Vascular Aging- Covid 19 references

References

1. Saeed S, Mancia G. Arterial stiffness and COVID-19: a bidirectional cause-effect relationship. *J Clin Hypertens*. 2021;23:1099-103. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8206945/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/33951308)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=J+ClinHypertens&title=Arterial+stiffness+and+COVID-19:+abidirectional+cause-effect+relationship&author=S+Saeed&author=G+Mancia&volume=23&publication_year=2021&pages=1099-103&)]

2. Libby P, Lüscher T. COVID-19 is, in the end, an endothelial disease. *Eur Heart J*. 2020;41:3038-44. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7470753/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/32882706)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Eur+Heart+J&title=COVID-19+is,+in+the+end,+anendothelial+disease&author=P+Libby&author=T+L%C3%BCscher&volume=41&publication_year=2020&pages=3038-44&pmid=32882706&)]

3. Fourie CMT, Schutte AE. Early vascular aging in the HIV infected: Is arterial stiffness assessment the ideal tool? *Virulence*. 2017;8:1075-7. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5711351/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/28467147)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Virulence&title=Early+vascular+aging+in+the+HIVinfected:+Is+arterial+stiffness+assessment+the+ideal+tool?&author=CMT+Fourie&author=AE+Schutte&volume=8&publication_year=2017&pages=1075-7&pmid=28467147&)]

4. Kotronias D, Kapranos N. Herpes simplex virus as a determinant risk factor for coronary artery atherosclerosis and myocardial infarction. *Vivo Athens Greece*. 2005;19:351-7. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/15796197)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Vivo+Athens+Greece&title=Herpes+simplex+virus+as+a+determinantrisk+factor+for+coronary+artery+atherosclerosis+and+myocardialinfarction&author=D+Kotronias&author=N+Kapranos&volume=19&publication_year=2005&pages=351-7&)]

5. Laurent S, Boutouyrie P, Cunha PG, et al. Concept of extremes in vascular aging. *Hypertension*. 2019;74:218-28. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/31203728)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Hypertension&title=Concept+of+extremes+in+vascular+aging&author=S+Laurent&author=P+Boutouyrie&author=PG+Cunha&volume=74&publication_year=2019&pages=218-28&pmid=31203728&)]

6. Sequí-Domínguez I, Cavero-Redondo I, Álvarez-Bueno C, et al. Accuracy of pulse wave velocity predicting cardiovascular and all-cause mortality. a systematic review and meta-analysis. *J Clin Med*. 2020;9:2080. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7408852/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/32630671)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=J+Clin+Med&title=Accuracy+of+pulse+wave+velocity+predicting+cardiovascular+andall-cause+mortality.+a+systematic+review+and+meta-analysis&author=I+Sequ%C3%AD-Dom%C3%ADnguez&author=I+Cavero-Redondo&author=C+%C3%81lvarez-Bueno&volume=9&publication_year=2020&pages=2080&pmid=32630671&)]

7. de Andrade CRM, Silva ELC, da Matta M de FB, et al. Vascular or chronological age: which is the better marker to estimate the cardiovascular risk in patients with type 1 diabetes? *Acta Diabetol*. 2016;53:925-33. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/27528365)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Acta+Diabetol&title=Vascular+or+chronological+age:+which+is+the+better+marker+toestimate+the+cardiovascular+risk+in+patients+with+type+1diabetes?&author=CRM+de+Andrade&author=ELC+Silva&author=M+de+FB+da+Matta&volume=53&publication_year=2016&pages=925-33&pmid=27528365&)]

8. Lin M, Chan GC, Chan KW, et al. Vascular age is associated with the risk of dialysis or death in chronic kidney disease. *Nephrology*. 2020;25:314-22. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/31226224)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Nephrology&title=Vascular+age+is+associated+with+the+risk+of+dialysis+or+death+inchronic+kidney+disease&author=M+Lin&author=GC+Chan&author=KW+Chan&volume=25&publication_year=2020&pages=314-22&pmid=31226224&)]

9. Nilsson PM. Early vascular ageing – a concept in development. *Eur Endocrinol*. 2015;11:26-31. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5819058/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/29632563)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Eur+Endocrinol&title=Early+vascular+ageing+%E2%80%93+a+concept+indevelopment&author=PM+Nilsson&volume=11&publication_year=2015&pages=26-31&pmid=29632563&)]

10. Zanoli L, Rastelli S, Granata A, et al. Arterial stiffness in inflammatory bowel disease: a systematic review and meta-analysis. *J Hypertens*. 2016;34:822-9. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/26882040)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=J+Hypertens&title=Arterial+stiffness+in+inflammatory+bowel+disease:+a+systematicreview+and+meta-analysis&author=L+Zanoli&author=S+Rastelli&author=A+Granata&volume=34&publication_year=2016&pages=822-9&pmid=26882040&)]

11. Lioufas N, Hawley CM, Cameron JD, et al. Chronic kidney disease and pulse wave velocity: a narrative review. *Int J Hypertens*. 2019;2019:9189362. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6397961/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/30906591)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Int+J+Hypertens&title=Chronic+kidney+disease+and+pulse+wave+velocity:+a+narrativereview&author=N+Lioufas&author=CM+Hawley&author=JD+Cameron&volume=2019&publication_year=2019&pages=9189362&pmid=30906591&)]

12. Muhammad IF, Borné Y, Östling G, et al. Arterial stiffness and incidence of diabetes: a population-based cohort study. *Diabetes Care*. 2017;40:1739-45. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/28971963)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Diabetes+Care&title=Arterial+stiffness+and+incidence+of+diabetes:+a+population-basedcohort+study&author=IF+Muhammad&author=Y+Born%C3%A9&author=G+%C3%96stling&volume=40&publication_year=2017&pages=1739-45&pmid=28971963&)]

13. Jordan J, Nilsson PM, Kotsis V, et al. Joint scientific statement of the European Association for the Study of Obesity and the European Society of Hypertension: obesity and early vascular ageing. *J Hypertens*. 2015;33:425-34. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/25629358)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=J+Hypertens&title=Joint+scientific+statement+of+the+European+Association+for+theStudy+of+Obesity+and+the+European+Society+of+Hypertension:+obesity+and+earlyvascular+ageing&author=J+Jordan&author=PM+Nilsson&author=V+Kotsis&volume=33&publication_year=2015&pages=425-34&pmid=25629358&)]

