VISTA Annual Report 2016

Virtual International Stroke Trials Archive (VISTA)
M0.07, Office Block
Queen Elizabeth University Hospital
G51 4SX
vista.coordinator@glasgow.ac.uk
www.vistacollaboration.org

Contents

Executive Summary

The Virtual International Stroke Trials Archive has continued to grow at a steady rate over the past year. Each archive has received a slow but steady stream of new proposals, and on average, there has been at least one new paper published and 2 new abstracts presented across each archive since April 2015; an additional 9 papers have been submitted for publication and are currently under review with a range of peer-reviewed journals.

VISTA-Prevention and VISTA-Endovascular continue to await completion of planned meta-analyses prior to the contribution of several large datasets. VISTA-Cognition has continued to build its profile through presentations at the International Congress on Vascular Dementia.

Coordinating partnerships have been established with Johns Hopkins University (VISTA-ICH Scans) and Seton University (VISTA-Imaging). Internal protocols are being implemented to facilitate coordination of data access from different sites.

VISTA will add to its remit by developing capability to store and provide access to trial protocols, in addition to clinical datasets.

A new VISTA Analysis Platform has been launched. This is similar to the Safe Haven platform (http://www.adls.ac.uk/nhs-scotland/nhs-scotland-national-safe-haven/) and will allow online access to analysis datasets in a secure environment. Implementation of this analysis platform provides reassurance of data security to trial sponsors and will encourage further contributions of trials; further to the launch of this platform, we are in negotiations with GlaxoSmithKline to contribute data to both VISTA and the cardiovascular sister archive VICCTA.

VISTA Overview

Message from the VISTA Chairman

It has been a further successful year for VISTA, with activity now spread among 8 sections. Recent changes in guidance on making clinical trial data publicly available both underline the excellent principles that VISTA has promoted in stroke for over a decade and provide an opportunity for VISTA to gain in strength and influence. The International Committee of Medical Journal Editors (ICMJE) has suggested recommendations for the sharing of clinical trial data. We want to encourage trial leaders to use VISTA as a repository for their trial data. VISTA preserves for trialists a degree of control over, and continued benefits from, subsequent use of the data. To ensure compliance with the ICMJE recommendations, we have reviewed the VISTA constitution and have identified a few areas that should be revised.

Kennedy R. Lees
April 2016

ICMJE & Proposed Changes to VISTA/ VICCTA Policy

ICMJE Requirement	Does VISTA/ VICCTA policy already address this issue?	Actions
Authors need to share data on which RCT reports are based	Yes, by sharing data with VISTA authors are opening their data to wider use, through a largely independent scientific review process	Highlight more prominently on the VISTA/ VICCTA website that VISTA/ VICCTA are resources for secure storage of RCT data, in line with current recommendations
Data sharing plan needs to be included in the trial registration process	This is for individual trialists to address via their protocols and on the registration website(s): it should be sufficient for standard language about VISTA or VICCTA to be cited.	Highlight more prominently on the VISTA/ VICCTA website that VISTA/ VICCTA are resources for secure storage of RCT data, in line with current recommendations VISTA/VICCTA can provide documentation of agreement to lodge data within the appropriate archives to support the trial registration process.
Data sharing plans need to be referenced in the original trial publication	This is for individual trialists to address via their protocols and on the registration website(s): it should be sufficient for standard language about VISTA or VICCTA to be cited.	None
Need to protect anonymity of patients	Yes	None
Need to meet the requirements of data requestors	Yes	None
Manuscripts need to acknowledge that data are made available in accordance with agreed terms and conditions	This is for individual trialists to address within their manuscript(s): it should be sufficient for standard language about VISTA or VICCTA to be cited.	The manuscript should include a statement that analyses have been conducted in accordance with agreed terms and conditions for sharing of VISTA data, and should refer queries back to the VISTA website for details of the terms and conditions. Post full terms and conditions for data sharing on the VISTA/ VICCTA websites.

The source of data in secondary analyses should be referenced by a unique identifier so the analyses are fully transparent and contributions to other analyses can be searched for	Partial (trial identifiers are available for internal use and all trials available within VISTA or VICCTA may be listed on the respective VISTA / VICCTA website but specific acknowledgement of source trials in manuscripts is not part of current policy)	Discussion on whether to reveal the source of trial data in analyses and manuscripts needs to take place within the Steering Committees Should the Steering Committees agree to reveal trial sources, then the VISTA/VICCTA websites should be updated accordingly with information about the trials. VISTA analysis often include partial use of trial datasets, and so the proposed referencing may be misleading
Authors must describe how their analyses are different from previous analyses	N/A (VISTA has not permitted the reanalysis of a trial's aims without prior permission from the contributing trialist, after which it becomes a trial group's paper rather that a VISTA paper)	Discussion should take place in the Steering Committee on whether to permit reanalysis of treatment effects within VISTA, presumably within terms of international agreement on data sharing and only for datasets from a specified date onwards. Following a positive decision, investigators will have to liaise with contributing trialists and include a clear explanation of the aims of the current study & the previous study, and any differences between the two. If VISTA Steering Committees vote to retain the existing policy of not examining treatment effects, investigators will be referred to the contributing trialists to liaise with them to conduct a non-VISTA analysis. However, VISTA facilitates data transfer and monitoring of use, so processing such requests for authors would be more efficient for all concerned.
Acknowledgement of the contributing trialists in manuscripts	Yes	None
Acknowledgement of those who compile and share data	Yes ("on behalf of the VISTA/ VICCTA Collaboration" is included on each paper and abstract)	None
	Partially (Contributing trialists are already part of the Steering	Trialists whose data are used in analyses should be notified after data compilation but before the analysis

Collaboration between the proposing investigator and the original trialist should be sought	Committees, review all proposals and abstracts, and contribute to analyses where this falls within their own research interests. The relevant PIs have the option to seek enhanced representation for their trial if appropriate; usually it is not. A more concerted effort to identify and engage specific trialists according to use of their contributed data could be warranted.)	period and specifically asked whether they would like to actively participate in the project, as opposed to post-hoc co- authorship after analyses have been completed. An additional step should be added to the proposal acceptance procedure to specifically involve trialists before analysis commences.

VISTA Analysis Platform

VISTA has thus far operated using a system that involves investigators receiving physical copies of their analysis datasets and destroying these data when the project has been completed. This has worked well with the vast majority of investigators adhering to the agreed regulations. However, with the growth of VISTA to include several new archives, and the development of the sister archive VICCTA, there is a need to streamline and automate certain data access procedures.

The Robertson Centre for Biostatistics (RCB) which houses VISTA data, has expertise in developing a secure, online analysis platform that can be used by investigators to access and analyse data, as well as to export research findings (Safe Haven). The NSS National Safe Haven is a secure environment in which data are linked and accessed. This environment provides a high powered computing service, secure analytic environment, secure file transfer protocol for receipt of data, and provision of a range of analytic software (SPSS, STATA, SAS and Revolution R [only for use when accessing from academic organisations]).

The VISTA Analysis Platform has been developed based on the principles of Safe Haven and has been implemented since January 2016. The proposal submission and manuscript review process will remain the same; data access will be granted via access to a secure workspace on the RCB's server using personalised log in credentials for each project and investigator (for a pre-specified time scale). Raw data cannot be copied from this location but all outputs can be downloaded. Shared folders are also available to allow multiple members of the research team to share and discuss results as necessary. There will be a nominal charge for this service.

VISTA-Acute

Update from the VISTA-Acute Chair

VISTA-Acute analyses have been responsible for 63 peer-reviewed publications to date, a rise of 6 in the last year. These manuscripts attract a healthy number of citations, over 9 each on average, and have featured in clinical guidelines. VISTA has its own H-index of 14 and so likely contributes usefully to the citation record or H-index of all Steering Committee members.

As discussed last year, only limited changes in the data available to VISTA-Acute are now anticipated because recent acute trials are being directed towards other sub-sections such as VISTA-Endovascular or VISTA–ICH. I predict a gradual decline in fresh analytic activity as a result. Even so, the size and quality of the dataset is still supporting a trickle of applications and an occasional enquiry from industry.

Last year we acknowledged that a challenge is to encourage younger researchers to use the data but at the same time to maintain quality of output. Journal reviewers do assess if there is genuinely new material being presented. However, student projects can still be supported readily, and we agreed last year that data - or a subset - may have repeated use for training purposes if students and supervisors accept that publication is not an option, i.e. projects could be recycled to more than one student.

