

Rune Aaslid

CURRICULUM VITAE [June 2008]

Born 14 June 1943, Volda, Norway

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Professional Aims: Invent, develop, introduce and propagate new noninvasive methods in clinical neurophysiology and cardiovascular medicine. Promote the understanding of cerebrovascular and cardiovascular hemodynamics. Improve diagnosis and monitoring routines by applying cybernetic methods. Develop and introduce realistic computer simulators for teaching cerebrovascular physiology and pathology.

Professional Competence: Hemodynamics and Cardiovascular Physiology, Clinical Research (20 years experience), Electronics (analog and digital) and Engineering Cybernetics, Programming (System design, Assembler, ALGOL, Pascal, C++).

Education and Degrees

- 1988: Privatdozent (PD) in Neurosurgical Research, University of Berne, Berne, Switzerland.
- 1975: Dr Philos (PhD) in Cardiovascular Physiology, Medical Faculty, University of Oslo, Oslo, Norway.
- 1968: Sivilingenieur (MS) in Engineering Cybernetics and Electrical Engineering, The Norwegian Institute of Technology (NTH), Trondheim, Norway.

Career Positions

- 1998 – present: Director of Research, Hemodynamics AG, Berne, Switzerland.
(<http://www.hemodynamic.com/>)
- 1989 – present: Privatdozent, (Affiliate Associate Professor), Department of Neurosurgery and Neurovascular Laboratory, University of Berne, Berne, Switzerland.
- 1991 – present: Affiliate Associate Professor of Neurosurgical Research, University of Washington, Seattle, Washington, USA.
- 1988 – 91: Director of Neurosurgical Research, Inselspital, University of Berne, Berne, Switzerland.
- 1985 – 87: Director of Cardiovascular Research, Institute of Applied Physiology and Medicine (IAPM) Seattle, Washington, USA.
- 1983 – 84: Senior Research Fellow, Department of Neurosurgery, Rikshospitalet, Oslo, Norway.
- 1981 – 83: Senior Research Fellow (Wissenschaftlicher Beamter), Department of Neurosurgery, Inselspital, University of Berne, Berne, Switzerland
- 1976 – 79: Adjunct Associate Professor of Biocybernetics, Division of Engineering Cybernetics, Department of Electrical Engineering, the Norwegian Institute of Technology (NTH), Trondheim, Norway.
- 1969 – 75: Research assistant, Institute of Surgical Research, Rikshospitalet, University of Oslo, Oslo, Norway; and Division of Engineering Cybernetics, Department of Electrical Engineering, the Norwegian Institute of Technology (NTH), Trondheim, Norway.
- 1978 – present: Consultant to industry and academic institutions.

Achievements, Education and Research

- 1998-2008: Created an interactive computer program for teaching Transcranial Doppler and Cerebral Hemodynamics. The i-book format integrates educational text with a comprehensive model of the cerebral circulation and a realistic rendering of pulsed Doppler and other instruments. Three-D simulation of anatomy and ultrasound insonation is also included in the newest version.
- 1989-2007: Introduced and developed the use of transcranial Doppler and cybernetic methods for quantitative clinical assessment of dynamic cerebral autoregulation. [42, 49, 60, 61, 63, 65, 66, 68]
- 1987: Introduced functional transcranial Doppler for study and quantification of evoked flow responses and the dynamic relationship between brain function and blood flow. [38]
- 1984: Introduced Cerebral Vasospasm Evaluation by Transcranial Doppler. [18, 19, 20, 26, 69, 70]
- 1982: Developed and introduced the Transcranial Doppler Method. [17]
- 1981: Invented and evaluated a new noninvasive blood pressure measurement method. [15] This technique permits recording of instantaneous and mean blood pressure with accuracy and resolution comparable to invasive methods.
- 1976: Cooperated on the first study describing a method for noninvasive assessment of pressure gradient in mitral valve stenosis. [5] Dr. Holen was the main contributor to this achievement.
- 1975: Described a new and accurate method of quantifying the efficiency of prosthetic heart valves. [3]