14. Bruno RM, Nilsson PM, Engström G, et al. Early and supernormal vascular aging: clinical characteristics and association with incident cardiovascular events. *Hypertens Dallas Tex*. 2020;76:1616-24. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/32895017)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Hypertens+Dallas+Tex&title=Early+and+supernormal+vascular+aging:+clinical+characteristicsand+association+with+incident+cardiovascular+events&author=RM+Bruno&author=PM+Nilsson&author=G+Engstr%C3%B6m&volume=76&publication_year=2020&pages=1616-24&)]

15. Olsen MH, Angell SY, Asma S, et al. A call to action and a lifecourse strategy to address the global burden of raised blood pressure on current and future generations: the Lancet Commission on hypertension. *Lancet Lond Engl*. 2016;388:2665-712. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/27671667)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Lancet+LondEngl&title=A+call+to+action+and+a+lifecourse+strategy+to+address+the+globalburden+of+raised+blood+pressure+on+current+and+future+generations:+theLancet+Commission+on+hypertension&author=MH+Olsen&author=SY+Angell&author=S+Asma&volume=388&publication_year=2016&pages=2665-712&)]

16. Donato AJ, Morgan RG, Walker AE, et al. Cellular and molecular biology of aging endothelial cells. *J Mol Cell Cardiol*. 2015;89:122-35. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4522407/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/25655936)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=J+Mol+Cell+Cardiol&title=Cellular+and+molecular+biology+of+aging+endothelialcells&author=AJ+Donato&author=RG+Morgan&author=AE+Walker&volume=89&publication_year=2015&pages=122-35&pmid=25655936&)]

17. Childs BG, Durik M, Baker DJ, et al. Cellular senescence in aging and age-related disease: from mechanisms to therapy. *Nat Med*. 2015;21:1424-35. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4748967/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/26646499)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Nat+Med&title=Cellular+senescence+in+aging+and+age-related+disease:+frommechanisms+to+therapy&author=BG+Childs&author=M+Durik&author=DJ+Baker&volume=21&publication_year=2015&pages=1424-35&pmid=26646499&)]

18. Seals DR, Jablonski KL, Donato AJ. Aging and vascular endothelial function in humans. *Clin Sci*. 2011;120:357-75. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3482987/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/21244363)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Clin+Sci&title=Aging+and+vascular+endothelialfunction+in+humans&author=DR+Seals&author=KL+Jablonski&author=AJ+Donato&volume=120&publication_year=2011&pages=357-75&)]

19. Jia G, Aroor AR, Jia C, et al. Endothelial cell senescence in aging-related vascular dysfunction. *Biochim Biophys Acta BBA - Mol Basis Dis* 2019;1865:1802-9. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/31109450)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Biochim+Biophys+Acta+BBA+-+Mol+BasisDis&title=Endothelial+cell+senescence+in+aging-related+vasculardysfunction&author=G+Jia&author=AR+Aroor&author=C+Jia&volume=1865&publication_year=2019&pages=1802-9&)]

20. Chia PY, Teo A, Yeo TW. Overview of the assessment of endothelial function in humans. *Front Med*. 2020;7:542567. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7575777/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/33117828)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Front+Med&title=Overview+of+the+assessment+ofendothelial+function+in+humans&author=PY+Chia&author=A+Teo&author=TW+Yeo&volume=7&publication_year=2020&pages=542567&)]

21. Furchgott RF. Endothelium-derived relaxing factor: discovery, early studies, and identifcation as nitric oxide (Nobel Lecture). *Angew Chem Int Ed*. 1999;38:1870-80. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/34182659)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Angew+Chem+Int+Ed&title=Endothelium-derived+relaxing+factor:discovery,+early+studies,+and+identifcation+as+nitric+oxide+(NobelLecture)&author=RF+Furchgott&volume=38&publication_year=1999&pages=1870-80&)]

22. Torregrossa AC, Aranke M, Bryan NS. Nitric oxide and geriatrics: implications in diagnostics and treatment of the elderly. *J Geriatr Cardiol JGC*. 2011;8:230-42. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3390088/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/22783310)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=J+Geriatr+Cardiol+JGC&title=Nitric+oxide+and+geriatrics:implications+in+diagnostics+and+treatment+of+the+elderly&author=AC+Torregrossa&author=M+Aranke&author=NS+Bryan&volume=8&publication_year=2011&pages=230-42&pmid=22783310&)]

23. Higashi Y, Noma K, Yoshizumi M, et al. Endothelial function and oxidative stress in cardiovascular diseases. *Circ J*. 2009;73:411-8. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/19194043)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Circ+J&title=Endothelial+function+and+oxidative+stress+in+cardiovasculardiseases&author=Y+Higashi&author=K+Noma&author=M+Yoshizumi&volume=73&publication_year=2009&pages=411-8&pmid=19194043&)]

24. Pennathur S, Heinecke JW. Mechanisms for oxidative stress in diabetic cardiovascular disease. *Antioxidants Redox Signal*. 2007;9:955-69. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/17508917)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Antioxidants+RedoxSignal&title=Mechanisms+for+oxidative+stress+indiabetic+cardiovascular+disease&author=S+Pennathur&author=JW+Heinecke&volume=9&publication_year=2007&pages=955-69&)]

25. Houde M, Desbiens L, D’Orléans-Juste P. Endothelin-1: biosynthesis, signaling and vasoreactivity. *Adv Pharmacol San Diego Calif*. 2016;77:143-75. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/27451097)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Adv+Pharmacol+San+DiegoCalif&title=Endothelin-1:+biosynthesis,+signalingand+vasoreactivity&author=M+Houde&author=L+Desbiens&author=P+D%E2%80%99Orl%C3%A9ans-Juste&volume=77&publication_year=2016&pages=143-75&)]

26. Sena CM, Leandro A, Azul L, et al. Vascular oxidative stress: impact and therapeutic approaches. *Front Physiol*; 9:1668. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6288353/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/30564132)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Front+Physiol&title=Vascular+oxidative+stress:+impact+and+therapeuticapproaches&author=CM+Sena&author=A+Leandro&author=L+Azul&volume=9&pages=1668&)]

27. Lubos E, Kelly NJ, Oldebeken SR, et al. Glutathione peroxidase-1 deficiency augments proinflammatory cytokine-induced redox signaling and human endothelial cell activation. *J Biol Chem*. 2011;286:35407-17. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3195617/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/21852236)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=J+Biol+Chem&title=Glutathione+peroxidase-1+deficiency+augments+proinflammatorycytokine-induced+redox+signaling+and+human+endothelial+cellactivation&author=E+Lubos&author=NJ+Kelly&author=SR+Oldebeken&volume=286&publication_year=2011&pages=35407-17&pmid=21852236&)]