VISTA-Acute Founding Members

(L-R) K.R. Lees, P.M. Bath, S. Davis, H-C Diener, G.A Donnan, M. Fisher, N-G Wahlgren, W. Hacke

Some of the additional VISTA-Acute data that are being sought at present overlap with VICCTA, and are primarily being sought under VICCTA leadership. The AF detection trial data are a good example. VICCTA has attracted its first peer-reviewed publication.

Ideas for future directions of the VISTA-Acute section are welcome.

Kennedy R. Lees
April 2016

Summary

30,320 Individual Anonymised Patient Records Available within VISTA-Acute

25 Ongoing Projects

63 Peer-Reviewed Publications based on novel analyses

76 Abstracts Presented at Conferences

3 European Stroke Conference Young Investigator Awards

Steering Committee

Name	Affiliation
K.R. Lees (Chair)	Institutes of Cardiovascular and Medical Sciences, University of Glasgow, UK
E. Bluhmki	Boehringer Ingelheim, Biberach, Germany
B. Gregson	Dept. of Neurosurgery, Newcastle University, Newcastle General Hospital, UK
G. Donnan,	Neurology, University of Melbourne, Australia
H. C. Diener	Department of Neurology, University Duisburg-Essen, Hufelandstrasse, Essen, Germany
J. Grotta	Department of Neurology, University of Texas, Houston Medical School, USA
J. Marler	Food and Drug Administration , USA
P. Teal	Professor of Stroke Neurology, University of British Columbia, Vancouver
M.G. Hennerici	Department of Neurology, University of Heidelberg, Germany
N.G. Wahlgren	Karolinska Hospital, Stockholm, Sweden
P. Lyden	Cedars-Sinai Medical Center, Los Angeles, USA
P.W. Bath	Institute of Neuroscience, University of Nottingham, UK
R. Sacco	Miller School of Medicine, University of Miami, USA
S.M Davis	Department of Neurology, Royal Melbourne Hospital, University of Melbourne, Australia
W. Hacke	Department of Neurology, University of Heidelberg, Germany
S. Warach	Department of Neurology and Neurotherapeutics, UT Southwestern Medical Center, Austin, TX
M. Fisher	Dept. of Neurology, University of Massachusetts Medical School, USA
M. Hommel	Joseph Fourier University, Grenoble, France
M. Kaste	Department of Neurology, Helsinki University Central Hospital, University of Helsinki, Finland
K. Muir	Division of Clinical Neurosciences, University of Glasgow, Glasgow, UK
A. Shuaib	Director, Stroke Program, University of Alberta, Canada
C. Weimar	Department of Neurology, University Hospital Essen, University of Duisburg-Essen, Essen, Germany
A. Alexandrov	University of Alabama Hospital, Birmingham, AL, USA
N Bornstein	Professor of Neurology at the Tel-Aviv University, Sackler Faculty of Medicine, Israel
M. Ginsberg	Department of Neurology, University of Miami Miller School of Medicine, Miami, USA

Ongoing Research Titles

1. BrainsGate Update, "Updated Prognostic Model Based on Historical Controls Matching BrainsGate's Study Population."
2. Hussein et al, "Effect of Cigarette Smoking on Outcomes of Acute Ischemic Stroke Treated with Intravenous or Intra-arterial Thrombolysis: Is There Any Paradox in The Brain?"
3. Dawson et al, "Antithrombotic Therapy after Stroke."
4. Dawson et al, "Medication burden and clinical outcomes early after acute stroke."
5. Lees et al, "Patient outcomes following stroke according to baseline level of renal function."
6. Scheitz et al, "Sulphonylurea use and infectious complications."
7. Scheitz et al, "Sulphonylurea use and haemorrhagic complications."
8. Endres et al, "Impact of Resting Heart Rate on Mortality and Morbidity after Acute Ischemic Stroke."
9. Ginsberg et al, "Controlled comparison of treatment groups from ALIAS-2 and VISTA."
10. Mazya et al, "SITS ICH Score."
11. Saini et al, "Effect of Blood Pressure Variations on Acute Ischemic Stroke Outcomes, in relation to specific patient populations."
12. Saini et al, "Study of effect of metabolic syndrome on ischaemic stroke outcomes."
13. Michel et al, "Extension and further validation of ASTRAL score's prognostic performance."
14. Fulton et al, "Exploration of case-control matching using historical controls for use in exploratory clinical trials: an evaluation using VISTA and SITS-East."
15. Kar et al, "A retrospective comparison between patients receiving autologous mononuclear bone marrow cells in stroke and matched VISTA controls."
16. Quinn et al, "Validation of SF-SIS."
17. Quinn et al, "Derivation and validation of a short form Barthel Index for ADLs."
18. Whiteley et al, "Validation of prognostic models for haemorrhagic and thrombotic events after stroke."
19. Saposnik et al, "Comparative models for estimating stroke outcomes."
20. Phan et al, "Application of stroke severity and comorbidity index to the prediction of 90 day outcome after ischemic stroke."
21. Hametner et al, "Relationship between sex and lesion side/site in acute ischemic stroke."
22. Ali et al, "Analysis of utility data from the Virtual International Stroke Trials Archive."
23. Myint et al, "Validation of prognostic scoring systems for acute and longer term patient related outcomes in ischaemic stroke."
24. El-Tawil, "Analysis of the profiles of thrombolysed vs non-thrombolysed patients between 1998- 2012."
25. Sykora et al, "Effects of SSRI exposure on hemorrhagic complications and outcome."

Publications based on Novel Analyses

1. Dawson J, Lees JS, Chang TP, Walters MR, Ali M, Davis SM, Diener HC, Lees KR, for the GAIN and VISTA Investigators. Association between disability measures and healthcare costs after initial treatment for acute stroke. Stroke.2007;38:1893-1898
2. Prosser J; MacGregor L; Lees KR; Diener HC; Hacke W; Davis SM; on behalf of the VISTA investigators. Predictors of Early Cardiac Morbidity and Mortality after Ischemic Stroke. Stroke. 2007;38:2295-2302
3. Fink JN, Frampton CM, Lyden P, Lees KR, on behalf of the VISTA Investigators. Does hemispheric lateralization influence functional and cardiovascular outcomes after stroke? An analysis of placebo-treated patients from prospective acute stroke trials. Stroke 2008;39:3335-3340
4. Konig IR; Ziegler A; Bluhmki E; Hacke W; Bath PMW; Sacco RL; Diener HC; Weimar C; on behalf of the Virtual International Stroke Trials Archive (VISTA) Investigators. Predicting Long-Term Outcome after Acute Ischemic Stroke. A Simple Index Works in Patients From Controlled Clinical Trials. Stroke. 2008;39:1821-1826
5. Quinn TJ, Dawson J, Lees JS, Chang TP, Walters MR, Lees KR; GAIN and VISTA Investigators. Time spent at home post-stroke: "home-time" a meaningful and robust outcome measure for stroke trials. Stroke 2008; 39: 231-3
6. Ovbiagele B; Starkman S; Teal P; Lyden P; Kaste M; Davis SM; Hacke W; Fierus M; Saver JL; on behalf of the VISTA Investigators, Serum Calcium as Prognosticator in Ischemic Stroke. *Stroke*. 2008;39:2231-2236
7. Hallevi H, Albright KC, Martin-Schild S, Barreto AD, Grotta JC, Savitz SI. The complications of cardioembolic stroke: lessons from the VISTA database. Cerebrovasc Dis 2008; 26:38–40.
8. Ali M, Atula S, Bath PMW, Grotta J, Hacke W, Lyden P, Marler J, Sacco RL, Lees KR, for the VISTA Investigators, Stroke Outcomes in Clinical Trials Patients Deriving from Different Countries. Stroke 2009;40:35-40
9. Dawson J, Lees KR, Weir CJ, Quinn TJ, Ali M, Hennerici M, Walters MR, and the VISTA collaborators. Baseline Serum Urate and 90-Day Functional Outcomes Following Acute Ischemic Stroke. Cerebrovascular Diseases, 2009; 28:202-203.
10. Gray LJ, Ali M, Lyden P, Bath PMW, for the VISTA Investigators. Interconversion of the National Institutes of Health Stroke Scale and Scandinavian Stroke Scale in acute stroke. Journal of Stroke and Cerebrovascular Diseases, 2009; 18: 466-468
11. Hallevi H, Albright KC, Martin-Schild SB, Barreto AD, Morales MM, Bornstein Nm Ifejika NL, Shuaib A, Grotta J, Savitz, on behalf of the VISTA Investigators. Recovery after ischaemic stroke: Criteria for good outcome by level of disability at day 7, Cerebrovascular Diseases 2009; 28: 341-348
12. Saini M, Saqqur M, Kamruzzaman A, Lees KR, and Shuaib A, for the VISTA collaboration. Effect of hyperthermia on prognosis after acute ischemic stroke. Stroke 2009;40:3051-9
13. Sare GM, Ali M, Shuaib A, Bath PMW, for the VISTA Collaboration. Relationship between Hyperacute Blood Pressure and Outcome after Ischemic Stroke. Stroke 2009; 40:2098-2103.

