



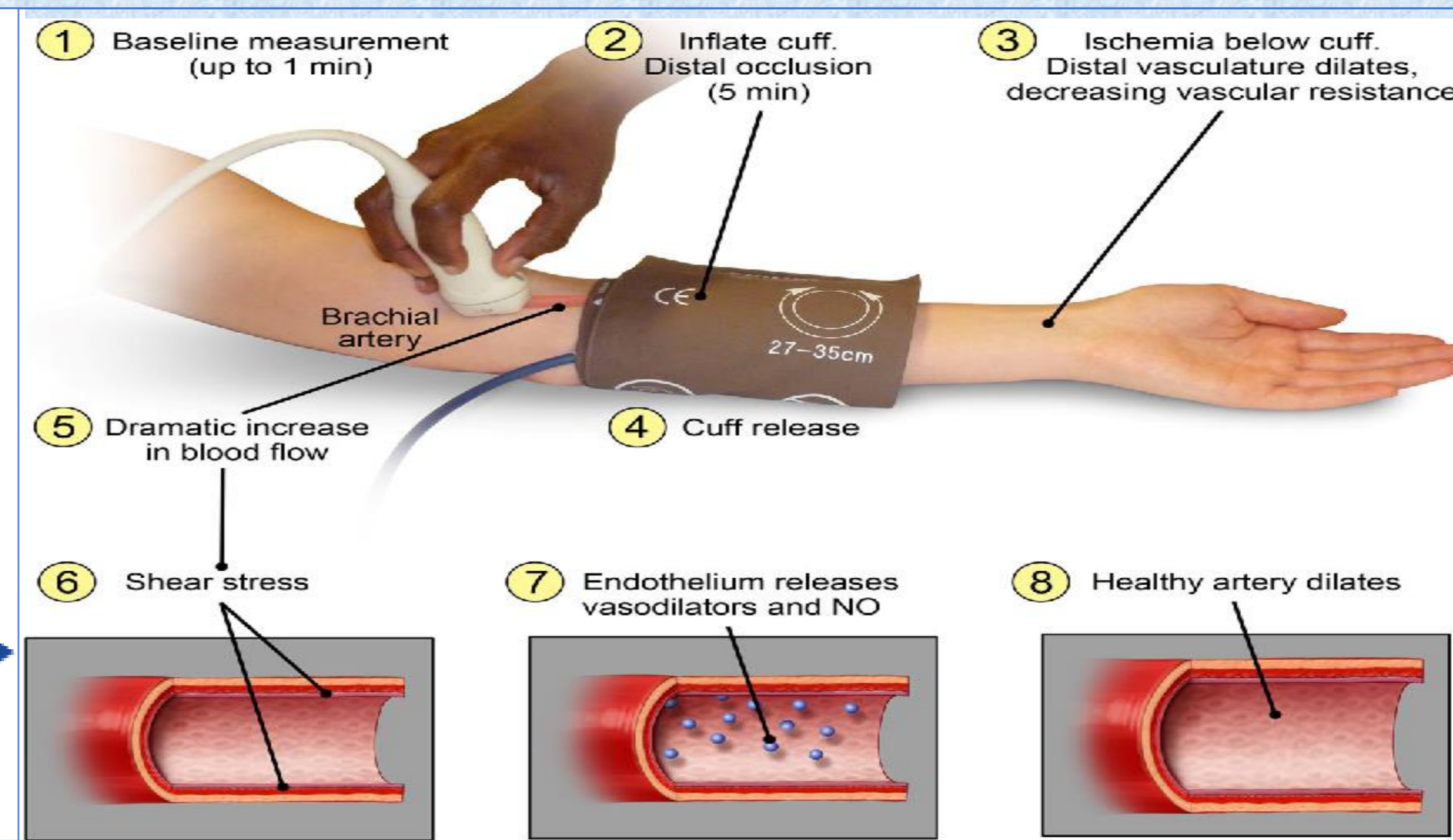
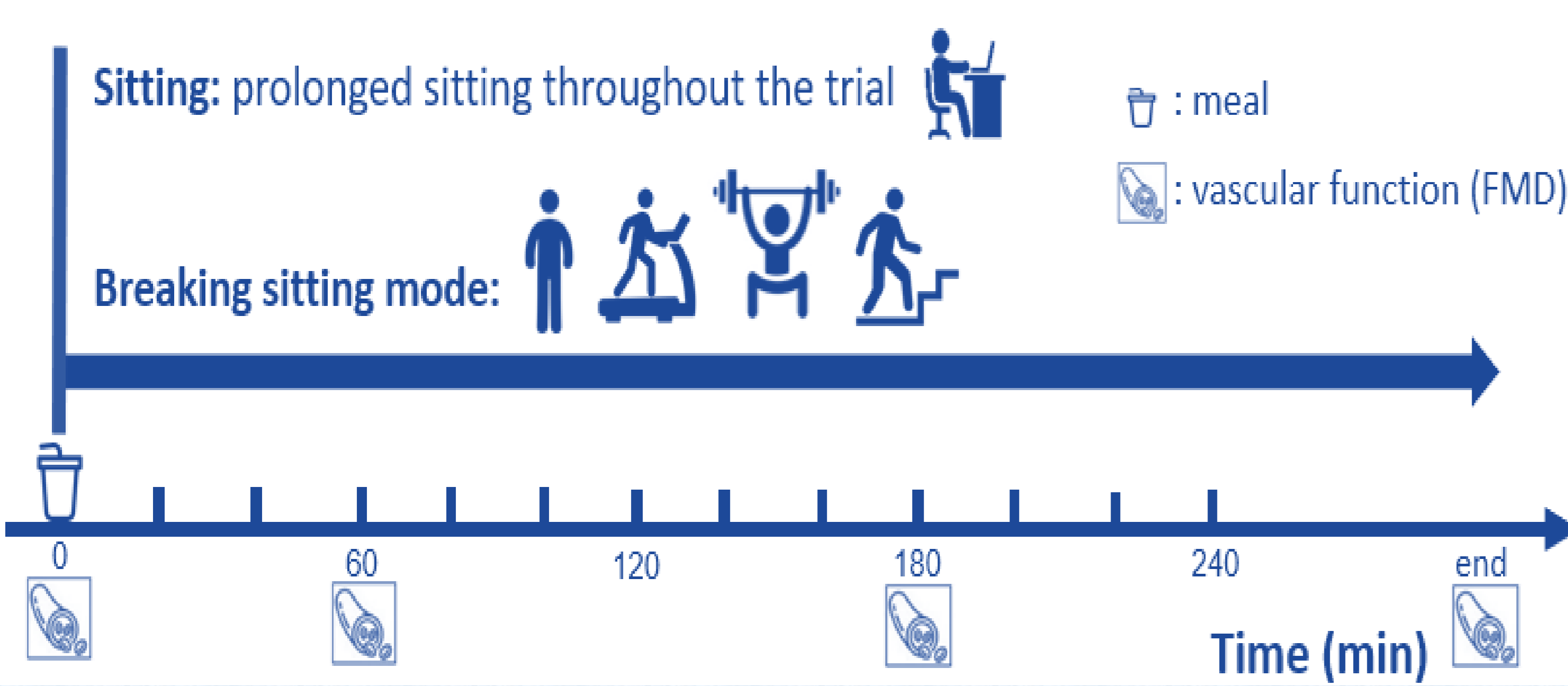
