Original Article

Characteristics from the 100 most influential articles on carotid stenosis

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Background: There are three main competing treatment modalities for carotid artery stenosis (CS), i.e., carotid endarterectomy (CEA), carotid artery angioplasty/stenting (CAS), and medical treatment. In this study, we analyzed the performance and trends of CS research through bibliometric analysis.

Methods: We searched the Thomson Reuters Web of Science citation indexing database. The key words used in the search were "carotid artery" and "carotid stenosis". The top 100 most cited manuscripts (T100) were analyzed based on title, author, institution, country of origin, year of publication, and topic.

Results: The T100 were published between 1990 and 2016. The *Stroke* published the most manuscripts (n=22) and the *New England Journal of Medicine* was the most cited (n=15,113). The United States had the greatest number of publications (n=43), and the University of Oxford was the institution with the most publications (n=7). Peter M. Rothwell was the corresponding author with the most publications (n=10). The main topics were in the following categories: CEA (n=22), medication (n=11), CAS (n=9), diagnosis (n=44), and CEA *vs.* CAS (n=14).

Conclusions: This bibliometric analysis of CS research provides insight into publication trends and perspective on the treatment of CS.

Keywords: Carotid stenosis (CS); carotid endarterectomy (CEA); angioplasty; bibliometric analysis

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Introduction

Carotid artery stenosis, or carotid stenosis (CS), is responsible for 8–12% of all ischemic stroke cases. Indeed, CS is an important preventable cause of ischemic stroke (1). Close monitoring and intervention are recommended for patients with moderate and severe (50–99%) CS and symptomatic CS (such as transient ischemic attacks) (2). Advances in treatment modalities, including carotid artery angioplasty/stenting (CAS) have helped diversify treatment options for CS. Advances in medical treatment have helped reduce the risk of stroke in patients with asymptomatic CS (3). Unlike other arterial stenosis (including in lower extremities and abdomen), it seems that carotid endarterectomy (CEA) for CS plays a favorable role even when compared to CAS in terms of overall risk of stroke or death (4). The recent guideline also considers the role of CEA as important (5).

Research pertaining to CS has largely focused on the appropriate selection from amongst the three main treatment modalities, i.e., medical treatment, CEA, and CAS. This is typically based on stroke risk stratification,

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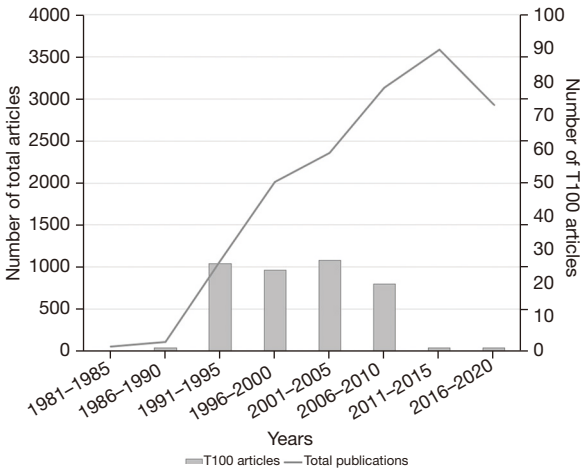

Figure 1 Temporal trend of the number of published articles on carotid stenosis. The line graph shows the overall number of articles published in each 5-year period. The bar graph shows the distribution of the top 100 cited articles (T100) in each 5-year period.

including assessing the symptoms, and the degree, of stenosis. Bibliometric analysis is a research method that aims to identify publication trends in a particular field with respect to authorship, journal, country, year of publication, and issues in a particular field (6). The purpose of this study was to analyze the performance and trends of CS research through bibliometric analysis.

Methods

Study design

Hallym University's Institutional Review Board (IRB No. HKS 2020-02-017) approved the review of medical article using a publicly available database. A search of the Thomson Reuters Web of Science citation indexing database and research platform was completed on August 22, 2019. The key words used in the search were "carotid artery" and "carotid stenosis". The retrieved articles were filtered to include only full-text manuscripts published in the English language. The filtered manuscripts pertained only to the extracranial portion of the internal carotid artery.