14. Weimar C, Ziegler A, Sacco RL, Diener HC, Ziegler A, Koenig IR on behalf of the VISTA Investigators. Predicting recovery after intracerebral hemorrhage – an external validation in patients from controlled clinical trials. J Neurol. 2009; 256:464–469
15. Kamel H, Lees KR, Lyden P, Teal PA, Shuaib A, Ali M and Johnston SC, on behalf of the VISTA Investigators. Delayed detection of atrial fibrillation after ischaemic stroke. Journal of Stroke and Cerebrovascular Diseases, 2009; 18: (6):453-457
16. Ali M, Lyden P, Sacco RL, Shuaib A, Lees KR, for the VISTA investigators. Natural History of Complications after Intracerebral Haemorrhage. European Journal of Neurology; 2009: 16:624-630
17. Ali M, Sacco R, Lees KR, On behalf of the VISTA Investigators. Primary endpoint times, functional outcome and adverse event profile after acute ischaemic stroke. International Journal of Stroke, 2009;4 (6):432-42
18. Whitehead J, Bolland K, Valdès-Márquez E, Lihic A, Ali M, Lees KR, for the VISTA Collaborators. Using historical lesion volume data in the design of a new phase II clinical trial in acute ischaemic stroke. Stroke 2009; 40:1347-1352
19. Ali M, Jüttler E, Lees K.R, Hacke W, Diedler J, for the VISTA and DESTINY Investigators. Patient Outcomes in Historical Comparators Compared with Randomised Controlled Trials. International Journal of Stroke 2010; 5(1):10-15.
20. Ovbiagele B, Lyden PD, Saver JL, for the VISTA Collaboration. Disability status at one month is a reliable proxy for final ischaemic stroke outcome. Neurology 2010; 24; 75 (8):688-92.
21. Mishra NK, Lyden PL, Grotta J, Lees KR, for the VISTA collaborators. Thrombolysis Is Associated With Consistent Functional Improvement Across Baseline Stroke Severity: A Comparison of Outcomes in Patients From the Virtual International Stroke Trials Archive (VISTA), Stroke 2010**;** 41:2612-2617.
22. Mishra N.K, Davis S.M, Kaste M. Lees KR, Comparison of outcomes following thrombolytic therapy amongst patients with prior stroke and diabetes in the Virtual International Stroke Trials Archive (VISTA).Care, 2010; 33: 2531 – 2537
23. Mishra N.K, Ahmed N, Andersen G, Herrero JE, Lindsberg P, Wahlgren N, Lees KR, for SITS and VISTA. Thrombolysis in very elderly people: controlled comparison of SITS International Stroke Thrombolysis Registry and Virtual International Stroke Trials Archive. BMJ 2010, 341:c6046.
24. Mishra NK, Diener H-C, Lyden PD, Lees KR, for the VISTA collaborators, Influence of age on outcome from thrombolysis in acute stroke: a controlled comparison in patients from the Virtual International Stroke Trials Archive (VISTA). Stroke 2010:41;2840-2848
25. Mishra NK, Ahmed N, Davalos A, Iversen HK, Melo T, Sionne L, Wahlgren N, Lees KR; SITS and VISTA Collaborators. Thrombolysis outcomes in acute ischemic stroke patients with prior stroke and diabetes mellitus. Neurology. 2011;77(21):1866-72
26. Favilla CG, Mullen MT, Ali M, Higgins P, Kasner SE, On behalf of the VISTA Collaboration. Sulfonylurea Use Prior to Stroke Does Not Influence Stroke Severity or Long-term Functional Outcome. Stroke 2011;42 710-715
27. Muir K, McCormick M, Baird T, Ali M. Prevalence, Predictors and Prognosis of Post-Stroke Hyperglycaemia in acute stroke trials: Individual Patient Data Pooled Analysis from the Virtual International Stroke Trials Archive VISTA. Cerebrovasc Dis Extra 2011;1:17-27.

28. Dowlatshahi D, Demchuk A, Flaherty ML, Ali M, Lyden P, and Smith EE, on behalf of the VISTA Collaboration. Defining hematoma expansion in intracerebral hemorrhage: relationship with patient outcomes. Neurology 2011; 76: 1238-1244.
29. Dowlatshahi D, Smith EE, Flaherty ML, Ali M, Lyden P, Demchuk AM; VISTA Collaborators. Small intracerebral haemorrhages are associated with less haematoma expansion and better outcomes. Int J Stroke. 2011 Jun;6(3):201-6
30. Lees JS, Mishra NK, Saini M, Lyden PD, Shuaib A, for Virtual International Stroke Trials Archive (VISTA) Collaborators. Low Body Temperature Does Not Compromise Treatment Effect of Alteplase, Stroke 2011; 42(9):2618-2.
31. Tu HTH, Campbell BCV, Churilov L, Kalman JM, Lees KR, Lyden PD, Shuaib A, Donnan GA, Davis SM; on behalf of the VISTA collaborators. Frequent early cardiac complications contribute to worse stroke outcome in atrial fibrillation. Cerebrovascular Diseases 2011;32(5):454-60.
32. Kerr D, Fulton RL, Lees KR, for the VISTA Collaborators. Day 7 NIHSS is a Sensitive Outcome Measure for Exploratory Clinical Trials in Acute Stroke: Evidence from the Virtual International Stroke Trials Archive (VISTA), Stroke 2012; 43:1401-3.
33. Vogt G, Laage R, Shuaib A, Schneider A, Initial lesion volume is an independent predictor of clinical stroke outcome at day 90: an analysis of the Virtual International Stroke Trials Archive (VISTA) database. Stroke. 2012;43:1266-72
34. Hajjar K, Fulton RL, Diener HC, Lees KR; for the VISTA Collaborators. Does the cognitive measure Cog-4 show improvement among patients treated with thrombolysis after acute stroke? International Journal of Stroke. 2012 Jul 19. doi: 10.1111/j.1747-4949.2012.00848.x
35. Frank B, Fulton R, Weimar C, Shuaib A, Lees KR, for the VISTA Collaborators, Impact of atrial fibrillation on outcome in thrombolysed patients with stroke: evidence from the Virtual International Stroke Trials Archive (VISTA), Stroke 2012 43(7):1872-7.
36. Ali M, Hazelton C, Lyden P, Pollock A, Brady M, on behalf of the VISTA Collaboration, Recovery from Post-Stroke Visual Impairment: Evidence from a Clinical Trials Resource, JNNR 2013 Feb;27(2):133-141
37. Ali M, Bath PM, Lyden P, Brady M on Behalf of the VISTA Collaboration. Representation of People with Aphasia in Randomised Controlled Trials of Acute Stroke Interventions. International Journal of Stroke 2013; doi: 10.1111/ijs.12043.
38. Fulton RL, Lees KR, Bluhmki E, Biegert G, Albers G, Davis SM, Donnan GA, Grotta J, Hacke W, Kaste M, von Kummer R, Shuaib A, Toni D, for the VISTA Collaboration and ECASS, ATLANTIS, NINDS and EPITHET Investigators. Selection for Delayed Intravenous Alteplase Treatment Based on a Prognostic Score, International Journal of Stroke 2013; doi: 10.1111/j.1747-4949.2012.00943.x.
39. Frank, B., J. C. Grotta, A. V. Alexandrov, E. Bluhmki, P. Lyden, A. Meretoja, N. K. Mishra, A. Shuaib, N. Wahlgren, C. Weimar, and K. R. Lees, on behalf of the VISTA Collaboration. Thrombolysis in Stroke despite Contraindications or Warnings? Stroke, 2013; 44:727-33.
40. Frank, B., R. Fulton, C. Weimar, K.R. Lees, and R.D. Sanders on behalf of the VISTA Collaboration. Use of Paracetamol in Ischaemic Stroke Patients: Evidence from VISTA. Neurologica Scandinavica, 2013; 128:172-7.