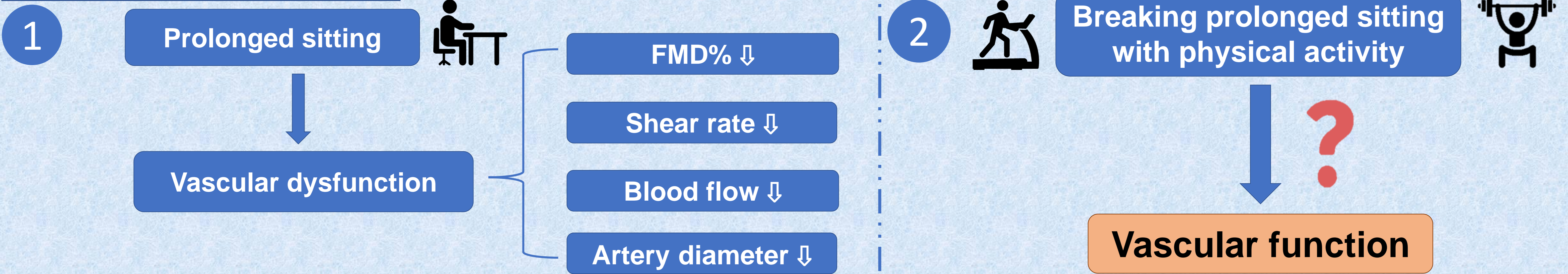
Acute effects of breaking prolonged sitting on vascular function: A review