Data collection and statistical analysis

The retrieved manuscripts were sorted by the number of citations, a method initially developed by Paladugu and colleagues (7). The two authors (H Jun and JW Hwang) analyzed the individual articles independently to ensure their relevance to CS. Any disagreements were resolved by consensus. The top 100 most cited articles (T100) were finally selected. The variables, including the title, corresponding author, institution, country of origin, year of publication, and topic, were then evaluated. All articles were analyzed according to their topic: CEA, medical treatment, CAS, diagnosis, and CEA *vs.* CAS. The "medical treatment" group included comparative studies between medical treatment and correction of stenosis by CEA or CAS. The "diagnosis" group included articles pertaining to manifestations, risk factors, clinical correlations with other diseases, and diagnostic tools (ultrasound, computed tomography, and magnetic resonance imaging). The "CEA *vs.* CAS" group included studies that compared the outcomes of CEA and CAS. Older articles are likely to be cited more frequently because more time has elapsed since publication; to eliminate this potential source of bias, the citation rate was analyzed by dividing the citation number by the number of years since publication.

Results

The authors retrieved 15,259 full-text English language papers from the Web of Science database. The T100 are listed in Table S1. The number of citations ranged from 5,424 for Barnett *et al.* (8) ("Beneficial effect of carotid endarterectomy in symptomatic patients with high-grade carotid stenosis") to 230 for Mannami *et al.* (9) ("Prevalence of asymptomatic carotid atherosclerotic lesions detected by high-resolution ultrasonography and its relation to cardiovascular risk factors in the general population of a Japanese city: the Suita study"). The mean number of citations for all articles was 582.7±707.7.

The T100 were published between 1990 and 2016. Overall, the number of articles pertaining to CS showed a progressive increase over successive years; however, the T100 were distributed uniformly over this period (*Figure 1*). The oldest of the T100 was published in 1990 by Craven *et al.* ("Evaluation of the associations between carotid artery atherosclerosis and coronary artery stenosis. A case-control study") (10). The most recent article was published in 2016 by Brott *et al.* ("Long-term results of stenting versus endarterectomy for carotid-artery stenosis") (11).

The T100 were published across 20 journals (*Table 1*). *Stroke* published the highest number of papers (n=22, citations =7,669). The *New England Journal of Medicine* had

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Table 1 Journals with three or more articles in the top 100 cited articles

Journal title	Impact factor 2018	5-year impact factor	Number of articles	Number of citations
Stroke	6.058	6.576	22	7,669
Circulation	23.054	20.469	18	7,428
Lancet	59.102	54.664	13	11,934
New England Journal of Medicine	70.67	70.331	10	15,113
Journal of Vascular Surgery	3.243	3.616	8	2,463
Journal of the American Medical Association	51.273	46.312	5	5,216
Radiology	7.608	8.282	5	1,972
Lancet Neurology	28.755	30.542	3	1,206
Journal of the American College of Cardiology	18.639	19.068	3	1,096

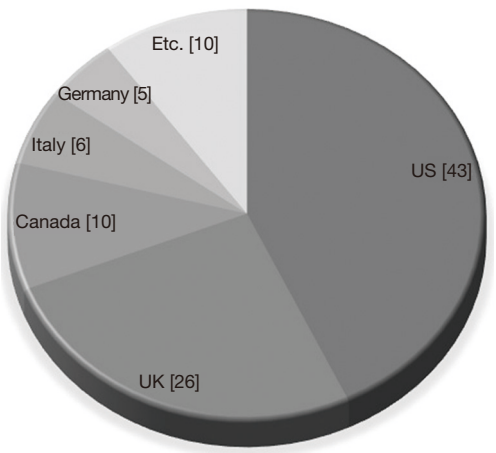

Figure 2 Pie chart showing the distribution of the top 100 cited articles according to the country of origin.

the highest number of citations [15,113], although only 10 out of the T100 were published in this journal.

A vast majority of the T100 were published in the United States (43 publications) and United Kingdom (26 publications) (*Figure 2*), and most of the studies were performed in western countries. The University of Oxford had the highest number of publications among the T100 (seven publications) followed by the University of Washington (six publications) (*Table 2*). Eleven corresponding authors contributed to two or more papers; among these, Peter M. Rothwell had contributed to 10 publications (*Table 3*).