41. Frank B, Fulton RL, Goldie FC, Hacke W, Weimar C, Lees KR for the VISTA Collaborators. Intracluster Correlation Coefficients and Reliability of Randomised Multicentre Stroke Trials within VISTA, International Journal of Stroke 2013, 9; 602-605, DOI: 10.1111/ijs.12123.
42. Goldie FC, Fulton RL, Dawson J, Lees KR on behalf of the VISTA Collaboration. Exploration of time-course combinations of outcome scales for use in a global test of stroke recovery. International Journal of Stroke 2013; 9(6):755-8. doi: 10.1111/ijs.12131.
43. Ankolekar S, Renton C, Sprigg N, and Bath PMW, The Cog-4 Subset of the National Institutes of Health Stroke Scale as a Measure of Cognition: Relationship with Baseline Factors and Functional Outcome after Stroke Using Data from the Virtual International Stroke Trials Archive, Stroke Research and Treatment, 2013 vol. 2013, Article ID 562506. doi:10.1155/2013/562506.
44. Frank B, Fulton R, Lees KR, Sanders RD for the VISTA Collaborators. Impact of benzodiazepines on functional outcome and occurrence of pneumonia in stroke: Evidence from VISTA. International Journal of Stroke 2013; DOI: 10.1111/ijs.12148.
45. Mishra NK, Mandava P, Chen C, Grotta J, Lees KR, Kent TA on behalf of the VISTA Collaboration. Post thrombolysis outcomes in acute ischemic stroke patients of Asian race-ethnicity. International Journal of Stroke 2013. Suppl A100:95-9. doi: 10.1111/ijs.12012
46. Ali M, Fulton R, Quinn T, Brady M on Behalf of the VISTA Collaboration. How well do Standard Trial Outcome Measures Reflect Quality of Life (QoL)? An Analysis of Clinical Trial Data. Stroke 2013; doi: 10.1161/STROKEAHA.113.001126.
47. Tu HT, Campbell BCV, Meretoja A, Churilov L, Lees KR, Donnan GA, Davis SM, on behalf of the VISTA collaborators. Pre-stroke CHADS2 and CHA2DS2-VASc scores are useful in stratifying three-month outcomes in patients with and without atrial fibrillation. Cerebrovasc Dis 2013;36:273-280
48. Flint AC, Faigeles BS, Cullen SP, Kamel H, Rao VA, Gupta R, Smith WS, Bath PM, Donnan GA, on behalf of the VISTA Collaboration. The THRIVE Score predicts ischemic stroke outcomes and thrombolytic hemorrhage risk in the Virtual International Stroke Trials Archive (VISTA). Stroke 2013 doi: 10.1161/STROKEAHA.113.002794.
49. Saposnik G, Reeves MJ, Johnston SC, Bath PM, Ovbiagele B on behalf of the VISTA Collaboration. Predicting Clinical Outcomes after Thrombolysis Using the iScore: Results from the Virtual International Stroke Trials Archive. Stroke 2013; doi: 10.1161/STROKEAHA.113.001343
50. Saini M, Saqqur M, Shuaib A, on behalf of the VISTA Collaborators. Body mass index and acute ischaemic stroke outcomes. International Journal of Stroke 2013; 9: 618-623
51. Ali M, Lyden P, Brady M, on Behalf of the VISTA Collaboration. Aphasia and Dysarthria in Acute Stroke: Recovery and Functional Outcome. International Journal of Stroke 2013 DOI: 10.1111/ijs.12067
52. Frank B, Fulton R, Lees KR on behalf of the VISTA Collaboration. The effect of time to treatment on outcome in very elderly thrombolysed stroke patients. International Journal of Stroke; 2014; 9: 591-596 DOI: 10.1111/ijs.12249.
53. Ovbiagele B, Reeves MJ, Nasiri M, Johnston SC, Bath PM, Saposnik G, for the VISTA-Acute Collaboration Steering Committee A Simple Risk Index and Thrombolytic Treatment Response in Acute Ischemic Stroke. JAMA Neurol. doi:10.1001/jamaneurol.2014.689

54. Abdul-Rahim A H, Fulton RL, Frank B, McMurray JJV, and Lees KR, Associations of Chronic Heart Failure with Outcome in Acute Ischaemic Stroke Patients who received Systemic Thrombolysis: Analysis from VISTA. European Journal of Neurology 2014, (DOI: 10.1111/ene.12548).
55. Hesse K, Fulton RL, Abdul-Rahim AH and Lees KR, on behalf of the VISTA Collaboration. Characteristic Adverse Events and their Incidence among Patients Participating in Acute Ischemic Stroke Trials. Stroke 2014; 45(9):2677-82.
56. Abdul-Rahim AH, Fulton RL, Frank B, Tatlisumak T, Paciaroni M, Caso V, Diener HC, Lees KR, on behalf of the VISTA Collaboration. Association of Improved Outcome in Acute Ischaemic Stroke Patients with Atrial Fibrillation who Receive Early Antithrombotic Therapy: Analysis from VISTA. European Journal of Neurology 2014, doi: 10.1111/ene.12577.
57. Abdul-Rahim, AH, Fulton RL, Sucharew H, Kleindorfer D, Khatri P, Broderick JP, Lees KR, for the VISTA Collaborators, National Institutes of Health Stroke Scale Item Profiles as Predictor of Patient Outcome: External validation on independent trial data. Stroke 2014 DOI: 10.1161/STROKEAHA.114.006837
58. Sykora M, Siarnik P, Diedler J, for the VISTA Acute Collaborators, Beta- Blockers, pneumonia and outcome after ischemic stroke: Evidence from VISTA. Stroke 2015 DOI: 10.1161/ STROKEAHA.114.008260
59. Beare R, Chen J, Phan TG, for the VISTA Collaboration, Googling Stroke ASPECTS to Determine Disability: Exploratory Analysis from VISTA-Acute Collaboration. PLOS One DOI:10.1371/journal.pone.0125687
60. McMeekin P, Flynn D, Ford GA, Rodgers H, Gray J, Thomson RG, On behalf of the VISTA and SITS-UK Collaboration, Development of a decision analytic model (DAM) to support patient individualised decision making and risk communication about thrombolytic treatment in acute stroke care, BMC Medical Informatics and Decision Making 2015; DOI: 10.1186/s12911-015-0213-z.
61. Phan TG, Clissold B. Ly J, Ma H, Moran C, Srikanth V, on behalf of the VISTA-Acute Collaboration. Stroke severity and comorbidity index for prediction of mortality after ischemic stroke from the VISTA-Acute collaboration. Journal of Stroke and Cerebrovascular Diseases, 2016 doi: 10.1016/j.jstrokecerebrovasdis.2015.12.01
62. Hesse K, MacIsaac RL, Abdul-Rahim AH, Lyden PD, Bluhmki E, Lees KR, and for the VISTA Collaborators, Online Tool to Improve Stratification of Adverse Events in Stroke Clinical Trials, Stroke, 2016 DOI: 10.1161/STROKEAHA.115.011930
63. Scheitz JF, MacIsaac RL, Abdul-Rahim AH, Siegerink B, Bath PM, Endres M, Lees KR, on behalf of the VISTA Collaboration, Statins and risk of post stroke haemorrhagic complications. Neurology 2016; 86: 1590-1596

VISTA-Rehab

Message from the VISTA-Rehab Chair

VISTA-Rehab has continued to grow over the last year with a new upper limb trial contribution bringing our archive to a total of 45 trial contributions (individual patient data from 10,874 stroke survivors). While overarching methodological investigations remain feasible (e.g. Projects 2,3 and 5) our primary objective remains building critical mass in specific clinical areas.

Over the next year, two external research activities will augment our recruitment and in turn the feasibility of research proposals seeking to use the VISTA-Rehab archive. UK National Institutes of Health Research (NIHR) funded aphasia project will support recruitment of aphasia trial datasets to VISTA-Rehab (currently a subset of 3 RCTs). While systematic review work underway (Glasgow Caledonian University funded PhD) will create a database of rehabilitation RCTs published since 2005. All trialists identified through these routes will be invited to contribute their data to VISTA-Rehab.

VISTA-Rehab Founding Members

(L-R) M. Brady, K.R. Lees, A. Pollock, P. Langhorne, M. Walker.

The VISTA-Rehab archive is looking forward to continued contributions and in turn, the development of additional research activities.