Achievements, Engineering and Consulting

- 1998-2004: Developed the first transcranial Doppler instrument capable of portable ambulatory monitoring for cerebral emboli. The battery-operated system can be carried in a pocket or attached to a belt, can store 8 hours of continuous raw Doppler data in flash memory, and is equipped with a miniature self-adjusting probe [80,82].
- 1989-1995: Developed the first two-channel transcranial Doppler instrument. [49] Consulted for DWL GmbH (now a CompuMedics company) to develop a commercial multi-channel Doppler unit. Wrote the software (TCD-7 and TCD-8) used in this family of instruments for: Hemodynamic analysis, autoregulation testing, evoked flow testing, vasomotor reactivity testing and embolus detection. The instruments have been very successful on the market, and the software was delivered with the high-end units until 2007.
- 1983: Designed and developed both the hardware as well as the software for the first dedicated transcranial Doppler instrument, the TC2-64, for EME GmbH – (now Viasys). It included a real-time Fast Fourier transform done with a (now totally antiquated) 6502 microprocessor at 2MHz. This rugged, no-nonsense instrument became a great commercial success, and a slightly modified version has flown 4 times (or more) on the Space Shuttle.
- 1979: Designed and built a realistic full-scale physical model of the left ventricle, aorta and branches for the Norwegian Underwater Institute. The model was used in testing ultrasound detection methods of gas emboli.

Editorial Appointments

- 1990 – 92: Member of the Editorial Board of Stroke.
1989 – present: Member of the Editorial Board of Neurosonology.
1987 – present: Ad Hoc reviewer for Stroke and various other journals.

Other Editorial

- 1999: Coeditor, Neurosurgical management of aneurysmal subarachnoid haemorrhage [69, 70]
1992: Coeditor, Transcranial Doppler [53]
1986: Editor, first book on Transcranial Doppler Sonography [28-30]

Publications in Peer Reviewed Journals and Books

1. Aaslid R, Brubakk AO: [Dynamic pressure-flow relationship of the human aorta]. Ver Dtsch Ges Kreislaufforschg 1973; 40:154-158
2. Aaslid R: Simulation of the individual cardiovascular system: A pilot study. PhD thesis, Medical Faculty, University of Oslo and Report No. 74-51-W Division of Engineering Cybernetics, The Norwegian Institute of Technology 1974
3. Aaslid R, Levang O, Froysaker T, Skagseth E, Hall KV: "In situ" evaluation of the aortic pivoting disc valve prosthesis. Scand J Thor Cardiovasc Surg 1975; 9:81-84
4. Nornes H, Magnes B, Aaslid R: Observations on intracranial pressure plateau waves, in Lundberg N, Ponten U, Brock M: Intracranial Pressure. Springer Verlag, Berlin-Heidelberg-New York 1975
5. Holen J, Aaslid R, Landmark K, Simonsen S: Determination of pressure gradient in mitral stenosis with a noninvasive ultrasound Doppler technique. Acta Med Scand 1976; 199:455-460
6. Aaslid R, DiStefano III J, Balchen JG: Modeling of the hormonal state of fishes. Report STF48 A76081, SINTEF, Trondheim 1976
7. Aaslid R: [Biocybernetics, textbook in Norwegian] Report no 75-110X, Division of Engineering Cybernetics, University of Trondheim, Trondheim 1975
8. Holen J, Aaslid R, Landmark K, Simonsen S, Ostrem T: Determination of the effective orifice area in mitral stenosis from noninvasive ultrasound Doppler data and mitral flow rate. Acta Med Scand 1977; 201:83-88
9. Nornes H, Aaslid R, Lindegaard KF: Intracranial pulse pressure dynamics in patients with intracranial hypertension. Acta Neurochir 1977; 38:177-186
10. Brubakk AO, Aaslid R: A model approach to studying cardiovascular function in man, in Perkins WJ: Biomedical Computing. Pitman Medical UK, 1977
11. Brubakk AO, Aaslid R: Use of a model for simulating individual aortic dynamics in man. Med Biol Eng Comput 1978; 16:231-242
12. Piene H, Aaslid R, Hansen M, Sund T: Simple system for analog data transmission from the physiological research laboratory to a digital computer. Ann Biom Eng 1978; 6:161-166