28. Paneni F, Costantino S, Battista R, et al. Adverse epigenetic signatures by histone methyltransferase Set7 contribute to vascular dysfunction in patients with type 2 diabetes mellitus. *Circ Cardiovasc Genet*. 2015;8:150-8. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/25472959)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Circ+Cardiovasc+Genet&title=Adverse+epigenetic+signatures+by+histone+methyltransferase+Set7contribute+to+vascular+dysfunction+in+patients+with+type+2+diabetesmellitus&author=F+Paneni&author=S+Costantino&author=R+Battista&volume=8&publication_year=2015&pages=150-8&pmid=25472959&)]

29. Pandey KB, Rizvi SI. Markers of oxidative stress in erythrocytes and plasma during aging in humans. *Oxid Med Cell Longev*. 2010;3:2-12. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2835884/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/20716923)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=OxidMed+Cell+Longev&title=Markers+of+oxidative+stress+inerythrocytes+and+plasma+during+aging+in+humans&author=KB+Pandey&author=SI+Rizvi&volume=3&publication_year=2010&pages=2-12&pmid=20716923&)]

30. Gielis J, Quirynen L, Briedé J, et al. Pathogenetic role of endothelial nitric oxide synthase uncoupling during lung ischaemia-reperfusion injury†. *Eur J Cardio-Thorac Surg*. 2017;52(2):256-263. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/28481990)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Eur+JCardio-Thorac+Surg&title=Pathogenetic+role+of+endothelial+nitric+oxide+synthase+uncouplingduring+lung+ischaemia-reperfusion+injury%E2%80%A0&author=J+Gielis&author=L+Quirynen&author=J+Bried%C3%A9&volume=52&issue=2&publication_year=2017&pages=256-263&)]

31. Tesauro M, Mauriello A, Rovella V, et al. Arterial ageing: from endothelial dysfunction to vascular calcification. *J Intern Med*. 2017;281:471-82. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/28345303)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=J+Intern+Med&title=Arterial+ageing:+from+endothelial+dysfunction+to+vascularcalcification&author=M+Tesauro&author=A+Mauriello&author=V+Rovella&volume=281&publication_year=2017&pages=471-82&pmid=28345303&)]

32. Bhayadia R, Schmidt BMW, Melk A, et al. Senescence-induced oxidative stress causes endothelial dysfunction. *J Gerontol A Biol Sci Med Sci*. 2016;71:161-9. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/25735595)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=J+Gerontol+A+Biol+Sci+Med+Sci&title=Senescence-induced+oxidative+stress+causes+endothelialdysfunction&author=R+Bhayadia&author=BMW+Schmidt&author=A+Melk&volume=71&publication_year=2016&pages=161-9&pmid=25735595&)]

33. Marcus AJ, Broekman MJ, Drosopoulos JH, et al. The endothelial cell ecto-ADPase responsible for inhibition of platelet function is CD39. *J Clin Invest*. 1997;99:1351-60. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC507951/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/9077545)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=J+Clin+Invest&title=The+endothelial+cell+ecto-ADPase+responsible+for+inhibition+ofplatelet+function+is+CD39&author=AJ+Marcus&author=MJ+Broekman&author=JH+Drosopoulos&volume=99&publication_year=1997&pages=1351-60&pmid=9077545&)]

34. Sawdey MS, Loskutoff DJ. Regulation of murine type 1 plasminogen activator inhibitor gene expression in vivo. Tissue specificity and induction by lipopolysaccharide, tumor necrosis factor-alpha, and transforming growth factor-beta. *J Clin Invest*. 1991;88:1346-53. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC295605/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/1918385)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=J+ClinInvest&title=Regulation+of+murine+type+1plasminogen+activator+inhibitor+gene+expression+in+vivo.+Tissue+specificityand+induction+by+lipopolysaccharide,+tumor+necrosis+factor-alpha,+andtransforming+growth+factor-beta&author=MS+Sawdey&author=DJ+Loskutoff&volume=88&publication_year=1991&pages=1346-53&pmid=1918385&)]

35. Polgar J, Matuskova J, Wagner DD. The P-selectin, tissue factor, coagulation triad. *J Thromb Haemost JTH*. 2005;3:1590-6. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/16102023)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=J+Thromb+Haemost+JTH&title=The+P-selectin,+tissue+factor,coagulation+triad&author=J+Polgar&author=J+Matuskova&author=DD+Wagner&volume=3&publication_year=2005&pages=1590-6&pmid=16102023&)]

36. McEver RP. Selectins: initiators of leucocyte adhesion and signalling at the vascular wall. *Cardiovasc Res*. 2015;107:331-9. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4592324/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/25994174)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Cardiovasc+Res&title=Selectins:+initiators+of+leucocyteadhesion+and+signalling+at+the+vascular+wall&author=RP+McEver&volume=107&publication_year=2015&pages=331-9&pmid=25994174&)]

37. Muller WA. Getting leukocytes to the site of inflammation. *Vet Pathol*. 2013;50:7-22. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3628536/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/23345459)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Vet+Pathol&title=Getting+leukocytes+to+the+site+ofinflammation&author=WA+Muller&volume=50&publication_year=2013&pages=7-22&pmid=23345459&)]

38. Noels H, Weber C, Koenen RR. Chemokines as therapeutic targets in cardiovascular disease. *Arterioscler Thromb Vasc Biol*. 2019;39:583-92. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/30760014)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Arterioscler+Thromb+VascBiol&title=Chemokines+as+therapeutic+targets+incardiovascular+disease&author=H+Noels&author=C+Weber&author=RR+Koenen&volume=39&publication_year=2019&pages=583-92&pmid=30760014&)]

39. Franceschi C, Garagnani P, Parini P, et al. Inflammaging: a new immune–metabolic viewpoint for age-related diseases. *Nat Rev Endocrinol*. 2018;14:576-90. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/30046148)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Nat+Rev+Endocrinol&title=Inflammaging:+a+new+immune%E2%80%93metabolic+viewpoint+for+age-relateddiseases&author=C+Franceschi&author=P+Garagnani&author=P+Parini&volume=14&publication_year=2018&pages=576-90&pmid=30046148&)]

40. Liu D, Richardson G, Benli FM, et al. Inflammageing in the cardiovascular system: mechanisms, emerging targets, and novel therapeutic strategies. *Clin Sci*. 2020;134:2243-62. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/32880386)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=ClinSci&title=Inflammageing+in+the+cardiovascular+system:+mechanisms,+emergingtargets,+and+novel+therapeutic+strategies&author=D+Liu&author=G+Richardson&author=FM+Benli&volume=134&publication_year=2020&pages=2243-62&)]