Summary

10,874 Individual Anonymised Patient Records Available within VISTA-Rehab

45 Trials Contributed

10 Commitments to Contribute Data

5 Ongoing Projects

5 Peer-Reviewed Publications & Commentary Articles

22 Abstracts Presented at Conferences

Steering Committee

Name	Affiliation
M.C. Brady (Chair)	NMAHP Research Unit, Glasgow Caledonian University, UK
M. Ali	NMAHP Research Unit, Glasgow Caledonian University, UK
A. Ashburn	School of Health Sciences, University of Southampton, UK
D. Barer	Stroke Research Team, Queen Elizabeth Hospital, Gateshead, UK
J. Bernhardt	University of Melbourne, Australia
A. Bowen	School of Psychological Sciences, University of Manchester, UK
A. Drummond	Faculty of Medicine and Health Sciences, University of Nottingham, UK
J. Edmans	School of Community Health Sciences, University of Nottingham, UK
C. English	School of Health Sciences, University of South Australia, Australia.
J. Gladman	School of Community Health Sciences, University of Nottingham, UK
E. Godecke	Edith Cowan University, Australia
T. Hoffmann	Faculty of Health Sciences and Medicine, Bond University, Australia
L. Kalra	King's College London, London, UK
S. Kuys	Allied Health Research Collaborative, The Prince Charles Hospital, Queensland, Australia
P. Langhorne	Academic Section of Geriatric Medicine, Glasgow Royal Infirmary and Faculty of Medicine, University of Glasgow, UK
A.C. Laska	Danderyd Hospital, Stockholm, Sweden
K.R. Lees	Institutes of Cardiovascular and Medical Sciences, Faculty of Medicine, University of Glasgow, UK
P. Logan	School of Community Health Sciences, University of Nottingham, UK
G. Mead	Clinical Sciences & Community Health, University of Edinburgh, UK
J. Morris	NMAHP Research Unit, Glasgow Caledonian University, UK
A. Pandyan	Keele University, UK
A. Pollock	NMAHP Research Unit, Glasgow Caledonian University, UK
V. Pomeroy	Health and Social Sciences Research Institute, University of East Anglia, UK
H. Rodgers	Institute for Ageing and Health, Newcastle University, UK
C. Sackley	University of Birmingham, UK
L. Shaw	Institute for Ageing and Health, Newcastle University, UK
D.J. Stott	Academic Section of Geriatric Medicine, Glasgow Royal Infirmary, Glasgow UK.
K.S. Sunnerhagen	Section for Clinical Neuroscience and Rehabilitation, University of Gothenburg, Sweden

S. Tyson	Stroke & Vascular Research Centre, School of Nursing, Midwifery & Social Work, University of Manchester, UK
P. van Vliet	Division of Physiotherapy Education, School of Nursing, Midwifery and Physiotherapy, University of Nottingham
M. Walker	School of Community Health Sciences, University of Nottingham, UK
W. Whiteley	Department of Clinical Neurosciences, Western General Hospital, Edinburgh, UK

Ongoing Research Titles

1. Ali et al, Epidemiology, risk factors and natural history of UI after stroke
2. Quinn et al, Development and Validation of a Short Form for the Stroke Impact Scale.
3. Quinn et al, The derivation and validation of a short form Barthel Index (BI) of Activities of Daily Living scale.
4. Ali et al, Quality of Life after Acute Ischemic Stroke: Analysis of Utility Data from the Virtual International Stroke Trials Archive (VISTA)
5. Weir et al, Practical methods for meta-analysis of continuous outcomes, with examples in stroke rehabilitation.

Publications

1. Ali M, Ashburn A, Bowen A, Brodie E, Corr S, Drummond A, Edmans J, Gladman J, Kalra L, Langhorne P, Lees KR, Lincoln N, Logan P, Mead G, Patchick E, Pollock A, Pomeroy V, Sackley C, Sunnerhagen KS, van Vliet P, Walker M, Brady M, On behalf of the VISTA-Rehab Investigators, VISTA-Rehab: A Resource for Stroke Rehabilitation Trials, International Journal of Stroke, 2010;5: 447–452.

2. Brady M, Reduce, Reuse, Recycle. International Journal of Stroke, 2010;5:421-2

3. Ali M, Hazelton C, Lyden P, Pollock A, Brady M, on behalf of the VISTA Collaboration, Recovery from Post-Stroke Visual Impairment: Evidence from a Clinical Trials Resource, JNNR 2013;27: 133-141

4. Ali M, English C, Bernhardt J, Sunnerhagen KS and Brady M on behalf of the VISTA-Rehab Collaboration. More Outcomes than Trials: A Call for Consistent Data Collection across Stroke Rehabilitation Trials. International Journal of Stroke, 2013; 8:18-24.

5. Ali M, More Outcomes than Trials: A Call for Consistent Data Collection across Stroke Rehabilitation Trials. International Journal of Stroke Podcast 2013, https://itunes.apple.com/ua/podcast/rehabilitation-edition-international/id610378155

VISTA-ICH

Message from the VISTA-ICH Chair

To date, VISTA-ICH has collated data from 3,232 individual patients.

Within this resource, we currently have 16 ongoing research projects and look forward to at least 2 new publications based on ongoing analyses in the coming months.

Further to establishment of the VISTA-ICH Scan Archive, a coordinating partnership has been set up between University of Glasgow and the Brain Injury Outcomes (BIOS) Centre at Johns Hopkins University. Dr Andrew Mould will coordinate access to VISTA-ICH Scans at BIOS, while coordination of the clinical datasets will remain at University of Glasgow.

We have collated scans from 4 trials so far; these scans are currently being optimized for external use. To date, we have facilitated one project using these ICH scans and look forward to many more.

We have also taken steps towards lodging and facilitating secure access to protocols and statistical analysis plans for ongoing ICH trials on the VISTA-ICH section of the website.

VISTA-ICH Founding Members

(L-R) D.F. Hanley, K.R. Lees, S. Davis

Dan Hanley
April 2016

Summary

3,232 Individual Anonymised Patient Records Available within VISTA-ICH

16 Ongoing Projects

9 Peer-Reviewed Publications based on novel analyses

17 Abstracts Presented at Conferences

Steering Committee

Name	Affiliation
K.R. Lees	Institutes of Cardiovascular and Medical Sciences, Faculty of Medicine, University of Glasgow, UK
D. Hanley	Division of Brain Injury Outcomes, The Johns Hopkins Medical Institutions, Baltimore, MD, USA
B. Gregson	Dept. of Neurosurgery, Newcastle University, Newcastle General Hospital, UK
P. Lyden	Cedars-Sinai Medical Center, Los Angeles, USA
K. Muir	Division of Clinical Neurosciences, University of Glasgow, Glasgow, UK
S. Mayer	Departments of Neurology and Neurosurgery, Columbia University College of Physicians and Surgeons, New York, USA
T. Steiner	Department of Neurology, University of Heidelberg, Germany
S. Davis	Department of Neurology, Royal Melbourne Hospital, University of Melbourne, Australia
K. Butcher	WMC Health Sciences Center, Edmonton, Alberta, Canada

Ongoing Research Titles

1. R. Al-Shahi Salman: Individual patient data meta-analysis of the occurrence and predictors of intracerebral haemorrhage growth
2. M. Florczak-Rzepka: Biomarkers of intracerebral hemorrhage
3. K. Krishnan: ICH and ethnicity.
4. T. Phan: An ordinal decision tree model for predicting outcome following ICH: data mining from the VISTA archives.
5. D. Parsons-Rich: Natural history, variability in outcomes and variation in standard of care of the ICH population, to inform sample size estimations.
6. T. Wu: Sulphonylureas and ICH.
7. A. Zandieh: Antiepileptic drugs in patients with spontaneous intracerebral hemorrhages
8. A. Parry-Jones: The oedema extension distance in intracerebral haemorrhage: association with baseline clinical characteristics and long-term outcome.
9. C. Anderson, D. Hanley, A. Parry-Jones, W. Ziai, Hematoma retraction in spontaneous intracerebral haemorrhage: incidence and association with perihematomal edema.

10. S. Murthy, Rate of perihematomal edema expansion predicts clinical outcomes in intracerebral haemorrhage.
11. A. Qureshi, Effect of active cigarette smoking on hematoma expansion and retraction in patients with intracerebral hemorrhage.
12. D. Dowlatshahi, Change from baseline to 24-hour NIHSS that best predicts outcome at 3 months in patients with ICH.
13. K. Hajjar, Cognitive outcome measures in ICH.
14. S. Mayer, Early Blood Pressure Dynamics and Outcomes (1) ICH volume growth, (2) PHE increase, and (3) three month outcome in Intracerebral Hemorrhage.
15. S. Yip, Perihaematomal oedema: a predictor of poor functional outcome on day 90 in ICH patients
16. W. Ziai, Hematoma retraction in spontaneous intracerebral hemorrhage: incidence and association with perihematomal edema.