13. Sudmann E, Aaslid R: A synchronization control unit for super 8 sound recording, editing and sound transfer to magnetic-striped film. *Society of Motion Picture and Television Engineers Journal* 1978; 87:158-162
14. Giltvedt J, Aaslid R: Timesaving method for segmental pressure measurements. *Med Biol End Comput* 1981; 19:775-776
15. Aaslid R, Brubakk AO: Accuracy of an ultrasound Doppler servo method for noninvasive determination of instantaneous and mean arterial blood pressure. *Circulation* 1981; 64:753-759
16. Hetland O, Warhuus K, Giercksky KE, Aaslid R, Prydz H: Toxicity of phospholipase C in rabbits. *Scand J Clin Lab Invest* 1982; 42:239-244
17. Aaslid R, Markwalder T-M, Nornes H: Noninvasive transcranial Doppler ultrasound recording of flow velocity in basal cerebral arteries. *J Neurosurg* 1982; 57:769-774
18. Aaslid R, Huber P, Nornes H: Evaluation of cerebrovascular spasm with transcranial Doppler ultrasound. *J Neurosurg* 1984; 60:37-41
19. Aaslid R, Nornes H: Musical Murmurs in human cerebral arteries after subarachnoid hemorrhage. *J Neurosurg* 1984; 60:32-36
20. Aaslid R, Huber P, Nornes H: Noninvasive transcranial Doppler ultrasound recording in basal cerebral arteries - A new approach to evaluation of cerebrovascular spasm, in Voth D, Glee P (eds): *Cerebral Vasospasm*. Walter de Gruyter, Berlin-New York, 1984
21. Markwalder T-M, Grolimund P, Seiler RW, Roth F, Aaslid R: Dependency of blood velocity in the middle cerebral artery on en-tidal carbon dioxide partial pressure - A transcranial ultrasound Doppler study. *J Cereb Blood Flow Metab* 1984; 4:368-372
22. Lindegaard K-F, Bakke SJ, Grolimund P, Aaslid R, Huber P, Nornes H: Carotid artery disease: Assessment of intracranial hemodynamic pattern by noninvasive transcranial Doppler. *J Neurosurg* 1985; 63:890-898
23. Lundar T, Lindegaard K-F, Froysaker T, Aaslid R, Wiberg J, Nornes H: Cerebral perfusion during nonpulsatile cardiopulmonary bypass. *Ann Thorac Surg* 1985; 40:144-150
24. Lundar T, Lindegaard K-F, Froysaker T, Aaslid R, Wiberg J, Nornes H: Dissociation between cerebral autoregulation and CO₂ reactivity during nonpulsatile cardiopulmonary bypass. *Ann Thorac Surg* 1986; 40:582-588
25. Seiler RW, Aaslid R, Grolimund P: Correlation of the middle cerebral artery flow velocity with the clinical course and CT-visualized subarachnoid blood in patients after aneurysm surgery, in Auer LM (ed): *Timing of aneurysm surgery*. Walter de Gruyter, Berlin-New York, 1985
26. Aaslid R, Huber P, Nornes H: A transcranial Doppler method in the evaluation of cerebrovascular spasm. *Neuroradiology* 1986; 28:11-16
27. Seiler RW, Grolimund P, Aaslid R, Huber P, Nornes H: Cerebral vasospasm evaluated by transcranial ultrasound correlated with clinical grade and CT-visualized subarachnoid hemorrhage. *J Neurosurg* 1986; 64:594-600
28. Aaslid R: Transcranial Doppler examination techniques, in Aaslid R (ed): *Transcranial Doppler sonography*, Springer, Vienna-New York, 1986
29. Aaslid R: The Doppler principle applied to measurement of blood flow velocity in cerebral arteries, in Aaslid R (ed): *Transcranial Doppler sonography*, Springer, Vienna-New York, 1986
30. Aaslid R, Lindegaard K-F: Cerebral Hemodynamics, in Aaslid R (ed): *Transcranial Doppler sonography*, Springer, Vienna-New York, 1986
31. Lindegaard K-F, Aaslid R, Nornes H: Cerebral arteriovenous malformations, in Aaslid R (ed): *Transcranial Doppler sonography*, Springer, Vienna-New York, 1986

