling to deal with her husband and was on more supplements and medications than ever before.

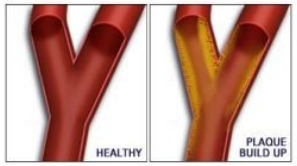
Carotid-IMT (Carotid Intima Media Thickness)

Your Carotid-IMT was significantly abnormal, at > 0.800 mm. Talk with your doctor about treating this abnormal Carotid-IMT with medications that may reverse arterial wall thickness. Lifestyle adjustments may help support this effort, as well. A C-IMT of >1.000mm is most significant from a preventive cardiology perspective, and should receive aggressive medical attention.

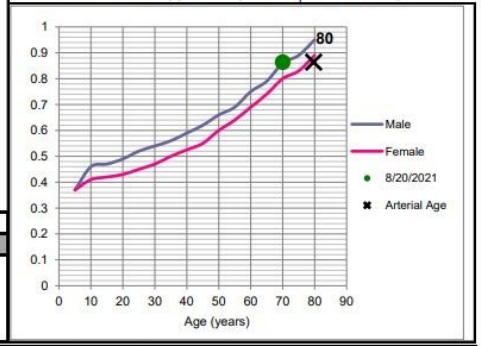
Date	8/20/2021	8/21/2020	2/21/2020
CIMT	0.864	0.922	0.863

An IMT measurement of less than 0.600 mm is generally considered healthy

Age	70	69	68
Arterial Age	80	85	80



Mean Distal 1 cm CCA IMT of General Population Without CAD



Thyroid Incedental Findings

Location	Type	Notes

Carotid Plaque Assessment and Characterization

Left Carotid	Plaque		Right Carotid	No Plaque
Max Velocity	65.7 cm/s		Max Velocity	39.3 cm/s

Atherosclerotic plaque was present in the carotid arteries of your neck. Medication strategies to treat this atherosclerotic plaque will need to be considered. Optimal exercise, nutrition, weight control, and stress management strategies will also help. Also, please discuss the use of daily Aspirin therapy with your doctor. The presence of carotid artery plaque is to be taken seriously, as it places you at higher risk for serious cardiovascular disease during the next 10 years.

Plaque	Current Test			Last Test			Previous Test		
Year-to-Year Comparison	8/20/2021			8/21/2020			2/21/2020		
Plaque Location	Type	Ht(mm)	Approx %	Type	Ht(mm)	Approx %	Type	Ht(mm)	Aprrox %
LT BULB	Soft	2.185	20%	Soft	1.796		Soft	1.102	
				Soft	1.524		Soft	1.717	
							Soft	1.455	

The data graphed above has been gathered from many known studies. This information should be used in conjunction with you physician as a estimate of your overall cardiovascular health. "Arterial Age" is equivalent to the 50th percentile of C-IMT values in a general population of patients at the aforementioned age with no history of coronary artery disease. The observed repeatability of IMT scores when using a standardized scanning and measuring protocol of 6 to 12 ultrasound images is within 4% with 95% confidence. This test is for screening purposes only. Your physician should interpret this IMT result in conjunction with your other risk factors. Medical decision-making must take a multitude of factors into account, and risk factor modification should be made only in

Date	Time (a.m./p.m.)	Blood Pressure	Pulse	Notes
2/4/20	3:25	159/83	57	
	3:30	140/89	56	
	3:35	129/92	56	
2/5/20	8:56 p.m.	131/85	53	Lisinopril @ 800
	9:04 "	139/81	53	
	9:12 "	125/84	52	
2/10/20	7:14 p.m.	135/78	57	
	7:22 p.m.	119/77	55	
2/16/20	10:56 p.m.	143/78	51	
	11:05 p.m.	111/77	50	
2/18/20	10:18 p.m.	122/77	56	before Lisinopril
	10:25 p.m.	118/73	54	
2/22/20	7:16 a.m.	125/86	63	
	7:22 a.m.	107/81	63	
2/24/20	7:56 a.m.	135/95	57	switched to right arm
	8:00 a.m.	127/86	58	
2/25/20	6:36 a.m.	123/88	59	
	6:42 a.m.	128/86	58	
2/26/20	7:40 a.m.	138/111	59	
	7:46 a.m.	120/87	66	
2/27/20	6:39 a.m.	132/87	57	
	6:46 a.m.	122/80	53	
2/28/20	7:22 a.m.	124/83	57	
	7:32 a.m.	124/82	56	
2/29/20	7:53 a.m.	109/78	55	
	8:01 a.m.	119/78	57	
3/01/20	7:25 a.m.	124/86	60	
	7:33 a.m.	126/80	57	