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Introduction & purpose



- Flow-mediated dilation (FMD):** Noninvasive approach to assessment of endothelial function in vivo.
- Shear stress:** Force applied to blood.
- Shear rate:** Application of a shear stress produce a specific flow velocity.

Figure 1. Protocols of breaking sitting

Figure 2. Steps of using FMD

Study summary

Aerobic exercise

Resistance exercise

Reference	Participants		Intervention Details			Vascular Total Outcome(s)				FMD Location
	N (M/F) group	Age/ BMI (mean(SD))	Total duration	Type of PA	Duration/ Frequency	FMD	Shear rate	Blood flow	Artery diameter	
Thosar S.S. et al.,2015	12(0/12)	24.2(4.2)/ 23.7(3.4)	5h	light intensity Walking	2min/60min	↑	↔	N/A	N/A	SFA
Kerr J. et al.,2017	9(0/9) Post-menopausal	66(9)/ 30.6(4.2)	5h	standing	2min/20min	↔	N/A	N/A	N/A	SFA
				standing more	10min/60min	↑	N/A	N/A	N/A	
				light intensity Walking	2min/60min	↔	N/A	N/A	N/A	
Carter S.E. et al.,2019	15(10/5)	35.8(10.2)/ 25.5(3.2)	4h	Light intensity Walking	2min/30min	↔	↔	↔	N/A	SFA
				Light intensity Walking	8min/120min	↔	↔	↑	N/A	
Cho M.J. et al.,2020	12(7/5)	23.5(2.9)/ 23.4(2.7)	4h	Climb stairs (vigorous intensity)	5min/60min	↔	↑	↑	↔	BA
Peddie M.C. et al.,2021	18(11/7)	23.5(5.0)/ 23.7(2.6)	6h	prolonged standing	6 hours	↔	↔	↔	↔	PA
				Moderate Walking (5km/hr., 10% incline)	2min/30min	↔	↑	↑	↔	
Silva G.O. et al.,2021	17(11/6)	29(10)/ 25.1(5.1)	3h	Light intensity Walking	2min/30min	↔	↔	↔	↔	PA
				Isometric resistance exercise(30%MVC)	2min/30min	↔	↔	↔	↔	
Climie R.E. et al.,2018	19(11/8)	57(12)/ 30.6(3.4)	5h	Simple Resistance Activity	3min/30min	↑	↔	↔	↔	SFA
Taylor F.C. et al.,2021	24(13/11) T2D	61.5(7.8)/ 32.6(3.5)	7h	Simple Resistance Activity	3min/30min	↑	↑	↔	↔	SFA
					6min/60min	↑	↑	↔	↔	SFA
Taylor F.C. et al.,2021	13(0/13) PCOS	32.2(6.3)/ 30.2(5.3)	3.5h	Simple Resistance Activity	3min/30min	↔	↑	↑	N/A	SFA