Publications based on Novel Analyses

1. Weimar C, Ziegler A, Sacco RL, Diener HC, Ziegler A, Koenig IR on behalf of the VISTA Investigators. Predicting recovery after intracerebral hemorrhage – an external validation in patients from controlled clinical trials. J Neurol. 2009; 256:464–469
2. Dowlatshahi D, Demchuk A, Flaherty ML, Ali M, Lyden P, and Smith EE, on behalf of the VISTA Collaboration. Defining hematoma expansion in intracerebral hemorrhage: relationship with patient outcomes. Neurology 2011 doi: 10.1212/WNL.0b013e3182143317.
3. Dowlatshahi, D., Smith, E.E., Flaherty, M.L., Ali, M., Lyden, P., and Demchuk, A.M. (2011) Small intracerebral haemorrhages are associated with less haematoma expansion and better outcomes. International Journal of Stroke, 6 (3). pp. 201-206.
4. Ali M, Hazelton C, Lyden P, Pollock A, Brady M, on behalf of the VISTA Collaboration, Recovery from Post-Stroke Visual Impairment: Evidence from a Clinical Trials Resource, JNNR 2013 Feb;27(2):133-141
5. Ali M, Lyden P, Sacco RL, Shuaib A, Lees KR, for the VISTA investigators. Natural History of Complications after Intracerebral Haemorrhage. European Journal of Neurology; 2009: 16:624-630
6. Rincon F, Lyden P, and Mayer SA, on Behalf of VISTA Collaboration. Relationship between Temperature, Hematoma Growth, and Functional Outcome after Intracerebral Hemorrhage. Neurocritical Care 2012 (In Press).
7. Morgan TC, Dawson J, Spengler D, Lees KR, Aldrich C, Mishra NK, Lane L, Quinn TJ, Diener-West M, Weir CJ, Higgins P, Rafferty M, Kinsley K, Ziai W, Awad I, Walters MR, Hanley DF, for the CLEAR and VISTA Investigators. The Modified Graeb Score. An Enhanced Tool for Intraventricular Hemorrhage Measurement and Prediction of Functional Outcome. Stroke 2013; 44: 635-641.

8. Lord AS, Gilmore E, Choi HA, Mayer SA, on behalf of VISTA-ICH Collaboration, Time Course and Predictors of Neurological Deterioration after Intracerebral Hemorrhage, Stroke 2015 DOI: 10.1161/STROKEAHA.114.007704.
9. Murthy SB, Moradiya Y, Dawson J, Lees KR, Hanley DF, Ziai WC, for the VISTA ICH Collaborators, Perihematomal Edema is Associated with Worse Functional Outcomes in Small to Moderate Volume and Basal Ganglia Hematomas Following Supratentorial Intracerebral Hemorrhage, Stroke, DOI: 10.1161/STROKEAHA.115.010054

VISTA-Prevention

Message from the VISTA-Prevention Chair

Planned meta-analyses of data from anti-platelet trials are ongoing. Contribution of these trials to VISTA-Prevention expected soon after completion.

In the past year, VISTA-Prevention has seen the publication of its first paper (Arba et al). We have secured a collaborative partnership with Prof Bruce Ovbiagele to provide access to data from the VISP trial. We cannot currently accept transfer of data from VISP to VISTA as the representatives have since retired. Prof Ovbiagele has offered query the dataset on our behalf and provide access as and when necessary.

We look forward to the completion of the planned meta-analysis by Ale Algra, and the subsequent contribution of data to VISTA-Prevention.

Chris Diener
April 2016

VISTA-Prevention Founding Members

(L-R) H-C Diener, A. Algra, K.R. Lees.

Summary

10,116 Individual Anonymised Patient Records Available within VISTA-Prevention

6 Commitments to Contribute Data

2 Ongoing Project

1 Peer-reviewed publication

7 Abstracts Presented at Conferences

Steering Committee

Name	Affiliation
K.R. Lees	Institutes of Cardiovascular and Medical Sciences, Faculty of Medicine, University of Glasgow, UK
H.C. Diener	Department of Neurology, University Duisburg-Essen, Hufelandstrasse, Essen, Germany
S. Davis	Department of Neurology, Royal Melbourne Hospital, University of Melbourne, Australia
B. Ovbiagele	Department of Neurosciences, Medical University of South Carolina, USA
A. Algra	Utrecht Stroke Center, Department of Neurology, Rudolf Magnus Institute of Neuroscience and Julius Center for General Health Sciences and Primary Care, University Medical Center, Utrecht, Netherlands
G. Hankey	Stroke Unit, Department of Neurology, Royal Perth Hospital, Australia
C. Weir	Edinburgh Health Services Research Unit, Edinburgh University, UK

Ongoing Projects

1. F. Arba et al, “Predictors of cognitive impairment after stroke.”
2. F. Arba et al, “Natural history of cognitive impairment after stroke.”

Publications based on Novel Analyses

1. Arba F, Ali M, Quinn TJ, Hankey GJ, Lees KR, Inzitari D on behalf of the VISTA Collaboration. Lacunar Infarcts, Depression and Anxiety Symptoms One Year After Stroke, Journal of Stroke and Cerebrovascular Diseases, 2016, DOI: http://dx.doi.org/10.1016/j.jstrokecerebrovasdis.2015.12.018

VISTA-Plus

Message from the VISTA-Plus Chairs

Over the past 2 years, we have welcomed the contribution of trial data from SITS-MOST and IST-1. The latter comprises data from 19,435 patients with acute ischaemic stroke. We welcomed Prof. Peter Sandercock and Dr. Maciej Niewada to the VISTA-Plus Steering Committee as the representatives of this trial and look forward to the development of new research proposals to make use of these data.

Our focus is now shifting towards facilitating novel exploratory analyses of VISTA-Plus data. We currently have 1 ongoing project.

As always, we continue to look for opportunities to expand the archive with the contribution of further data.

Nils Wahlgren & Christian Weimar
April 2016

VISTA-Plus Founding Members

(L-R) N-G Wahlgren, C. Weimar, K.R. Lees.

Summary

35,884 Individual Anonymised Patient Records Available within VISTA-Plus

2 Completed Project

1 Ongoing Projects

9 Abstracts Presented at Conferences

Steering Committee

Name	Affiliation
K.R. Lees	Institutes of Cardiovascular and Medical Sciences, Faculty of Medicine, University of Glasgow, UK
H. Numinnen	Department of Clinical Neuroscience, Helsinki University Central Hospital, Helsinki, Finland
G. Tsivgoulis	School of Medicine, Democritus University of Thrace, Greece
C. Molina	Department of Neuroscience, Hospital Universitari Vall d'Hebron, Barcelona, Spain
N.G. Wahlgren	Karolinska Hospital, Stockholm, Sweden
S. Warach	Department of Neurology and Neurotherapeutics, UT Southwestern Medical Center, Austin, TX
C. Weimar	Department of Neurology, University Hospital Essen, University of Duisburg-Essen, Essen, Germany
P. Sandercock	Department of Clinical Neurosciences, University of Edinburgh, Department of Clinical Neurosciences, Western General Hospital, Edinburgh, UK
M. Niewada	Department of Clinical and Experimental Pharmacology, Warsaw Medical University, Poland; Department of Neurology, Institute of Psychiatry and Neurology, Warsaw, Poland

Ongoing Research Titles

1. Michel et al, “Extension and further validation of ASTRAL score's prognostic performance.”

Publications based on Novel Analyses

1. Flint AC, Gupta R, Smith WS, Kamel H, Faigeles BS, Cullen SP, Rao VA, Bath PM, Wahlgren N, Ahmed N, Donnan GA; SITS International and VISTA-plus investigators. The THRIVE score predicts symptomatic intracerebral hemorrhage after intravenous tPA administration in SITS-MOST. Int J Stroke. 2014 Aug;9(6):705-10.
2. Flint AC, Rao VA, Chan SL, Cullen SP, Faigeles BS, Smith WS, Bath PM, Wahlgren NG, Ahmed N, Donnan GA and Johnston SC on behalf of the SITS International and VISTA-Plus Investigators. International Journal of Stroke, 2015; DOI: 10.1111/ijs.12529

VISTA-Imaging

Message from the VISTA-Imaging Chair

VISTA-Imaging continues to expand and facilitate new research projects. VISTA-Imaging is collaborating with Texas Advanced Computing Center (TACC) to move forward with the development of imaging portals for STIR\VISTA Imaging.