Date	Time	Blood Pressure	Pulse	Notes
1/21/21	4:48	115/75	55	
3/9/21	11:22	111/73	58	
6/7/21		81/49		@ dentist
7/24/21	10:49	86/62	61	
7/2/21	10:18	105/70	54	
7/19/21	10:20	103/67	56	
7/26/21	1:29 pm	86/65	58	
7/31/21	7:40 pm	85/60	62	
8/1/21	3:12 pm	84/59	53	
8/2/21	7:02 a.m.	92/69	61	
8/3/21	6:50 a.m.	102/84	56	upon awakening
8/3/21	10:18 a.m.	73/58	57	some dizziness
8/4/21	5:15 p.m.	112/74	55	(K)
8/5/21	11:15 a.m.	75/60	59	
8/6/21	11:17 a.m.	86/57	56	
8/8/21	3:17 p.m.	92/60	59	
8/9/21	4:25 p.m.	99/62	51	
8/11/21	10:00 a.m.	85/64	65	light-headed
8/12/21	7:12 a.m.	103/65	53	upon arising
8/13/21	8:28 pm	99/67	54	
8/14/21	4:00 p.m.	79/64	58	
8/15/21	4:05 p.m.	89/67	50	
8/17/21	3:00 p.m.	89/61	57	
8/18/21	9:24 a.m.	107/68	58	
8/19/21	7:05 a.m.	100/72	56	
8/24/21	7:15 a.m.	113/72	57	
8/26/21	7:05 a.m.	95/70	62	
8/28/21	6:45 a.m.	97/76	59	
8/29/21	3:20 p.m.	101/66	54	
8/30/21	2:45 p.m.	97/64	54	

Age	68	Sex	F	Received Date/Time	03/06/20 1000 PST
DOB	6/29/51			Report Date/Time	03/09/20 1730 PST
Accession ID	76801			Report Status	Final

Client ID	2666 NatureMed Intergrative
Address	5330 Manhattan Circle Boulder, CO 80303

Patient Acute Coronary Syndrome (ACS) Profile is Elevated

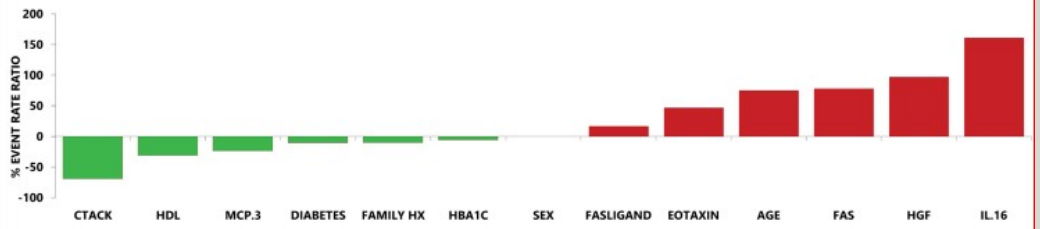
PULS Score: 9.61%

Normal < 3.50% | Borderline 3.50% - 7.49% | Elevated ≥ 7.50%

Expected Score: 3.09%

TEST INTERPRETATION:

- Your PULS score indicates that **9.61%** (Absolute Risk) of individuals of your age, sex, and score had a cardiac event within a 5 year time period. Your expected score of **3.09%** is where you should be according to your current age and sex.
- Your PULS score indicates that you are **3.11** times (Relative Risk) more likely to experience an ACS (heart attack) than would be expected for your age and sex.
- This PULS score classifies you at **High** Risk by AHA/ACC Cardiovascular Risk Guidelines.