The articles were divided into the following categories according to the main topic (*Figure 3*): CEA (n=22), medical treatment (n=11), CAS (n=9), diagnosis (n=44), and CEA *vs.* CAS (n=14). Only 2 of the T100 were published after 2011. Articles in the CEA group were consistently published over time; however, the number of publications tended to decrease over time. Most articles in the CAS groups were published between 1996 and 2005. Publications in the medical treatment group tended to increase over time. The diagnosis group continued to account for a significant proportion of articles and included four studies investigating the correlation with coronary artery disease. The number of studies in the CEA *vs.* CAS group showed a remarkable increase after 2006.

Discussion

CEA was introduced by DeBakey (12) in 1953; it has long been considered the standard therapy for CS requiring recanalization. Ever since the first CAS study was published by Kerber *et al.* in 1980 (13), it is widely practiced as a viable alternative to CEA. Consistent with this, our study also revealed a consistent trend of published studies comparing CEA and CAS (*Figure 3*). Favorable results have been published for CEA, but similar results have recently been reported in the overall risk of stroke or death in patients with CS (4,11). Medical treatment trials for CS were initiated in the 1990s; the resultant advances in medical treatment have helped reduce the stroke risk in patients with CS (3). In recent trials (including SAMMPRIS trial), aggressive medical treatment (including antiplatelet and lipid management) was associated with decreased risk of stroke in patients with asymptomatic CS, regardless of recanalization (14). Despite advances in recanalization technology, medical treatment seems to play a more

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Table 2 Institutions with three or more articles in the top 100 cited articles

Institution	Number of publications	Total number of citations
University of Oxford	7	3,235
University of Washington	6	2,511
Wake Forest University	5	5,100
Western General Hospital	5	5,043
University College London	4	2,294
John P. Robarts Research Institute	3	3,485
St George Hospital	3	2,339
University of Western Ontario	3	864

Table 3 Corresponding authors that contributed two or more articles to the top 100 cited articles

Author	Number of articles	Total number of citations
Rothwell, P	10	4,005
Barnett, H	5	3,847
Yuan, C	5	1,834
Brown, M	4	2,294
Crouse, J	3	1,255
Taylor, D	2	5,787
Halliday, A	2	1,975
Brott, T	2	1,786
Oleary, D	2	1,122
Hatsukami, T	2	899
Wholey, M	2	705

important role in CS.

Recently, the endovascular approach is an important issue in vascular disease and has greatly improved. While the number of studies pertaining to CS has increased progressively over successive years, the temporal distribution of the T100 has remained mostly steady over a long period of time (*Figure 1*). This likely reflects the fact that modern treatment modalities for CS have not replaced traditional treatments completely. There are several ongoing historical studies of the comparative efficacy of CEA, CAS, and medical treatment.

Bibliometric analysis can help assess research performance, scientific productivity, and publication quality (15). The

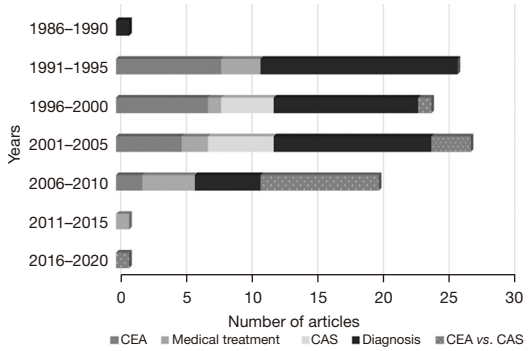

Figure 3 Composite bar graph showing the distribution of the top 100 cited articles in each 5-year period according to the research topic. CEA, carotid endarterectomy; CAS, carotid artery angioplasty/stenting.

number of citations is a good indicator of the quality and impact of publications. In this study, we selected the T100 according to the number of citations. By analyzing the flow of past publications, bibliometric analysis can help predict future publication trends. Therefore, bibliometric analysis is a useful tool to understand the history of a particular field.

As with any bibliometric analysis, our results are liable to be affected by several potential sources of bias, including institutional bias and influential researcher bias. Moreover, older studies are more likely to be cited because more time has elapsed since publication; this is another source of potential bias. Lastly, we analyzed only the T100 and not all CS studies; therefore, we may not have assessed the overall study trends accurately.