32. Seiler RW, Aaslid R: Transcranial Doppler for evaluation of cerebral vasospasm, in Aaslid R (ed): Transcranial Doppler sonography, Springer, Vienna-New York, 1986
33. Aaslid R, Lundar T, Lindegaard K-F, Nornes H: Estimation of cerebral perfusion pressure from arterial blood pressure and transcranial Doppler recordings, in Miller JD et al (eds): Intracranial Pressure VI. Springer-Verlag, Berlin-Heidelberg-New York, 1986, pp226-229
34. Lindegaard K-F, Grolimund P, Aaslid R, Nornes H: Evaluation of cerebral AVM's using transcranial Doppler ultrasound. *J Neurosurg* 1986; 65:335-344
35. Lindegaard K-F, Bakke SJ, Aaslid R, Nornes H: Doppler diagnosis of intracranial artery occlusive disorders. *J Neurol Neurosurg Psychiat* 1986; 47:510-518
36. Aaslid R: [Future possibilities in transcranial Doppler sonography - in German], in Widder B (ed): Transcranielle Doppler-Sonographie bei zerebrovascularen Erkrankungen. Springer-Verlag, New York-Berlin-Heidelberg, pp 25-29, 1987
37. Aaslid R: Transcranial Doppler diagnosis, in Spencer MP (ed): Ultrasonic diagnosis of cerebrovascular disease. Martinus Nijhoff Publishers, Dordrech, 1987, pp 227-240
38. Aaslid R: Visually evoked dynamic blood flow response of the human cerebral circulation. *Stroke* 1987; 18:771-775
39. Grolimund P, Seiler RW, Aaslid R, Huber P, Zurbruegg M: Evaluation of cerebrovascular disease by combined extracranial and transcranial Doppler sonography: Experience in 1039 patients. *Stroke* 1987; 18:1018-1024
40. Lindegaard K-F, Lundar T, Wiberg J, Sjoberg D, Aaslid R, Nornes H: Variations in middle cerebral artery blood flow investigated with noninvasive transcranial blood velocity measurements. *Stroke* 1987; 18:1024-1030
41. Adams RJ, Aaslid R, el Gammal T, Nichols FT, McKie V: Detection of cerebral vasculopathy in sickle cell disease using transcranial Doppler ultrasonography and magnetic resonance imaging. Case report, *Stroke* 1988; 19:518-520
42. Aaslid R, Lindegaard K-F, Sorteberg W, Nornes H: Cerebral autoregulation dynamics in humans. *Stroke* 1989; 20:45-52
43. Steiger HJ, Aaslid R, Keller S, Reulen HJ: Strength, elasticity and viscoelastic properties of cerebral aneurysms. *Heart Vessels* 1989; 5:41-46
44. Steiger HJ, Aaslid R, Keller S, Reulen HJ: Growth of aneurysms can be understood as passive yield to blood pressure. An experimental study. *Acta Neurochir (Wien)* 1989; 100:74-78
45. Augustyniak E, Swietliczko I, Aaslid R: [Evaluation of blood flow velocity and pulsation curves in the posterior ciliary arteries in glaucoma - in Polish.] *Klin Oczna* 1989; 91:3-6
46. Adams RJ, Nichols FT, Aaslid R, McKie VC, McKie K, Carl E, Stephens S, Thompson WO, Milner P, Figueroa R: Cerebral vessel stenosis in sickle cell disease: Criteria for detection by transcranial Doppler. *Am J Pediatric Hematol Oncol* 1990; 12:277-282
47. Aaslid R, Groger U, Patlak CS, Fenstermacher JD, Huber P, Reulen HJ: Fluid flow rates in human peritumoural Oedema. *Acta Neurochir Suppl (Wien)* 1990; 51:152-154
48. Nornes H, Sorteberg W, Nakstad P, Bakke SJ, Aaslid R, Lindegaard K-F: Haemodynamic aspects of clinical cerebral angiography - concurrent two vessel monitoring using transcranial Doppler ultrasound. *Acta Neurochir (Wien)* 1990; 105:89-97
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50. Aaslid R, Bondar, RL, Kassam MS, Stein F, Dunphy PT. Cerebral autoregulation in microgravity. *Proceedings, Spacebound '91, Ottawa, ON. 1991; 224-227.*