The new STIR\VISTA Imaging website is
http://stir.tacc.utexas.edu

Steven J. Warach
April 2016

VISTA-Imaging Founding Members

(L-R) S. Warach, M. Wintermark

Summary

524 Individual Anonymised Patients Available within VISTA-Imaging

11 Ongoing Projects

11 Completed Projects

14 Peer-Reviewed Publications

11 Abstracts Presented at Conferences

Steering Committee

Name	Affiliation
G. W. Albers	Department of Neurology, Stanford University School of Medicine, Stanford, CA, USA
S. M. Davis	Departments of Medicine and Neurology, Melbourne Brain Centre at the Royal Melbourne Hospital, University of Melbourne, Parkville, Victoria, Australia
G. A. Donnan	Department of Medicine, The Florey Institute of Neuroscience and Mental Health, Melbourne, Australia
M. Fisher	Department of Neurology, University of Massachusetts Medical School, Worcester, MA, USA
A. J. Furlan	Department of Neurology, University Hospitals Case Medical Center, Case Western Reserve University, Cleveland, OH, USA
J. C. Grotta	Department of Neurology, University of Texas Health Science Center, Houston, TX, USA
W. Hacke	Department of Neurology, University of Heidelberg, Heidelberg, Germany
D.W Kang	Department of Neurology, Asan Medical Center, University of Ulsan College of Medicine, Seoul, South Korea
C. Kidwell	Department of Neurology and the Stroke Center, Georgetown University, Washington, DC, USA
W. Koroshetz	National Institute of Neurological Disorders and Stroke (NINDS), National Institutes of Health (NIH), Bethesda, MD, USA
K. R. Lees	Department of Medicine and Therapeutics, Institute of Cardiovascular and Medical Sciences, University of Glasgow, Western Infirmary, Glasgow, UK
M. H. Lev	Department of Radiology, Massachusetts General Hospital and Harvard Medical School, Boston, MA, USA
D. S. Liebeskind	Department of Neurology, UCLA Stroke Center, Los Angeles, CA, USA
A. G. Sorensen	Department of Radiology, Massachusetts General Hospital and Harvard Medical School, Boston, MA, USA
V. N. Thijs	Laboratory of Neurobiology, Vesalius Research Center, VIB, Experimental Neurology and Leuven Research Institute for Neuroscience and Disease (LIND), University of Leuven (KU Leuven), Department of Neurology, University Hospital Leuven, Leuven, Belgium
G. Thomalla	University Medical Center Hamburg, Eppendorf, Hamburg, Germany

S. J. Warach	Seton/UT Southwestern Clinical Research Institute of Austin, Department of Neurology and Neurotherapeutics, UT Southwestern Medical Center, Austin, TX, USA
J. M. Wardlaw	Department of Clinical Neurosciences, Brain Research Imaging Centre, Division of Neuroimaging Sciences, Centre for Clinical Brain Sciences, University of Edinburgh, Edinburgh, UK
M. Wintermark	Department of Radiology, Neuroradiology, University of Virginia, Charlottesville, VA & Department of Radiology, Centre Hospitalier Universitaire Vaudois (CHUV), Lausanne, Switzerland

Ongoing Research Titles

1. Prediction Neural Net (Bagher-Ebadian et al)
2. ACA digital map (Phan et al)
3. PREDICT-A Natural History Study (Vagal et al)
4. Predicting malignant edema in large MCA infarct (Shang et al)
5. Timing Stroke Onset using ADC, FLAIR, and PWI (Ford et al)
6. Development of Image Processing Tools (Warach et al)
7. Timing Stroke Onset using ADC, FLAIR, and PWI (Ford et al)
8. Association of Cerebral Blood Volume with Early FLAIR Hyper-intensity in Acute Ischemic Stroke (Nagaraja et al)
9. Small vessel disease and stroke outcomes (Arba et al)
10. The effect of small vessel disease on radiological features after acute ischaemic stroke (Arba et al) 11. Small vessel disease and baseline Blood Brain Barrier permeability in acute ischaemic stroke before intravenous thrombolysis (Arba et al)
11. MISSION – MRI for Stroke Stratification: A Multi-Modal MRI Tool for Stroke Treatment Stratification Based on Multicenter Stroke data (Livne\Sobesky et al)

Publications

1. Thomalla G, Cheng B, Ebinger M, Hao Q, Tourdias T, Wu O, Kim JS, Breuer L, Singer OC, Warach S, Christensen S, Treszl A, Forkert ND, Galinovic I, Rosenkranz M, Engelhorn T, Köhrmann M, Endres M, Kang DW, Dousset V, Sorensen AG, Liebeskind DS, Fiebach JB, Fiehler J, Gerloff C; STIR and VISTA Imaging Investigators. DWI-FLAIR mismatch for the identification of patients with acute ischaemic stroke within 4·5 h of symptom onset (PRE-FLAIR): a multicentre observational study. Lancet Neurol. 2011 Nov;10(11):978-86.
2. Cheng B, Ebinger M, Kufner A, Köhrmann M, Wu O, Kang DW, Liebeskind D, Tourdias T, Singer OC, Christensen S, Warach S, Luby M, Fiebach JB, Fiehler J, Gerloff C, Thomalla G; Stroke Imaging Repository (STIR) Investigators. Hyperintense vessels on acute stroke fluid-attenuated inversion recovery imaging: associations with clinical and other MRI findings. Stroke. 2012 Nov;43(11):2957-61.
3. Kudo K, Christensen S, Sasaki M, Ostergaard L, Shirato H, Ogasawara K, Wintermark M, Warach S; For the Stroke Imaging Repository (STIR) Investigators, Accuracy and Reliability Assessment of CT and MR Perfusion Analysis Software Using a Digital Phantom. Radiology. 2012 267(1):201-11.
4. Cheng B, Brinkmann M, Forkert ND, Treszl A, Ebinger M, Köhrmann M, Wu O, Kang DW, Liebeskind DS, Tourdias T, Singer OC, Christensen S, Luby M, Warach S, Fiehler J, Fiebach

JB, Gerloff C, Thomalla G, on behalf of the STIR and VISTA Imaging Investigators. Quantitative measurements of relative fluid-attenuated inversion recovery (FLAIR) signal intensities in acute stroke for the prediction of time from symptom onset. J Cereb Blood Flow Metab. 2013 Jan;33(1):76-84.