Conclusions

This bibliometric analysis of CS research provides insight into publication trends and perspective on the treatment of CS. The main treatment modalities for CS include CEA, CAS, and medical treatment; these are viable treatment alternatives and may be used in conjunction with each other. Ongoing analysis of CS research is a key imperative.

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Footnote

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Conflicts of Interest: Both authors have completed the ICMJE uniform disclosure form (available at https://apm.amegroups.com/article/view/10.21037/apm-21-3420/coif). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. Hallym University's Institutional Review Board (IRB No. HKS 2020-02-017) approved the review of medical articles using a publicly available database.

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3. Abbott AL. Medical (nonsurgical) intervention alone is now best for prevention of stroke associated with asymptomatic severe carotid stenosis: results of a systematic review and analysis. Stroke 2009;40:e573-83.
4. Abbott AL, Adelman MA, Alexandrov AV, et al. Why calls for more routine carotid stenting are currently inappropriate: an international, multispecialty, expert review and position statement. Stroke 2013;44:1186-90.
5. Naylor AR, Ricco JB, de Borst GJ, et al. Editor's Choice – Management of atherosclerotic carotid and vertebral artery disease: 2017 Clinical Practical Guidelines of the European Society for Vascular Surgery (ESVS). Eur J Vasc Endovasc Surg 2018;55:3-81.
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7. Paladugu R, Schein M, Gardezi S, et al. One hundred citation classics in general surgical journals. World J Surg 2002;26:1099-105.
8. North American Symptomatic Carotid Endarterectomy Trial Collaborators; Barnett HJM, Taylor DW, et al. Beneficial effect of carotid endarterectomy in symptomatic patients with high-grade carotid stenosis. N Engl J Med 1991;325:445-53.
9. Mannami T, Konishi M, Baba S, et al. Prevalence of asymptomatic carotid atherosclerotic lesions detected by high-resolution ultrasonography and its relation to cardiovascular risk factors in the general population of a Japanese city: the Suita study. Stroke 1997;28:518-25.
10. Craven TE, Ryu JE, Espeland MA, et al. Evaluation of the associations between carotid artery atherosclerosis and coronary artery stenosis. A case-control study. Circulation 1990;82:1230-42.
11. Brott TG, Howard G, Roubin GS, et al. Long-Term Results of Stenting versus Endarterectomy for Carotid-Artery Stenosis. N Engl J Med 2016;374:1021-31.
12. DeBakey ME. Successful carotid endarterectomy for cerebrovascular insufficiency. Nineteen-year follow-up. JAMA 1975;233:1083-5.
13. Kerber CW, Cromwell LD, Loehden OL. Catheter dilatation of proximal carotid stenosis during distal bifurcation endarterectomy. AJNR Am J Neuroradiol 1980;1:348-9.
14. Derdeyn CP, Chimowitz MI, Lynn MJ, et al. Aggressive medical treatment with or without stenting in high-risk patients with intracranial artery stenosis (SAMMPRIS): the final results of a randomised trial. Lancet 2014;383:333-41.
15. Asghar I, Cang S, Yu H. Assistive technology for people with dementia: an overview and bibliometric study. Health Info Libr J 2017;34:5-19.

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Table S1 The top 100 cited articles on carotid stenosis