INFLAMMATORY PROTEIN BIOMARKERS WERE ELEVATED

- Added NAD, green tea extract and resveratrol
- Asked her to eat less carbohydrates because her A1c had gone up to 5.8 again and her HDL had gone down

DOB	6/29/51	Report Date/Time	06/08/20 1934 PST	Address	5330 Manhattan Circle Boulder, CO 80303
Accession ID	82485	Report Status	Final		

Patient Acute Coronary Syndrome (ACS) Profile is Borderline



TEST INTERPRETATION:

1. Your PULS score indicates that **6.49%** (Absolute Risk) of individuals of your age, sex, and score had a cardiac event within a 5 year time period. Your expected score of **3.09%** is where you should be according to your current age and sex.
2. Your PULS score indicates that you are **2.1** times (Relative Risk) more likely to experience an ACS (heart attack) than would be expected for your age and sex.
3. This PULS score classifies you at **Intermediate** Risk by AHA/ACC Cardiovascular Risk Guidelines.

WHY DID HER CAROTID PLAQUE GET BETTER THEN WORSE THEN BETTER AGAIN?

- She went through a stressful time with her family.
- She became less compliant with her supplement regime…on and off but mostly stayed on the majority of the supplements. Covid affected follow-up. This is how real-life is.
- It was not until 2020 that her blood pressure was actually under control. Previously it was typically in the 150s over 90s. It was not until near the end of 2020 that her lipids were treated aggressively.
- It was not until February 2020 that we pulled out all the stops and started aggressive treatment with a long list of supplements and medications.

TREATMENT LIST

- Niacin ER 750 mg Day
- Omega-3 2 Day
- Bergamot extract 1 Day (self)
- Garlic 2 Day
- Green tea extract 1 Day
- Extended-release arginine 1 Day(self)
- CoQ10 300 mg Day
- Vitamin C 1,000 Day
- Vitamin D 5,000 Day
- Vitamin K2 1 Day
- Essential amino acids 5 Day (self)
- Curcumin 1 Day
- Pomegranate seed oil and fruit extract with superoxide dismutase and bioflavonoids 2 Day
- Resveratrol 2 Day
- NAD+ 600 mg Day

CURRENT MEDICATIONS

- Plavix 75 mg and Lipitor 20 mg started in July 2020 post stroke
- Lisinopril 20 mg
- Amlodipine 5mg
- She is lightheaded now and blood pressure is low so I am asking her to cut back to lisinopril 10 mg…..notified PCP.

WHAT DOES THIS CASE TEACH US?

- Hypertension is an independent risk factor for atherosclerosis.
- Hypertension puts mechanical strain on arteries leading to endothelial dysfunction.
- Objective testing/imaging gets “by-in” from patient. Blood work and imaging prove what is and is not working. Carotid plaque will sometimes move around and not follow a clear trajectory providing even more reason for continued follow-up.
- By building good rapport/gaining trust the patient will continue to follow-up with you. Patients don’t like doctors who guess they like doctors who know!
- Coordination with the PCP and using nutraceuticals along with pharmaceuticals can be important for a good outcome. Most primary care doctors are open to coordination of care.

WHAT DOES THIS CASE TEACH US?

- Some cases are complicated, and labs go up and down based on the reality of life.
- Establishment of trust with the provider allowed for continuation of care. Patients who are lost to follow-up is a significant factor affecting good outcomes that is often not discussed! It is frustrating and affects the ability of the provider build competence.
- Arterial health can be monitored. Serial data points are the best thing we have when the patient is asymptomatic.
- Imagine what would have happened if she had just received the standard of care?

CASE 2 HYPERTENSION/WEIGHT GAIN/HEART ATTACK PREVENTION

- Asymptomatic 47-year-old female with weight gain, hypertension and fatigue. Her mother, brother and grandfather all had heart attacks at a young age (50s). She has another brother, but he has not had any problems.
- She presents for a preventive cardiology visit. Weight has changed a lot with *almost* no change in eating or exercise. We talked about the exercise and she realized that she is getting less structured exercise and no prolonged elevated heart rate (30 min 5 days a week is what I like to see). Walking, some gym but more unplanned walking.
- Perimenopausal: tried HRT (T,E,P) pellets 2 mo ago. She felt good for about a month and then did not notice any difference.
- PCOS
- Hematuria no cause, needs to see renal doc …its been 5 years. I sent a referral.
- Loose stool: unformed 2-3 times a week.
- Kids 18,17,12