41. Prattichizzo F, De Nigris V, Spiga R, et al. Inflammageing and metaflammation: the yin and yang of type 2 diabetes. *Ageing Res Rev*. 2018;41:1-17. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/29081381)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Ageing+Res+Rev&title=Inflammageing+and+metaflammation:+the+yin+and+yang+of+type+2diabetes&author=F+Prattichizzo&author=V+De+Nigris&author=R+Spiga&volume=41&publication_year=2018&pages=1-17&pmid=29081381&)]

42. Libby P. Interleukin-1 beta as a target for atherosclerosis therapy: the biological basis of CANTOS and beyond. *J Am Coll Cardiol*. 2017;70:2278-89. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5687846/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/29073957)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=J+Am+Coll+Cardiol&title=Interleukin-1+beta+as+a+target+foratherosclerosis+therapy:+the+biological+basis+of+CANTOS+andbeyond&author=P+Libby&volume=70&publication_year=2017&pages=2278-89&pmid=29073957&)]

43. Harrison DG, Guzik TJ, Lob H, et al. Inflammation, immunity and hypertension. *Hypertension*. 2011;57:132-40. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3028593/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/21149826)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Hypertension&title=Inflammation,+immunity+and+hypertension&author=DG+Harrison&author=TJ+Guzik&author=H+Lob&volume=57&publication_year=2011&pages=132-40&pmid=21149826&)]

44. De Ciuceis C, Amiri F, Brassard P, et al. Reduced vascular remodeling, endothelial dysfunction, and oxidative stress in resistance arteries of angiotensin II-infused macrophage colony-stimulating factor-deficient mice: evidence for a role in inflammation in angiotensin-induced vascular injury. *Arterioscler Thromb Vasc Biol*. 2005;25:2106-13. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/16100037)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Arterioscler+Thromb+Vasc+Biol&title=Reduced+vascular+remodeling,+endothelial+dysfunction,+andoxidative+stress+in+resistance+arteries+of+angiotensin+II-infused+macrophagecolony-stimulating+factor-deficient+mice:+evidence+for+a+role+ininflammation+in+angiotensin-induced+vascular+injury&author=C+De+Ciuceis&author=F+Amiri&author=P+Brassard&volume=25&publication_year=2005&pages=2106-13&pmid=16100037&)]

45. Samani NJ, Boultby R, Butler R, et al. Telomere shortening in atherosclerosis. *Lancet Lond Engl*. 2001;358:472-3. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/11513915)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Lancet+Lond+Engl&title=Telomere+shortening+in+atherosclerosis&author=NJ+Samani&author=R+Boultby&author=R+Butler&volume=358&publication_year=2001&pages=472-3&)]

46. Tomiyama H, Shiina K, Matsumoto‐Nakano C, et al. The contribution of inflammation to the development of hypertension mediated by increased arterial stiffness. *J Am Heart Assoc Cardiovasc Cerebrovasc Dis*. 2017;6:e005729. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5586296/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/28666991)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=J+Am+Heart+Assoc+Cardiovasc+Cerebrovasc+Dis&title=The+contribution+of+inflammation+to+the+development+ofhypertension+mediated+by+increased+arterial+stiffness&author=H+Tomiyama&author=K+Shiina&author=C+Matsumoto%E2%80%90Nakano&volume=6&publication_year=2017&pages=e005729&)]

47. Sanchis P, Ho CY, Liu Y, et al. Arterial ‘inflammaging’ drives vascular calcification in children on dialysis. *Kidney Int*. 2019;95:958-72. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6684370/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/30827513)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Kidney+Int&title=Arterial+%E2%80%98inflammaging%E2%80%99+drives+vascular+calcification+in+childrenon+dialysis&author=P+Sanchis&author=CY+Ho&author=Y+Liu&volume=95&publication_year=2019&pages=958-72&pmid=30827513&)]

48. Shintouo CM, Mets T, Beckwee D, et al. Is inflammageing influenced by the microbiota in the aged gut? A systematic review. *Exp Gerontol*. 2020;141:111079. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/32882334)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Exp+Gerontol&title=Is+inflammageing+influenced+by+the+microbiota+in+the+aged+gut?+Asystematic+review&author=CM+Shintouo&author=T+Mets&author=D+Beckwee&volume=141&publication_year=2020&pages=111079&pmid=32882334&)]

49. Biagi E, Franceschi C, Rampelli S, et al. Gut microbiota and extreme longevity. *Curr Biol CB*. 2016;26:1480-5. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/27185560)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Curr+Biol+CB&title=Gut+microbiota+and+extreme+longevity&author=E+Biagi&author=C+Franceschi&author=S+Rampelli&volume=26&publication_year=2016&pages=1480-5&pmid=27185560&)]

50. Biagi E, Nylund L, Candela M, et al. Through ageing, and beyond: gut microbiota and inflammatory status in seniors and centenarians. *PLoS One*. 2010;5:e10667. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2871786/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/20498852)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=PLoSOne&title=Through+ageing,+and+beyond:+gut+microbiota+and+inflammatorystatus+in+seniors+and+centenarians&author=E+Biagi&author=L+Nylund&author=M+Candela&volume=5&publication_year=2010&pages=e10667&pmid=20498852&)]

51. Fransen F, van Beek AA, Borghuis T, et al. Aged gut microbiota contributes to systemical inflammaging after transfer to germ-free mice. *Front Immunol*. 2017;8:1385. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5674680/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/29163474)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Front+Immunol&title=Aged+gut+microbiota+contributes+to+systemical+inflammaging+aftertransfer+to+germ-free+mice&author=F+Fransen&author=AA+van+Beek&author=T+Borghuis&volume=8&publication_year=2017&pages=1385&pmid=29163474&)]

52. Tang W, Zhu H, Feng Y, et al. The impact of gut microbiota disorders on the blood&brain barrier. *Infect Drug Resist*. 2020;13:3351-63. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7532923/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/33061482)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Infect+Drug+Resist&title=The+impact+of+gut+microbiota+disorders+on+the+blood&brainbarrier&author=W+Tang&author=H+Zhu&author=Y+Feng&volume=13&publication_year=2020&pages=3351-63&pmid=33061482&)]

53. Ridker PM, Danielson E, Fonseca FAH, et al. Rosuvastatin to prevent vascular events in men and women with elevated C-reactive protein. *N Engl J Med*. 2008;359:2195-207. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/18997196)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=N+Engl+J+Med&title=Rosuvastatin+to+prevent+vascular+events+in+men+and+women+withelevated+C-reactive+protein&author=PM+Ridker&author=E+Danielson&author=FAH+Fonseca&volume=359&publication_year=2008&pages=2195-207&pmid=18997196&)]