Rank	Article	Citations	Citation rate
1	Taylor DW. Beneficial effect of carotid endarterectomy in symptomatic patients with high-grade carotid stenosis. N Engl J Med 1991;325(7):445-53.	5,424	193.7
2	Walker MD, Marler JR, Goldstein M, et al. Endarterectomy for asymptomatic carotid-artery stenosis. JAMA 1995;273(18):1421-8.	3,568	148.7
3	Warlow C. MRC European Carotid Surgery Trial: interim results for symptomatic patients with severe (70-99%) or with mild (0-29%) carotid stenosis. European Carotid Surgery Trialists' Collaborative Group. Lancet 1991;337(8752):1235-43.	2,269	81
4	Barnett HJM, Taylor W, Eliasziw M, et al. Benefit of carotid endarterectomy in patients with symptomatic moderate or severe stenosis. N Engl J Med 1998;339(20):1415-25.	2,179	103.8
5	Farrell B, Fraser A, Sandercock P, et al. Randomised trial of endarterectomy for recently symptomatic carotid stenosis: final results of the MRC European carotid surgery trial (ECST). Lancet 1998;351(9113):1379-87.	1,990	94.8
6	Yadav JS, Wholey MH, Kuntz RE, et al. Protected carotid-artery stenting versus endarterectomy in high-risk patients. N Engl J Med 2004;351(15):1493-501.	1,807	120.5
7	Halliday A, Mansfield A, Marro J, et al. Prevention of disabling and fatal strokes by successful carotid endarterectomy in patients without recent neurological symptoms: randomised controlled trial. Lancet 2004;363(9420):1491-502.	1,568	104.5
8	Brott TG, Hobson RW, Howard G, et al. Stenting versus Endarterectomy for Treatment of Carotid-Artery Stenosis. N Engl J Med 2010;363(1):11-23.	1,555	172.8
9	Mas J, Chatellier G, Beyssen B, et al. Endarterectomy versus stenting in patients with symptomatic severe carotid stenosis. N Engl J Med 2006;355(16):1660-71.	1,032	79.4
10	Hobson RW, Weiss DG, Fields WS, et al. Efficacy of carotid endarterectomy for asymptomatic carotid stenosis. N Engl J Med 1993;328(4):221-7.	1,000	38.5
11	Selhub J, Jacques PF, Bostom AG, et al. Association between plasma homocysteine concentrations and extracranial carotid-artery stenosis. N Engl J Med 1995;332(5):286-91.	979	40.8
12	Ringleb PA, Allenberg J, Berger J, et al. 30 day results from the SPACE trial of stent-protected angioplasty versus carotid endarterectomy in symptomatic patients: a randomised non-inferiority trial. Lancet 2006;368(9543):1239-47.	967	74.4
13	Rothwell PM, Eliasziw M, Gutnikov SA, et al. Analysis of pooled data from the randomised controlled trials of endarterectomy for symptomatic carotid stenosis. Lancet 2003;361(9352):107-16.	962	60.1
14	Brown MM, Rogers J, Bland JM, et al. Endovascular versus surgical treatment in patients with carotid stenosis in the Carotid and Vertebral Artery Transluminal Angioplasty Study (CAVATAS): a randomised trial. Lancet 2001;357(9270):1729-37.	900	50
15	Rothwell PM, Eliasziw M, Gutnikov SA, et al. Endarterectomy for symptomatic carotid stenosis in relation to clinical subgroups and timing of surgery. Lancet 2004;363(9413):915-24.	867	57.8
16	Ederle J, Dobson J, Featherstone RL, et al. Carotid artery stenting compared with endarterectomy in patients with symptomatic carotid stenosis (International Carotid Stenting Study): an interim analysis of a randomised controlled trial. Lancet 2010;375(9719):985-97.	771	85.7
17	Crisby M, Nordin-Fredriksson G, Shah PK, et al. Pravastatin treatment increases collagen content and decreases lipid content, inflammation, metalloproteinases, and cell death in human carotid plaques- Implications for plaque stabilization. Circulation 2001;103(7):926-33.	765	42.5
18	Grant EG, Benson CB, Moneta GL, et al. Carotid artery stenosis: Gray-scale and Doppler US diagnosis-Society of Radiologists in Ultrasound consensus conference. Radiology 2003;229(2):340-6.	754	47.1