CASE 2

- Diet:
- BFAST eggs, 2, turkey bacon, no bread, potato, coffee
- LUNCH: “sandwich”
- DINNER: animal protein, veg, salad, burgers

ASSESSMENT

- This is a woman who went through menopause early. Over the last year she has gained a lot of weight (30- lbs). She has high blood pressure and family history of cardiovascular disease. She used to exercise more but finds herself running around doing errands and being busy more with less defined aerobic exercise or visits to the gym. She is making it just once a week to the gym now and used to go 2-3 times. Ever since menopause her blood pressure has gone up and she has gained weight.
- She owns a Mexican restaurant but does not work there much. She tries to make a home-cooked meals most nights unless she is running around bringing the kids to various athletic practices. She states that she loves salt. Sometimes the choices she makes for lunch and dinner while she is doing errands are not good. She will eat fast food typically. She only does this because she gets so hungry. Her kids love burgers and she will eat them too.

CASE 2

- She went to a hormone replacement practice and they gave her estrogen and testosterone pellets with oral progesterone. She stated that she is not good about taking pills. She would take the progesterone on and off. She also said that initially she felt great but then went right back to how she felt the beginning.
- I suspect that the dose might have been too low. Send records request for all her blood work from the hormone doctor.

CASE 2

- We had a long discussion about the type of diet that is good for cholesterol, blood pressure and weight. It is all the same diet. I asked her to be careful with the salt and to make a salad with animal protein instead of going out to eat. I gave her an extensive handout on diet.
- I suggested she get some good containers and also get prechopped salad mix. I told her she can put chicken, avocado, fish even some cheese in there for now but I do not want her eating fried food, burgers any of that type of stuff. I talked about how potassium and sodium balance each other and by increasing her potassium intake it should help with her blood pressure especially when sodium intake goes down. I told her fruits, vegetables, raw nuts and seeds are key and suggested 2 tablespoons of ground flaxseed because it can help with blood pressure, cholesterol and help improve stool consistency.

CASE 2

- We talked about the importance of aerobic exercise for blood pressure, lipids and glucose and the fact that she is really just not getting enough of any type of exercise and how it is critical that she get back into this.
- I explained to her the mechanisms that drive the clustering of risk factors with menopause. She thought it was interesting and completely understood.
- I started her on a blood pressure reducing formula.
- It came down but was not at target ~120/80. We eventually put her on low dose ARB spironolactone.

LABS

- CBC with Differential/Platelet Panel, Hemoglobin A1c, Comp. Metabolic Panel (14), CARDIO IQ(R) INSULIN, GGT, Ferritin, CARDIO IQ(R) VITAMIN D, 25-HYDROXY, LC/MS/MS, CARDIO IQ(R) HOMOCYSTEINE, proBNP, N-terminal, TSH, T4 Free, serum, T3 Free, Serum, CARDIO IQ(R) ADVANCED LIPID PANEL AND INFLAMMATION PANEL, IRON, TIBC AND FERRITIN PANEL, hsCRP (C-Reactive Protein), Uric Acid, Fibrinogen
- CIMT

Optimal	Non-Optimal					
LIPID PANEL						
CHOLESTEROL, TOTAL	245	<200	N/A	>=200	mg/dL	
HDL CHOLESTEROL	49	>=50	N/A	<50	mg/dL	
TRIGLYCERIDES	164	<150	150-199	>=200	mg/dL	
LDL-CHOLESTEROL	165	<100	100-129	>129	mg/dL (calc)	
CHOL/HDLC RATIO	5.0	<=3.5	3.6-5.0	>5.0	calc	
NON-HDL CHOLESTEROL	196	<130	130-189	>=190	mg/dL (calc)	
LIPOPROTEIN FRACTIONATION, ION MOBILITY						
LDL PARTICLE NUMBER	1876	<1138	1138-1409	>1409	nmol/L	
LDL SMALL	517	<142	142-219	>219	nmol/L	
LDL MEDIUM	474	<215	215-301	>301	nmol/L	
HDL LARGE	5559	>6729	6729-5353	<5353	nmol/L	
LDL PATTERN	B	A	N/A	B	Pattern	
LDL PEAK SIZE	213.9	>222.9	222.9-217.4	<217.4	Angstrom	
APOLIPOPROTEINS						
APOLIPOPROTEIN B	141	<90	90-119	>=120	mg/dL	
LIPOPROTEIN (a)	<10	<75	75-125	>125	nmol/L	
INFLAMMATION						
HS CRP	4.7	<1.0	1.0-3.0	>3.0	mg/L	
LP PLA2 ACTIVITY	134	<=123	N/A	>123	nmol/ min/mL	

What does this tell us?