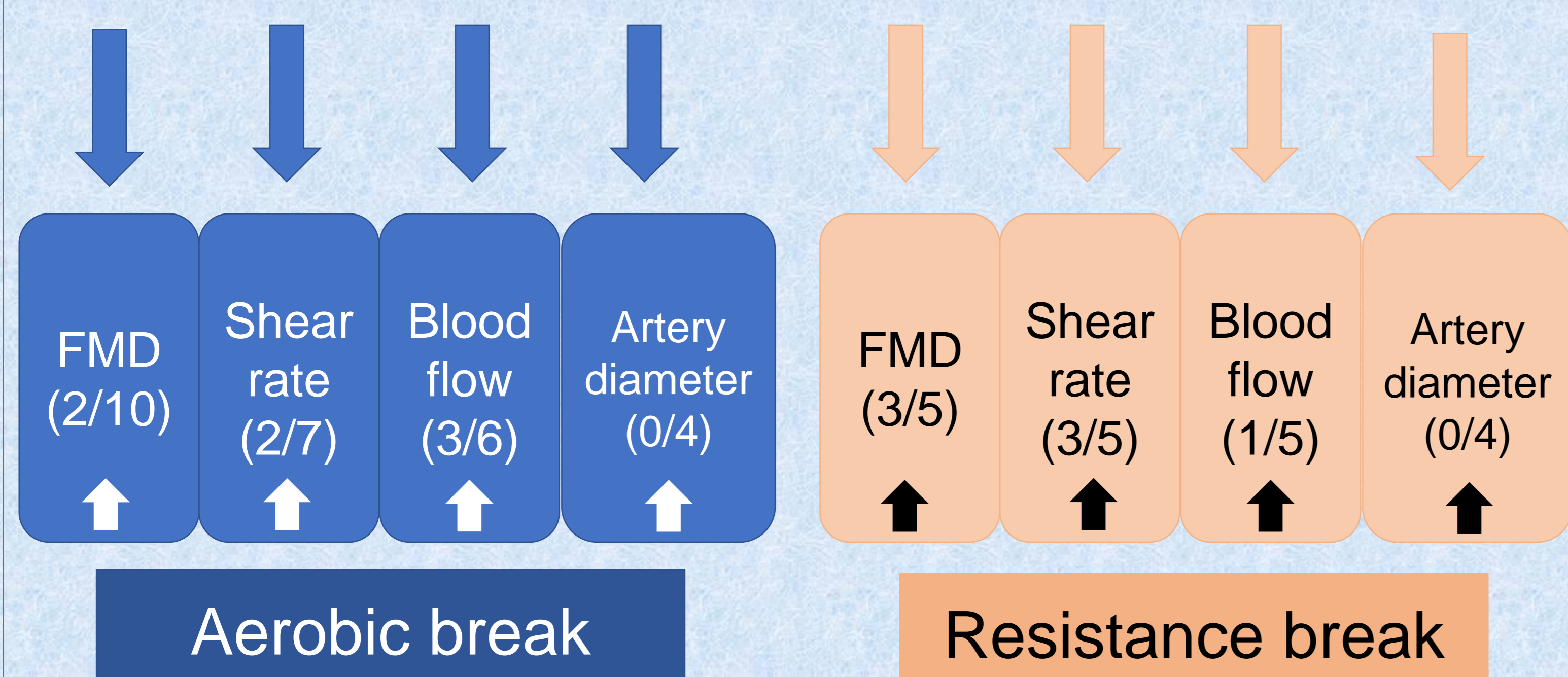
Table 1. Effects of breaking sitting on vascular function in 9 studies.

Compared to control group
 ↑: Better or preserve
 ↔: Not significant

• T2D: Type 2 Diabetes
 • PCOS: Polycystic Ovary Syndrome
 • SFA: superficial femoral artery
 • PA: popliteal artery
 • BA: brachial artery

Results

Breaking sitting vs. sitting



Discussion

- Resistance break seems to have higher proportion of positive outcomes on vascular function.
- Aerobic breaks which involves more body movements (e.g., walking and climbing stairs), appear to have better results on blood flow.
- More frequent breaks, longer time duration and accumulation of total time of exercise would have higher possibility of positive outcomes.
- Moderate-to-vigorous intensity no matter aerobic or resistance exercise breaks can increase shear rate and blood flow.

Conclusion: Breaking sitting has certain beneficial effects on vascular function.