54. Crittenden DB, Lehmann RA, Schneck L, et al. Colchicine use is associated with decreased prevalence of myocardial infarction in patients with gout. *J Rheumatol*. 2012;39:1458-64. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3733459/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/22660810)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=JRheumatol&title=Colchicine+use+is+associated+with+decreased+prevalence+ofmyocardial+infarction+in+patients+with+gout&author=DB+Crittenden&author=RA+Lehmann&author=L+Schneck&volume=39&publication_year=2012&pages=1458-64&pmid=22660810&)]

55. McClelland RL, Jorgensen NW, Budoff M, et al. 10-year coronary heart disease risk prediction using coronary artery calcium and traditional risk factors: derivation in the MESA (Multi-Ethnic Study of Atherosclerosis) with validation in the HNR (Heinz Nixdorf Recall) study and the DHS (Dallas Heart Study). *J Am Coll Cardiol*. 2015;66:1643-53. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4603537/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/26449133)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=J+Am+Coll+Cardiol&title=10-year+coronary+heart+disease+risk+prediction+using+coronaryartery+calcium+and+traditional+risk+factors:+derivation+in+the+MESA(Multi-Ethnic+Study+of+Atherosclerosis)+with+validation+in+the+HNR+(HeinzNixdorf+Recall)+study+and+the+DHS+(Dallas+Heart+Study)&author=RL+McClelland&author=NW+Jorgensen&author=M+Budoff&volume=66&publication_year=2015&pages=1643-53&pmid=26449133&)]

56. New SEP, Aikawa E. The role of extracellular vesicles in de novo mineralization: an additional novel mechanism of cardiovascular calcification. *Arterioscler Thromb Vasc Biol*. 2013;33:1753-8. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3788633/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/23766262)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Arterioscler+Thromb+VascBiol&title=The+role+of+extracellular+vesicles+inde+novo+mineralization:+an+additional+novel+mechanism+of+cardiovascularcalcification&author=SEP+New&author=E+Aikawa&volume=33&publication_year=2013&pages=1753-8&pmid=23766262&)]

57. Kalampogias A, Siasos G, Oikonomou E, et al. Basic mechanisms in atherosclerosis: the role of calcium. *Med Chem Shariqah United Arab Emir*. 2016;12:103-13. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/26411606)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Med+Chem+Shariqah+United+ArabEmir&title=Basic+mechanisms+in+atherosclerosis:+the+role+ofcalcium&author=A+Kalampogias&author=G+Siasos&author=E+Oikonomou&volume=12&publication_year=2016&pages=103-13&)]

58. Sawabe M. Vascular aging: from molecular mechanism to clinical significance. *Geriatr Gerontol Int*. 2010;10:S213-20. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/20590836)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Geriatr+GerontolInt&title=Vascular+aging:+from+molecularmechanism+to+clinical+significance&author=M+Sawabe&volume=10&publication_year=2010&pages=S213-20&pmid=20590836&)]

59. Mackey RH, Venkitachalam L, Sutton-Tyrrell K. Calcifications, arterial stiffness and atherosclerosis. *Adv Cardiol*. 2007;44:234-44. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/17075212)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Adv+Cardiol&title=Calcifications,+arterial+stiffnessand+atherosclerosis&author=RH+Mackey&author=L+Venkitachalam&author=K+Sutton-Tyrrell&volume=44&publication_year=2007&pages=234-44&pmid=17075212&)]

60. Fok P-W, Lanzer P. Media sclerosis drives and localizes atherosclerosis in peripheral arteries. *PLoS One*. 2018;13:e0205599. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6203409/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/30365531)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=PLoSOne&title=Media+sclerosis+drives+and+localizesatherosclerosis+in+peripheral+arteries&author=P-W+Fok&author=P+Lanzer&volume=13&publication_year=2018&pages=e0205599&pmid=30365531&)]

61. Pescatore LA, Gamarra LF, Liberman M. Multifaceted mechanisms of vascular calcification in aging. *Arterioscler Thromb Vasc Biol*. 2019;39:1307-16. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/31144990)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Arterioscler+Thromb+VascBiol&title=Multifaceted+mechanisms+of+vascularcalcification+in+aging&author=LA+Pescatore&author=LF+Gamarra&author=M+Liberman&volume=39&publication_year=2019&pages=1307-16&pmid=31144990&)]

62. Lanzer P, Boehm M, Sorribas V, et al. Medial vascular calcification revisited: review and perspectives. *Eur Heart J*. 2014;35:1515-25. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4072893/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/24740885)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Eur+Heart+J&title=Medial+vascular+calcification+revisited:+review+andperspectives&author=P+Lanzer&author=M+Boehm&author=V+Sorribas&volume=35&publication_year=2014&pages=1515-25&pmid=24740885&)]

63. London GM, Guérin AP, Marchais SJ, et al. Arterial media calcification in end-stage renal disease: impact on all-cause and cardiovascular mortality. *Nephrol Dial Transplant*. 2003;18:1731-40. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/12937218)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=NephrolDial+Transplant&title=Arterial+media+calcification+in+end-stage+renal+disease:+impacton+all-cause+and+cardiovascular+mortality&author=GM+London&author=AP+Gu%C3%A9rin&author=SJ+Marchais&volume=18&publication_year=2003&pages=1731-40&pmid=12937218&)]

64. Stary HC. Macrophages, macrophage foam cells, and eccentric intimal thickening in the coronary arteries of young children. *Atherosclerosis*. 1987;64:91-108. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/3606726)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Atherosclerosis&title=Macrophages,+macrophage+foam+cells,and+eccentric+intimal+thickening+in+the+coronary+arteries+of+youngchildren&author=HC+Stary&volume=64&publication_year=1987&pages=91-108&pmid=3606726&)]

65. Bennett MR, Sinha S, Owens GK. Vascular smooth muscle cells in atherosclerosis. *Circ Res*. 2016;118:692-702. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4762053/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/26892967)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Circ+Res&title=Vascular+smooth+muscle+cells+inatherosclerosis&author=MR+Bennett&author=S+Sinha&author=GK+Owens&volume=118&publication_year=2016&pages=692-702&pmid=26892967&)]

66. Wang JC, Bennett M. Aging and atherosclerosis: mechanisms, functional consequences, and potential therapeutics for cellular senescence. *Circ Res*. 2012;111:245-59. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/22773427)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Circ+Res&title=Aging+and+atherosclerosis:mechanisms,+functional+consequences,+and+potential+therapeutics+for+cellularsenescence&author=JC+Wang&author=M+Bennett&volume=111&publication_year=2012&pages=245-59&pmid=22773427&)]