DOB: 06/16/1974 AGE: 47
Gender: F
Patient ID: P2P1436803

Received: 10/15/2021 / 23:42 MDT
Reported: 10/26/2021 / 09:12 MDT

Test Name	In Range	Out Of Range	Reference Range	Lab
URIC ACID		8.1 H	2.5-7.0 mg/dL	KS
Therapeutic target for gout patients: <6.0 mg/dL				
NT PROBNP	22		pg/mL	KS
For Heart Failure (HF) diagnosis, reference				

Why is her CIMT so high?

DOB 6/16/1974 Gender F

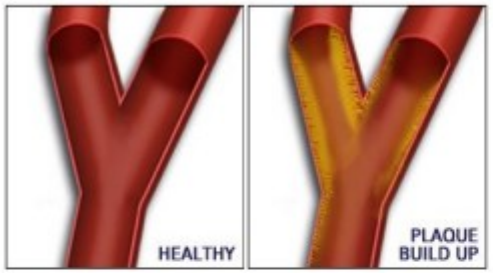
Carotid-IMT (Carotid Intima Media Thickness)

Your Carotid-IMT was significantly abnormal, at > 0.800 mm. Talk with your doctor about treating this abnormal Carotid-IMT with medications that may reverse arterial wall thickness. Lifestyle adjustments may help support this effort, as well. A C-IMT of >1.000mm is most significant from a preventive cardiology perspective, and should receive aggressive medical attention.

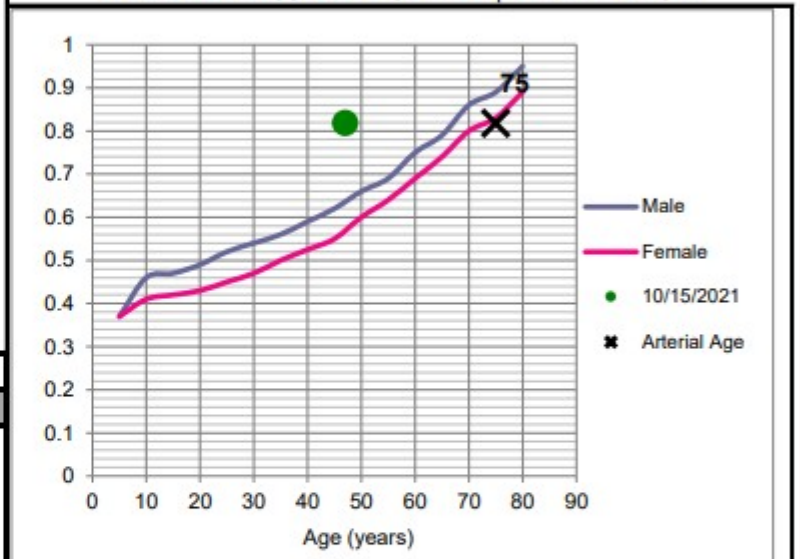
Date	10/15/2021		
CIMT	✖ 0.818		

An IMT measurement of less than 0.600 mm is generally considered healthy

Age	47		
Arterial Age	75		



Mean Distal 1 cm CCA IMT of General Population Without CAD



Thyroid Incedental Findings

Location	Type	Notes

Carotid Plaque Assessment and Characterization

Left Carotid	No Plaque		Right Carotid	No Plaque
Max Velocity	48.1	cm/s	Max Velocity	66.5 cm/s

Carotid artery plaque was not present in your evaluation! This excellent finding places you at lower risk for a future cardiovascular event, especially stroke. Those with carotid plaque are more likely to suffer a cardiovascular event during the next 10 years than those, like you, who have no carotid plaque. However, if your carotid IMT is greater than 0.800mm or your arterial age is greater than 60 years, you will need to take action despite your lack of plaque.