Table S1 *(continued)*

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Table S1 *(continued)*

Rank	Article	Citations	Citation rate
19	Barnett HJM. North American Symptomatic Carotid Endarterectomy Trial. Methods, patient characteristics, and progress. Stroke 1991;22(6):711-20.	688	24.6
20	Mayberg MR, Wilson SE, Yatsu F, et al. Carotid endarterectomy and prevention of cerebral-ischemia in symptomatic carotid stenosis. JAMA 1991;266(23):3289-94.	677	24.2
21	Oleary DH, Polak JF, Kronmal RA, et al. Distribution and correlates of sonographically detected carotid-artery disease in the cardiovascular health study. Stroke 1992;23(12):1752-60.	669	24.8
22	Ferguson GG, Eliasziw M, Barr HWK, et al. The North American Symptomatic Carotid Endarterectomy Trial - Surgical results in 1415 patients. Stroke 1999;30(9):1751-8.	618	30.9
23	Tawakol A, Migrino RQ, Bashian GG, et al. In vivo F-18-fluorodeoxyglucose positron emission tomography imaging provides a noninvasive measure of carotid plaque inflammation in patients. J Am Coll Cardiol 2006;48(9):1818-24.	581	44.7
24	Yuan C, Mitsumori LM, Ferguson MS, et al. In vivo accuracy of multispectral magnetic resonance imaging for identifying lipid-rich necrotic cores and intraplaque hemorrhage in advanced human carotid plaques. Circulation 2001;104(17):2051-6.	522	29
25	Roubin GS, New G, Iyer SS, et al. Immediate and late clinical outcomes of carotid artery stenting in patients with symptomatic and asymptomatic carotid artery stenosis - A 5-year prospective analysis. Circulation 2001;103(4):532-7.	521	28.9
26	Craven TE, Ryu JE, Espeland MA, et al. Evaluation of the associations between carotid-artery atherosclerosis and coronary-artery stenosis - a case-control study. Circulation 1990;82(4):1230-42.	518	17.9
27	Yadav JS, Roubin GS, Iyer S, et al. Elective stenting of the extracranial carotid arteries. Circulation 1997;95(2):376-81.	513	23.3
28	Takaya N, Yuan C, Chu BC, et al. Association between carotid plaque characteristics and subsequent ischemic cerebrovascular events - A prospective assessment with MRI - Initial results. Stroke 2006;37(3):818-23.	485	37.3
29	Eckstein HH, Ringleb P, Allenberg JR, et al. Results of the Stent-Protected Angioplasty versus Carotid Endarterectomy (SPACE) study to treat symptomatic stenoses at 2 years: a multinational, prospective, randomised trial. Lancet Neurol 2008;7(10):893-902.	477	43.4
30	Cai JM, Hastukami TS, Ferguson MS, et al. Classification of human carotid atherosclerotic lesions with in vivo multicontrast magnetic resonance imaging. Circulation 2002;106(11):1368-73.	472	27.8
31	Gurm HS, Yadav JS, Fayad P, et al. Long-term results of carotid stenting versus endarterectomy in high-risk patients. N Engl J Med 2008;358(15):1572-9.	467	42.5
32	Diethrich EB, Ndiaye M, Raid DB. Stenting in the carotid artery: Initial experience in 110 patients. J Endovasc Surg 1996;3(1):42-62.	459	20
33	Crouse JR, Byington RP, Bond MG, et al. Pravastatin, lipids, and atherosclerosis in the carotid arteries (PLAC-II). Am J Cardiol 1995;75(7):455-9.	455	19
34	Oleary DH, Polak JF, Wolfson SK, et al. Use of sonography to evaluate carotid atherosclerosis in the elderly - the cardiovascular health study. Stroke 1991;22(9):1155-63.	453	16.2
35	Asahara T, Bauters C, Pastore C, et al. Local-delivery of vascular endothelial growth-factor accelerates reendothelialization and attenuates intimal hyperplasia in balloon-injured rat carotid-artery. Circulation 1995;91(11):2793-801.	443	18.5
36	Markus HS, Droste DW, Kaps M, et al. Dual antiplatelet therapy with clopidogrel and aspirin in symptomatic carotid stenosis evaluated using Doppler embolic signal detection - The Clopidogrel and Aspirin for Reduction of Emboli in Symptomatic Carotid Stenosis (CARESS) trial. Circulation 2005;111(17):2233-40.	442	31.6