67. Virmani R, Kolodgie FD, Burke AP, et al. Lessons from sudden coronary death: a comprehensive morphological classification scheme for atherosclerotic lesions. *Arterioscler Thromb Vasc Biol*. 2000;20:1262-75. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/10807742)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Arterioscler+Thromb+Vasc+Biol&title=Lessons+from+sudden+coronary+death:+a+comprehensive+morphologicalclassification+scheme+for+atherosclerotic+lesions&author=R+Virmani&author=FD+Kolodgie&author=AP+Burke&volume=20&publication_year=2000&pages=1262-75&pmid=10807742&)]

68. Zhu X-Y, Bentley MD, Chade AR, et al. Early changes in coronary artery wall structure detected by microcomputed tomography in experimental hypercholesterolemia. *Am J Physiol-Heart Circ Physiol*. 2007;293:H1997-2003. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/17573460)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Am+J+Physiol-Heart+CircPhysiol&title=Early+changes+in+coronary+artery+wall+structure+detected+bymicrocomputed+tomography+in+experimentalhypercholesterolemia&author=X-Y+Zhu&author=MD+Bentley&author=AR+Chade&volume=293&publication_year=2007&pages=H1997-2003&pmid=17573460&)]

69. Spagnoli LG, Orlandi A, Mauriello A, et al. Age-dependent increase of rabbit aortic atherosclerosis a morphometric approach. *Pathol - Res Pract* 1992;188:637-42. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/1409103)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Pathol+-+Res+Pract&title=Age-dependent+increase+of+rabbit+aortic+atherosclerosis+amorphometric+approach&author=LG+Spagnoli&author=A+Orlandi&author=A+Mauriello&volume=188&publication_year=1992&pages=637-42&pmid=1409103&)]

70. Alexopoulos N, Raggi P. Calcification in atherosclerosis. *Nat Rev Cardiol*. 2009;6:681-8. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/19786983)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Nat+Rev+Cardiol&title=Calcification+inatherosclerosis&author=N+Alexopoulos&author=P+Raggi&volume=6&publication_year=2009&pages=681-8&pmid=19786983&)]

71. Gustafson D, Raju S, Wu R, et al. Overcoming barriers. *Arterioscler Thromb Vasc Biol*. 2020;40:1818-29. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7370857/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/32510978)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Arterioscler+ThrombVasc+Biol&title=Overcoming+barriers&author=D+Gustafson&author=S+Raju&author=R+Wu&volume=40&publication_year=2020&pages=1818-29&pmid=32510978&)]

72. Goshua G, Pine AB, Meizlish ML, et al. Endotheliopathy in COVID-19-associated coagulopathy: evidence from a single-centre, cross-sectional study. *Lancet Haematol*. 2020;7:e575-82. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7326446/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/32619411)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=LancetHaematol&title=Endotheliopathy+in+COVID-19-associated+coagulopathy:+evidencefrom+a+single-centre,+cross-sectional+study&author=G+Goshua&author=AB+Pine&author=ML+Meizlish&volume=7&publication_year=2020&pages=e575-82&pmid=32619411&)]

73. Scialo F, Daniele A, Amato F, et al. ACE2: the major cell entry receptor for SARS-CoV-2. *Lung*. 2020;198:867-77. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7653219/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/33170317)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Lung&title=ACE2:+the+major+cell+entry+receptor+forSARS-CoV-2&author=F+Scialo&author=A+Daniele&author=F+Amato&volume=198&publication_year=2020&pages=867-77&pmid=33170317&)]

74. Abassi Z, Higazi AAR, Kinaneh S, et al. ACE2, COVID-19 infection, inflammation, and coagulopathy: missing pieces in the puzzle. *Front Physiol*. 2020;11:1253. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7573220/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/33123031)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Front+Physiol&title=ACE2,+COVID-19+infection,+inflammation,+and+coagulopathy:+missingpieces+in+the+puzzle&author=Z+Abassi&author=AAR+Higazi&author=S+Kinaneh&volume=11&publication_year=2020&pages=1253&)]

75. Zou X, Chen K, Zou J, et al. Single-cell RNA-seq data analysis on the receptor ACE2 expression reveals the potential risk of different human organs vulnerable to 2019-nCoV infection. *Front Med*. 2020;14:185-92. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7088738/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/32170560)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Front+Med&title=Single-cell+RNA-seq+data+analysis+on+the+receptor+ACE2+expressionreveals+the+potential+risk+of+different+human+organs+vulnerable+to+2019-nCoVinfection&author=X+Zou&author=K+Chen&author=J+Zou&volume=14&publication_year=2020&pages=185-92&pmid=32170560&)]

76. Hamming I, Timens W, Bulthuis MLC, et al. Tissue distribution of ACE2 protein, the functional receptor for SARS coronavirus. A first step in understanding SARS pathogenesis. *J Pathol*. 2004;203:631-7. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7167720/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/15141377)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=J+Pathol&title=Tissue+distribution+of+ACE2+protein,+the+functional+receptor+forSARS+coronavirus.+A+first+step+in+understanding+SARSpathogenesis&author=I+Hamming&author=W+Timens&author=MLC+Bulthuis&volume=203&publication_year=2004&pages=631-7&pmid=15141377&)]

77. Datta PK, Liu F, Fischer T, et al. SARS-CoV-2 pandemic and research gaps: Understanding SARS-CoV-2 interaction with the ACE2 receptor and implications for therapy. *Theranostics*. 2020;10:7448-64. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7330865/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/32642005)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Theranostics&title=SARS-CoV-2+pandemic+and+research+gaps:+Understanding+SARS-CoV-2interaction+with+the+ACE2+receptor+and+implications+fortherapy&author=PK+Datta&author=F+Liu&author=T+Fischer&volume=10&publication_year=2020&pages=7448-64&pmid=32642005&)]

78. Wang W, McKinnie SMK, Farhan M, et al. Angiotensin-converting enzyme 2 metabolizes and partially inactivates Pyr-Apelin-13 and Apelin-17. *Hypertension*. 2016;68:365-77. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/27217402)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Hypertension&title=Angiotensin-converting+enzyme+2+metabolizes+and+partiallyinactivates+Pyr-Apelin-13+and+Apelin-17&author=W+Wang&author=SMK+McKinnie&author=M+Farhan&volume=68&publication_year=2016&pages=365-77&pmid=27217402&)]