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52. Aaslid R: Principles of transcranial Doppler measurements, in Olesen J (ed): Migraine and other headaches: the vascular mechanisms. New York: Raven Press 1991;253-259
53. Aaslid R: Cerebral hemodynamics, in Newell DW, Aaslid R eds. Transcranial Doppler. New York: Raven Press 1992; pp49-55
54. Newell DW, Aaslid R: Transcranial Doppler: clinical and experimental uses. Cerebrovasc Brain Metab Rev 1992; 4:122-143
55. Newell DW, Aaslid R, Stooss R, Reulen HJ: The relationship of blood flow velocity fluctuations to intracranial pressure B waves. J Neurosurg 1992; 76:415-421
56. Steiger HJ, Aaslid R, Stooss R: Dynamic computed tomographic imaging of regional cerebral blood flow and blood volume. A clinical pilot study. Stroke 1993; 24:591-597
57. Giller CA, Aaslid R: Estimates of pulse wave velocity and measurement of pulse transit time in the human cerebral circulation. Ultrasound Med Biol 1994; 20:101-105
58. Newell DW, Aaslid R, Lam A, Mayberg TS, Winn HR: Comparison of Flow and velocity during dynamic autoregulation testing in humans. Stroke 1994; 25:793-797
59. Steiger HJ, Aaslid R, Stooss R, Seiler RW: Transcranial Doppler monitoring in head injury: relations between type of injury, flow velocities, vasoreactivity, and outcome. Neurosurgery 1994; 34:79-85
60. Tiecks FP, Lam AM, Aaslid R, Newell DW: Comparison of static and dynamic autoregulation measurements. Stroke 1995; 26:1014-19
61. Strebel S, Lam AM, Matta B, Mayberg TS, Aaslid R, Newell DW: Dynamic and static autoregulation during Isoflurane, Desflurane and Propofol anesthesis. Anesthesiology 1995; 83:66-76
62. Baumgartner RW, Mattle HP, Aaslid R: Transcranial color-coded duplex sonography, magnetic resonance angiography, and computed tomography angiography: methods, applications, advantages, and limitations. J Clin Ultrasound 1995; 23:89-111
63. Newell DW, Weber JP, Watson R, Aaslid R, Winn HR: Effect of transient moderate hyperventilation on dynamic cerebral autoregulation after severe head injury. Neurosurgery 1996; 35-43
64. Sturzenegger M, Newell DW, Aaslid R: Visually evoked blood flow response assessed by simultaneous two-channel transcranial Doppler using flow velocity averaging. Stroke 1996; 27:2256-2261
65. Newell DW, Aaslid R, Stooss R, Seiler RW, Reulen HJ: Evaluation of hemodynamic responses in head injury patients with transcranial Doppler monitoring. Acta Neurochir (Wien) 1997; 139:804-817
66. Junger EC, Newell DW, Grant GA, Avellino AM, Ghatan S, Douville CM, Lam AM, Aaslid R, Winn HR: Cerebral autoregulation following minor head injury. J Neurosurg 1997; 87:485-486
67. Seidel G, Beller KD, Aaslid R, Hummel RP, Thibaut U, Vidal-Langwasser M, Kukat B, Kaps M: The influence of different gases on acoustic properties of a spherosome-based ultrasound contrast agent (BY963). A transcranial Dopplersonography study. J Neuroimaging 1998; 8:83-87

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69. Aaslid R: Hemodynamics of cerebrovascular spasm. *Acta Neurochir [Suppl]* 1999;72: 47-57
70. Langmoen IA, Lundar T, Aaslid R, Reulen H-J eds. Neurosurgical management of aneurysmal subarachnoid haemorrhage. *Acta Neurochir [Suppl 72]* 1999
71. Aaslid R: Hemodynamics of cerebrovascular spasm. *Acta Neurochir [Suppl 72]* 1999;72:47-57
72. Newell DW, Eskridge JM, Aaslid R. Current indications and results of cerebral angioplasty. *Acta Neurochir Suppl.* 2001; 77:181-183
73. Aaslid R: Transcranial Doppler assessment of cerebral vasospasm. *Eur J Ultrasound.* 2002;16: 3-10
74. Vavilala MS, Newell DW, Junger E, Douville CM, Aaslid R, Rivara FP, Lam AM. Dynamic cerebral autoregulation in healthy adolescents. *Acta Anaesthesiol Scand.* 2002; 46:393-397.
75. Park CW, Sturzenegger M, Douville CM, Aaslid R, Newell DW. Autoregulatory response and CO₂ reactivity of the basilar artery. *Stroke.*2003; 34:34-39.
76. Blaha M, Aaslid R, Douville CM, Correra R, Newell DW. Cerebral blood flow and dynamic cerebral autoregulation during ethanol intoxication and hypercapnia. *J Clin Neurosci.* 2003; 10:195-198.
77. Aaslid R, Lash SR, Bardy GH, Gild WH, Newell DW. Dynamic pressure--flow velocity relationships in the human cerebral circulation. *Stroke.* 2003; 34: 1645-1649.
78. Mackinnon AD, Aaslid R, Markus HS. Long-term ambulatory monitoring for cerebral emboli using transcranial Doppler ultrasound. *Stroke.* 2004;35:73-78
79. Aaslid R, Newell DW. Response: Limitations in Estimating Critical Closing Pressure by Noninvasive Blood Pressure Measurements. *Stroke* 2004; 35:e91-e92
80. Mackinnon AD, Aaslid R, Markus HS: Ambulatory transcranial Doppler cerebral embolic signal detection in symptomatic and asymptomatic carotid stenosis. *Stroke* 2005;36:1726-1730
81. Aaslid R: Cerebral autoregulation and vasomotor reactivity. In Baumgartner RW (ed): *Handbook on neurovascular ultrasound.* Front. Neurol. Neurosci, Basel, Karger 2006;21:1-13
82. Aaslid R, Blaha M, Sviri G, Douville CM, Newell DW. Asymmetric dynamic cerebral autoregulatory response to cyclic stimuli. *Stroke* 2007; 38:1465-69 ([Abstract](#)) ([Full Text](#))