Plaque	Current Test			Last Test			Previous Test		
Year-to-Year Comparison	10/15/2021								
Plaque Location	Type	Ht(mm)	Approx %	Type	Ht(mm)	Approx %	Type	Ht(mm)	Aprrox %

DOB: 06/16/1974 **AGE: 47**
Gender: F
Patient ID: P2P1436803

Received: 02/04/2022 / 22:38 MST
Reported: 02/07/2022 / 16:55 MST

Cardio IQ®

Test Name	Current Result & Risk: Optimal	Current Result & Risk: Non-Optimal	Risk/Reference Interval: Optimal	Moderate	High	Units	Historical Result & Risk
LIPID PANEL							
CHOLESTEROL, TOTAL	181		<200	N/A	>=200	mg/dL	
HDL CHOLESTEROL		46	>=50	N/A	<50	mg/dL	
TRIGLYCERIDES	143		<150	150-199	>=200	mg/dL	
LDL-CHOLESTEROL		110	<100	100-129	>129	mg/dL (calc)	
CHOL/HDLC RATIO		3.9	<=3.5	3.6-5.0	>5.0	calc	
NON-HDL CHOLESTEROL		135	<130	130-189	>=190	mg/dL (calc)	
LIPOPROTEIN FRACTIONATION, ION MOBILITY							
LDL PARTICLE NUMBER		2099	<1138	1138-1409	>1409	nmol/L	
LDL SMALL		396	<142	142-219	>219	nmol/L	
LDL MEDIUM		524	<215	215-301	>301	nmol/L	
HDL LARGE		6223	>6729	6729-5353	<5353	nmol/L	
LDL PATTERN	A		A	N/A	B	Pattern	
LDL PEAK SIZE		218.1	>222.9	222.9-217.4	<217.4	Angstrom	
APOLIPOPROTEINS							
APOLIPOPROTEIN B		101	<90	90-119	>=120	mg/dL	
LIPOPROTEIN (a)	<10		<75	75-125	>125	nmol/L	
INFLAMMATION							
HS CRP		>10.0	<1.0	1.0-3.0	>3.0	mg/L	
LP PLA2 ACTIVITY	111		<=123	N/A	>123	nmol/ min/mL	

For details on reference ranges please refer to the reference range/comment section of the report

TREATMENT

50,000 IU VIT D once per week

RYR 2 twice a day with or without food for cholesterol

Niacin 500 mg before bed for cholesterol

Green tea 2 day with or without food for cholesterol

Myoinositol 2 day with or without food for cholesterol and insulin resistance

Omega pro 2 day with or without food for cholesterol

Hypertension formula 2 twice a day

Berberine 2 twice a day

TREATMENT RX

- Spironolactone 50 mg tablet (PCOS)
- Metformin ER 500 mg (low dose)
- Telmisartan 20 mg tablet (low dose)
- Progesterone/testosterone

WHAT DOES THIS CASE TEACH US?

- This is a classic example of clustering of risk factors.
- She is doing more for others than for herself
- Subclinical plaque with arterial stiffness, thickness and advanced aging
- She needs to be held accountable and have guidance regarding exercise and diet
- Imaging and laboratory findings should have a positive impact on her motivation.
- By repeating labs and imaging that show improvements the patient will have continued buy in.
- Diet should be individualized based on a person's background lifestyle, bandwidth and reflect reality.

WAT DOES THIS CASE TEACH US?

- RX medication is sometimes needed to reduce pill volume, move the needle and speed up treatment effect
- Natural treatment options work synergistically with RX and this allow for a low dose
- She needed DETAILED diet and exercise counseling. She never would have received this under the conventional model.
- She needed to hear it more than once and benefitted from handounts

SUMMARY OF PRESENTATION

- Test not guess!
- You are better prepared to do this than most providers
- Whole patient approach with detailed diagnostics, integrative treatment, diet, lifestyle etc. can work well
- Menopause mat cause a rapid clustering of risk factors (weight, lipids, glucose, plaque, HTN)
- Women can have different symptoms than men and may need a different work up
- Microvascular disease with or without ischemia is more common in women
- Women have differently weighted disproportionate risk factors compared to men