79. Galán M, Jiménez-Altayó F. Small resistance artery disease and ACE2 in hypertension: a new paradigm in the context of COVID-19. *Front Cardiovasc Med*. 2020;7:588692. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7661633/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/33195477)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Front+Cardiovasc+Med&title=Small+resistance+artery+disease+andACE2+in+hypertension:+a+new+paradigm+in+the+context+ofCOVID-19&author=M+Gal%C3%A1n&author=F+Jim%C3%A9nez-Altay%C3%B3&volume=7&publication_year=2020&pages=588692&pmid=33195477&)]

80. Turner AJ, Hiscox JA, Hooper NM. ACE2: from vasopeptidase to SARS virus receptor. *Trends Pharmacol Sci*. 2004;25:291-4. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7119032/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/15165741)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Trends+Pharmacol+Sci&title=ACE2:+from+vasopeptidase+to+SARSvirus+receptor&author=AJ+Turner&author=JA+Hiscox&author=NM+Hooper&volume=25&publication_year=2004&pages=291-4&pmid=15165741&)]

81. Tan LY, Komarasamy TV, RMT Balasubramaniam V. Hyperinflammatory immune response and COVID-19: a double edged sword. *Front Immunol*; 12:742941. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8515020/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/34659238)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=FrontImmunol&title=Hyperinflammatory+immune+response+andCOVID-19:+a+double+edged+sword&author=LY+Tan&author=TV+Komarasamy&author=V+RMT+Balasubramaniam&volume=12&pages=742941&)]

82. Clapp BR, Hingorani AD, Kharbanda RK, et al. Inflammation-induced endothelial dysfunction involves reduced nitric oxide bioavailability and increased oxidant stress. *Cardiovasc Res*. 2004;64:172-8. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/15364625)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Cardiovasc+Res&title=Inflammation-induced+endothelial+dysfunction+involves+reducednitric+oxide+bioavailability+and+increased+oxidant+stress&author=BR+Clapp&author=AD+Hingorani&author=RK+Kharbanda&volume=64&publication_year=2004&pages=172-8&pmid=15364625&)]

83. Palombo C, Kozakova M. Arterial stiffness, atherosclerosis and cardiovascular risk: pathophysiologic mechanisms and emerging clinical indications. *Vasc Pharmacol*. 2016;77:1-7. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/26643779)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Vasc+Pharmacol&title=Arterial+stiffness,+atherosclerosisand+cardiovascular+risk:+pathophysiologic+mechanisms+and+emerging+clinicalindications&author=C+Palombo&author=M+Kozakova&volume=77&publication_year=2016&pages=1-7&)]

84. Vlachopoulos C, Dima I, Aznaouridis K, et al. Acute systemic inflammation increases arterial stiffness and decreases wave reflections in healthy individuals. *Circulation*. 2005;112:2193-200. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/16186422)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Circulation&title=Acute+systemic+inflammation+increases+arterial+stiffness+anddecreases+wave+reflections+in+healthy+individuals&author=C+Vlachopoulos&author=I+Dima&author=K+Aznaouridis&volume=112&publication_year=2005&pages=2193-200&pmid=16186422&)]

85. Bouvet C, Moreau S, Blanchette J, et al. Sequential activation of matrix metalloproteinase 9 and transforming growth factor β in arterial elastocalcinosis. *Arterioscler Thromb Vasc Biol*. 2008;28:856-62. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/18292396)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Arterioscler+Thromb+Vasc+Biol&title=Sequential+activation+of+matrix+metalloproteinase+9+andtransforming+growth+factor+%CE%B2+in+arterial+elastocalcinosis&author=C+Bouvet&author=S+Moreau&author=J+Blanchette&volume=28&publication_year=2008&pages=856-62&pmid=18292396&)]

86. Orr AW, Lee MY, Lemmon JA, et al. Molecular mechanisms of collagen isotype-specific modulation of smooth muscle cell phenotype. *Arterioscler Thromb Vasc Biol*. 2009;29:225-31. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2692987/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/19023090)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Arterioscler+ThrombVasc+Biol&title=Molecular+mechanisms+of+collagen+isotype-specific+modulation+ofsmooth+muscle+cell+phenotype&author=AW+Orr&author=MY+Lee&author=JA+Lemmon&volume=29&publication_year=2009&pages=225-31&pmid=19023090&)]

87. Steppan J, Barodka V, Berkowitz DE, et al. Vascular stiffness and increased pulse pressure in the aging cardiovascular system. *Cardiol Res Pract*. 2011;2011:263585. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3154449/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/21845218)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Cardiol+Res+Pract&title=Vascular+stiffness+and+increased+pulse+pressure+in+the+agingcardiovascular+system&author=J+Steppan&author=V+Barodka&author=DE+Berkowitz&volume=2011&publication_year=2011&pages=263585&pmid=21845218&)]

88. Constantinides P. The role of arterial wall injury in atherogenesis and arterial thrombogenesis. *Zentralblatt Allg Pathol U Pathol Anat*. 1989;135:517-30. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/2683499)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Zentralblatt+Allg+Pathol+U+Pathol+Anat&title=The+role+of+arterial+wall+injury+inatherogenesis+and+arterial+thrombogenesis&author=P+Constantinides&volume=135&publication_year=1989&pages=517-30&)]

89. Davis C, Fischer J, Ley K, et al. The role of inflammation in vascular injury and repair. *J Thromb Haemostasis*. 2003;1:1699-709. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/12911580)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=J+Thromb+Haemostasis&title=The+role+of+inflammation+in+vascular+injury+andrepair&author=C+Davis&author=J+Fischer&author=K+Ley&volume=1&publication_year=2003&pages=1699-709&pmid=12911580&)]

90. Monteil V, Kwon H, Prado P, et al. Inhibition of SARS-CoV-2 infections in engineered human tissues using clinical-grade soluble human ACE2. *Cell*. 2020;181:905-13. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7181998/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/32333836)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Cell&title=Inhibition+of+SARS-CoV-2+infections+in+engineered+human+tissuesusing+clinical-grade+soluble+human+ACE2&author=V+Monteil&author=H+Kwon&author=P+Prado&volume=181&publication_year=2020&pages=905-13&pmid=32333836&)]

91. Ferrario CM, Jessup J, Chappell MC, et al. Effect of angiotensin-converting enzyme inhibition and angiotensin II receptor blockers on cardiac angiotensin-converting enzyme 2. *Circulation*. 2005;111:2605-10. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/15897343)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Circulation&title=Effect+of+angiotensin-converting+enzyme+inhibition+andangiotensin+II+receptor+blockers+on+cardiac+angiotensin-converting+enzyme2&author=CM+Ferrario&author=J+Jessup&author=MC+Chappell&volume=111&publication_year=2005&pages=2605-10&pmid=15897343&)]