Table S1 *(continued)*

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Table S1 *(continued)*

Rank	Article	Citations	Citation rate
37	Inzitari D, Eliasziw M, Gates P, et al. The causes and risk of stroke in patients with asymptomatic internal-carotid-artery stenosis. N Engl J Med 2000;342(23):1693-700.	439	23.1
38	Kastrup A, Groschel K, Krapf H, et al. Early outcome of carotid angioplasty and stenting with and without cerebral protection devices - A systematic review of the literature. Stroke 2003;34(3):813-9.	424	26.5
39	Hatsukami TS, Ross R, Polissar NL, et al. Visualization of fibrous cap thickness and rupture in human atherosclerotic carotid plaque in vivo with high-resolution magnetic resonance imaging. Circulation 2000;102(9):959-64.	414	21.8
40	Halliday A, Harrison M, Hayter E, et al. 10-year stroke prevention after successful carotid endarterectomy for asymptomatic stenosis (ACST-1): a multicentre randomised trial. Lancet 2010;376(9746):1074-84.	407	45.2
41	Liapis CD, Bell PRF, Mikhailidis D, et al. ESVS Guidelines. Invasive Treatment for Carotid Stenosis: Indications, Techniques. Eur J Vasc Endovasc Surg 2009;37:S1-S19.	403	40.3
42	Mathiesen EB, Bonaa KH, Joakimsen O. Echolucent plaques are associated with high risk of ischemic cerebrovascular events in carotid stenosis - The Tromso Study. Circulation 2001;103(17):2171-5.	397	22.1
43	Hobson RW, Howard VJ, Roubin GS, et al. Carotid artery stenting is associated with increased complications in octogenarians: 30-day stroke and death rates in the CREST lead-in phase. J Vasc Surg 2004;40(6):1106-10.	389	25.9
44	Mas JL, Trinquart L, Leys D, et al. Endarterectomy Versus Angioplasty in Patients with Symptomatic Severe Carotid Stenosis (EVA-3S) trial: results up to 4 years from a randomised, multicentre trial. Lancet Neurol 2008;7(10):885-92.	379	34.5
45	Abbott AL. Medical (Nonsurgical) Intervention Alone Is Now Best for Prevention of Stroke Associated with Asymptomatic Severe Carotid Stenosis Results of a Systematic Review and Analysis. Stroke 2009;40(10):E573-E83.	373	37.3
46	Taylor DW, Barnett HJM, Haynes RB, et al. Low-dose and high-dose acetylsalicylic acid for patients undergoing carotid endarterectomy: a randomised controlled trial. Lancet 1999;353(9171):2179-84.	363	18.2
47	Wholey MH, Wholey M, Mathias K, et al. Global experience in cervical carotid artery stent placement. Catheter Cardiovasc Interv 2000;50(2):160-7.	359	18.9
48	Wennberg DE, Lucas FL, Birkmeyer JD, et al. Variation in carotid endarterectomy mortality in the Medicare population - Trial hospitals, volume, and patient characteristics. JAMA 1998;279(16):1278-81.	354	16.9
49	Bonati LH, Jongen LM, Haller S, et al. New ischaemic brain lesions on MRI after stenting or endarterectomy for symptomatic carotid stenosis: a substudy of the International Carotid Stenting Study (ICSS). Lancet Neurol 2010;9(4):353-62.	350	38.9
50	Wholey MH, Al-Mubarek N, Wholey MH. Updated review of the global carotid artery stent registry. Catheter Cardiovasc Interv 2003;60(2):259-66.	346	21.6
51	Moneta GL, Edwards JM, Papanicolaou G, et al. Screening for asymptomatic internal carotid artery stenosis: duplex criteria for discriminating 60% to 99% stenosis. J Vasc Surg 1995;21(6):989-94.	341	13.1
52	Gronholdt MLM, Nordestgaard BG, Schroeder TV, et al. Ultrasonic echolucent carotid plaques predict future strokes. Circulation 2001;104(1):68-73.	339	18.8
53	Naylor AR, Bolia A, Abbott RJ, et al. Randomized study of carotid angioplasty and stenting versus carotid endarterectomy: A stopped trial. J Vasc Surg 1998;28(2):326-34.	336	16
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Table S1 *(continued)*

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Table S1 *(continued)*

Rank	Article	Citations	Citation rate
56	Adams MR, Nakagomi A, Keech A, et al. Carotid intima-media thickness is only weakly correlated with the extent and severity of coronary-artery disease. Circulation 1995;92(8):2127-34.	332	13.8
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59	Fox AJ. How to measure carotid stenosis. Radiology 1993;186(2):316-8.	323	12.4
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Table S1 *(continued)*

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Rank	Article	Citations	Citation rate
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Table S1 *(continued)*

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Rank	Article	Citations	Citation rate
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