92. Varga Z, Flammer AJ, Steiger P, et al. Endothelial cell infection and endotheliitis in COVID-19. *Lancet Lond Engl*. 2020;395:1417-8. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7172722/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/32325026)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Lancet+Lond+Engl&title=Endothelial+cell+infection+and+endotheliitis+inCOVID-19&author=Z+Varga&author=AJ+Flammer&author=P+Steiger&volume=395&publication_year=2020&pages=1417-8&)]

93. Lei Y, Zhang J, Schiavon CR, et al. SARS-CoV-2 spike protein impairs endothelial function via downregulation of ACE2. *BioRxiv Prepr Serv Biol*. 2020. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8091897/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/33784827)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=BioRxiv+Prepr+ServBiol&title=SARS-CoV-2+spike+protein+impairs+endothelial+function+viadownregulation+of+ACE2&author=Y+Lei&author=J+Zhang&author=CR+Schiavon&publication_year=2020&)]

94. Gopal R, Marinelli MA, Alcorn JF. Immune mechanisms in cardiovascular diseases associated with viral infection. *Front Immunol*; 11:570681. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7642610/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/33193350)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=FrontImmunol&title=Immune+mechanisms+in+cardiovasculardiseases+associated+with+viral+infection&author=R+Gopal&author=MA+Marinelli&author=JF+Alcorn&volume=11&pages=570681&pmid=33193350&)]

95. Gelzo M, Cacciapuoti S, Pinchera B, et al. Matrix metalloproteinases (MMP) 3 and 9 as biomarkers of severity in COVID-19 patients. *Sci Rep*. 2022;12:1212. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8786927/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/35075175)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Sci+Rep&title=Matrix+metalloproteinases+(MMP)+3+and+9+as+biomarkers+of+severityin+COVID-19+patients&author=M+Gelzo&author=S+Cacciapuoti&author=B+Pinchera&volume=12&publication_year=2022&pages=1212&pmid=35075175&)]

96. Li T, Li X, Feng Y, et al. The role of matrix metalloproteinase-9 in atherosclerotic plaque instability. *Mediat Inflamm*. 2020;2020:3872367. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7557896/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/33082709)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Mediat+Inflamm&title=The+role+of+matrix+metalloproteinase-9+in+atherosclerotic+plaqueinstability&author=T+Li&author=X+Li&author=Y+Feng&volume=2020&publication_year=2020&pages=3872367&)]

97. Florence JM, Krupa A, Booshehri LM, et al. Metalloproteinase-9 contributes to endothelial dysfunction in atherosclerosis via protease activated receptor-1. *PLoS One*. 2017;12:e0171427. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5293219/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/28166283)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=PLoS+One&title=Metalloproteinase-9+contributes+to+endothelial+dysfunction+inatherosclerosis+via+protease+activated+receptor-1&author=JM+Florence&author=A+Krupa&author=LM+Booshehri&volume=12&publication_year=2017&pages=e0171427&pmid=28166283&)]

98. Robles JP, Zamora M, Adan-Castro E, et al. The spike protein of SARS-CoV-2 induces endothelial inflammation through integrin α5β1 and NF-κB signaling. *J Biol Chem*. 2022;298:101695. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8820157/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/35143839)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=J+BiolChem&title=The+spike+protein+of+SARS-CoV-2+induces+endothelial+inflammationthrough+integrin+%CE%B15%CE%B21+and+NF-%CE%BAB+signaling&author=JP+Robles&author=M+Zamora&author=E+Adan-Castro&volume=298&publication_year=2022&pages=101695&pmid=35143839&)]

99. Fatkhullina AR, Peshkova IO, Koltsova EK. The role of cytokines in the development of atherosclerosis. *Biochem Biokhimiia*. 2016;81:1358-70. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5471837/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/27914461)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=BiochemBiokhimiia&title=The+role+of+cytokines+in+thedevelopment+of+atherosclerosis&author=AR+Fatkhullina&author=IO+Peshkova&author=EK+Koltsova&volume=81&publication_year=2016&pages=1358-70&)]

100. Galkina E, Ley K. Vascular adhesion molecules in atherosclerosis. *Arterioscler Thromb Vasc Biol*. 2007;27:2292-301. [[PubMed](https://pubmed.ncbi.nlm.nih.gov/17673705)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Arterioscler+Thromb+VascBiol&title=Vascular+adhesion+molecules+inatherosclerosis&author=E+Galkina&author=K+Ley&volume=27&publication_year=2007&pages=2292-301&pmid=17673705&)]

101. Katsuumi G, Shimizu I, Yoshida Y, et al. Vascular senescence in cardiovascular and metabolic diseases. *Front Cardiovasc Med*; 5:18. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5845435/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/29556500)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Front+Cardiovasc+Med&title=Vascular+senescence+in+cardiovascular+and+metabolicdiseases&author=G+Katsuumi&author=I+Shimizu&author=Y+Yoshida&volume=5&pages=18&pmid=29556500&)]

102. Mongelli A, Barbi V, Gottardi Zamperla M, et al. Evidence for biological age acceleration and telomere shortening in COVID-19 survivors. *Int J Mol Sci*. 2021;22:6151. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8201243/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/34200325)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=Int+J+Mol+Sci&title=Evidence+for+biological+age+acceleration+and+telomere+shorteningin+COVID-19+survivors&author=A+Mongelli&author=V+Barbi&author=M+Gottardi+Zamperla&volume=22&publication_year=2021&pages=6151&pmid=34200325&)]

103. AlGhatrif M, Tanaka T, Moore AZ, et al. Age-associated difference in circulating ACE2, the gateway for SARS-COV-2, in humans: results from the InCHIANTI study. *GeroScience*. 2021;43:619-27. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7813532/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/33462706)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=GeroScience&title=Age-associated+difference+in+circulating+ACE2,+the+gateway+forSARS-COV-2,+in+humans:+results+from+the+InCHIANTI+study&author=M+AlGhatrif&author=T+Tanaka&author=AZ+Moore&volume=43&publication_year=2021&pages=619-27&pmid=33462706&)]

104. Said MA, Eppinga RN, Lipsic E, et al. Relationship of arterial stiffness index and pulse pressure with cardiovascular disease and mortality. *J Am Heart Assoc*; 7:e007621. [[PMC free article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5850166/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/29358193)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=J+Am+HeartAssoc&title=Relationship+of+arterial+stiffness+index+and+pulse+pressure+withcardiovascular+disease+and+mortality&author=MA+Said&author=RN+Eppinga&author=E+Lipsic&volume=7&pages=e007621&pmid=29358193&)]