5. Scalzo F, Alger JR, Saver JL, Dani KA, Muir KW, Demchuk AM, Coutts SB, Luby M, Liebeskind DS, on behalf of the STIR and VISTA Imaging Investigators. Multi-center prediction of hemorrhagic transformation in acute ischemic stroke using permeability imaging features. Magn Reson Imaging. 2013 Jul;31(6):961-9.
6. Wintermark M, Warach SJ, on behalf of the STIR and VISTA Imaging Investigators. Acute stroke imaging research roadmap II and international survey of acute stroke imaging capabilities: we need your help! AJNR 2013 Sep;34(9):1671.
7. Wintermark M, Albers GW, Broderick JP, Demchuk AM, Fiebach JB, Fiehler J, Grotta JC, Houser G, Jovin TG, Lees KR, Lev MH, Liebeskind DS, Luby M, Muir KW, Parsons MW, von Kummer R, Wardlaw JM, Wu O, Yoo AJ, Alexandrov AV, Alger JR, Aviv RI, Bammer R, Baron JC, Calamante F, Campbell BC, Carpenter TC, Christensen S, Copen WA, Derdeyn CP, Haley EC Jr, Khatri P, Kudo K, Lansberg MG, Latour LL, Lee TY, Leigh R, Lin W, Lyden P, Mair G, Menon BK, Michel P, Mikulik R, Nogueira RG, Ostergaard L, Pedraza S, Riedel CH, Rowley HA, Sanelli PC, Sasaki M, Saver JL, Schaefer PW, Schellinger PD, Tsivgoulis G, Wechsler LR, White PM, Zaharchuk G, Zaidat OO, Davis SM, Donnan GA, Furlan AJ, Hacke W, Kang DW, Kidwell C, Thijs VN, Thomalla G, Warach SJ, on behalf of the STIR and VISTA Imaging Investigators. Acute Stroke Imaging Research Roadmap II. Stroke. 2013 Sep;44(9):2628-39.
8. Wintermark M, Albers GW, Broderick JP, Demchuk AM, Fiebach JB, Fiehler J, Grotta JC, Houser G, Jovin TG, Lees KR, Lev MH, Liebeskind DS, Luby M, Muir KW, Parsons MW, von Kummer R, Wardlaw JM, Wu O, Yoo AJ, Alexandrov AV, Alger JR, Aviv RI, Bammer R, Baron JC, Calamante F, Campbell BC, Carpenter TC, Christensen S, Copen WA, Derdeyn CP, Haley EC Jr, Khatri P, Kudo K, Lansberg MG, Latour LL, Lee TY, Leigh R, Lin W, Lyden P, Mair G, Menon BK, Michel P, Mikulik R, Nogueira RG, Ostergaard L, Pedraza S, Riedel CH, Rowley HA, Sanelli PC, Sasaki M, Saver JL, Schaefer PW, Schellinger PD, Tsivgoulis G, Wechsler LR, White PM, Zaharchuk G, Zaidat OO, Davis SM, Donnan GA, Furlan AJ, Hacke W, Kang DW, Kidwell C, Thijs VN, Thomalla G, Warach SJ, on behalf of the STIR and VISTA Imaging Investigators. Acute Stroke Imaging Research Roadmap II. AJNR. 2013 Sep;34(9):e113.
9. Artzi M, Aizenstein O, Jonas-Kimchi T, Bornstein N, Shopin L, Hallevi H, Ben Bashat D, on behalf of the STIR and VISTA Imaging Investigators Classification of Lesion Area in Stroke Patients During the Subacute Phase: A Multiparametric MRI Study. Magn Reson Med. 2013 Nov 14. DOI: 10.1002/mrm.25031.
10. Leigh R, Jen SS, Hillis AE, Krakauer JW, Barker PB, on behalf of the STIR and VISTA Imaging Investigators. Pretreatment Blood Brain Barrier Damage and Post Treatment Intracranial Hemorrhage in Patients Receiving IV tPA. Stroke. 2014 Jul;45:2030-2035.
11. Schröder J, Cheng B, Ebinger M, Köhrmann M, Wu O, Kang DW, Liebeskind DS, Tourdias T, Singer OC, Christensen S, Campbell B, Luby M, Warach S, Fiehler JB, Gerloff C, Thomalla G, STIR and VISTA Imaging Investigators. Validity of acute stroke lesion volume estimation by diffusion-weighted imaging-Alberta Stroke Program Early Computed Tomographic Score depends on lesion location in 496 patients with middle cerebral artery stroke. Stroke. 2014 Dec;45:3583-8.
12. Rekik I, Allasonniére S, Luby M, Carpenter TK, Wardlaw JM. Phase-based metamorphosis of diffusion lesion in relation to perfusion values in acute ischemic stroke. Neuroimage Clin. 2015 Aug;9:44-9.
13. Luby M, Warach SJ, Albers GW, Baron JC, Cognard C, Dávalos A, Donnan GA, Fiebach JB, Fiehler J, Hacke W, Lansberg MG, Liebeskind DS, Mattle HP, Oppenheim C, Schellinger PD,

Wardlaw JM, Wintermark M. Identification of imaging selection patterns in acute ischemic stroke patients and the influence on treatment and clinical trial enrollment decision making. Int J Stroke. 2016 Feb;11:180-90.

14. Warach SJ, Luby M, Albers GW, Bammer R, Bivard A, Campbell BCV, Derdeyn C, Heit JJ, Khatri P, Lansberg MG, Liebeskind DS, Majoie CBLM, Marks MP, Menon BK, Muir KW, Parsons MW, Vagal A, Yoo AJ, Alexandrov AV, Baron J-C, Fiorella DJ, Furlan AJ, Puig J, Schellinger PD, Wintermark M. Acute Stroke Imaging Research Roadmap III imaging selection and outcomes in acute stroke reperfusion clinical trials. Stroke. 2016 May. in press.

Future Directions

Transition of STIR\VISTA-Imaging to Seton (Austin, TX) from NIH\NINDS is completed. The new website is http://stir.tacc.utexas.edu. We welcome the contribution of new trials and datasets to the resource.

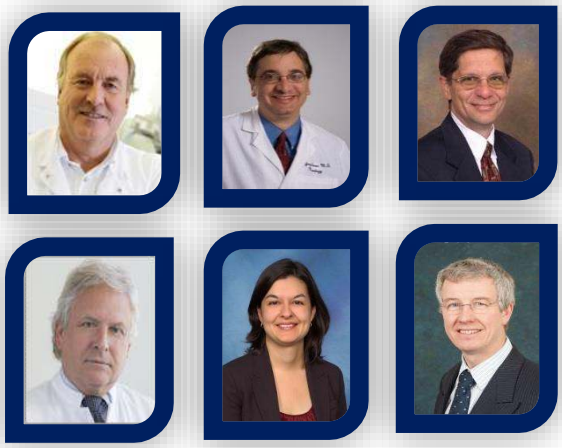
VISTA-Endovascular

Message from the VISTA-Endovascular Chair

VISTA-Endovascular was launched in early 2013 as a repository for trials involving endovascular approaches to stroke treatment. Our collaborators in academia and industry indicated a willingness to contribute data. By this time last year, we had secured commitments from BASICS, DAWN. ESCAPE, EXTEND-IA, IMS III, MR CLEAN, MR RESCUE, PISTE, POSITIVE, RESILIENT, REVASCAT, SWIFT-PRIME, SYNTHESIS, THERAPY, THRACE, and THRILL trialists.

At present, datasets have been received from IMS III, MR RESCUE, SYNTHESIS, EXTEND-IA, THERAPY, and REVASCAT. Among completed trials, we are still awaiting datasets from PISTE (recently reported); and from MR CLEAN, ESCAPE, SWIFT-PRIME as soon as HERMES analyses of the solitaire device are complete: although not announced before the flood of positive trial results, a company-sponsored analysis of thrombectomy data was an unforeseen prelude to full data sharing and independent analysis. This selective analysis was recently published by Goyal et al (Lancet. 2016; published online Feb 18.http://dx.doi.org/10.1016/S0140-6736 (16)00163-X).

VISTA-Endovascular Founding Members



(L-R) W. Hacke, J. Saver, J. Broderick, H-C Diener, P. Khatri, K.R. Lees

Dr David Liebeskind continues as the liaison between VISTA-Imaging and VISTA-Endovascular and Dr Pooja Khatri continues to coordinate the TREAT analysis.

The last year transformed the position of endovascular treatment of acute stroke. Guidelines have fully accepted the role of thrombectomy, and questions are now about nuances of selection rather than the general principle. Data sharing and transparency will continue to have an important role and so we expect that activities of VISTA-Endovascular will increase considerably. Our second paper was published in International Journal of Stroke: MacIsaac et al (International Journal of Stroke 10, no. A100; 2015: 136-144) and issues pertinent to VISTA-Endovascular were discussed at the STAIR IX Conference: Lees and Khatri for the STAIR Participants (Stroke, in press).

Werner Hacke & Kennedy R. Lees
April 2016

VISTA-Cognition

Message from the VISTA-Cognition Chairs

The VISTA-Cognition resource continues to grow and we are thankful to all the collaborators and colleagues who have submitted data. We now have individual level cognitive or mood data on 2,422 patients. Of course, we would welcome more data and we are keen to hear from teams who have stroke cohorts with post-stroke cognitive or mood assessments and/or data describing clinical diagnosis of a recognized psychological syndrome.

The importance of post stroke psychological problems is increasingly recognised and we look forward to the VISTA-Cognition resource producing important new findings in the field. We are working with various research teams who wish to use the resource to answer new research questions and we hope to see the first VISTA-Cognition papers published soon.

Martin Dichgans & Terry Quinn
April 2016

VISTA-Cognition Founding Members

(L-R) T.J. Quinn, M. Dichgans, K.R. Lees.

Summary

2,422 Individual Anonymised Patient Records Available within VISTA-Cognition

8 Studies Contributed

2 Conference Presentations

1 Submitted Publication

5 Expressions of interest to contribute data

Steering Committee

Name	Affiliation
T.J. Quinn	Institutes of Cardiovascular and Medical Sciences University of Glasgow
M. Dichgans	Institute for Stroke and Dementia Research German Center for Neurodegenerative Diseases (DZNE)
K.R. Lees	Institutes of Cardiovascular and Medical Sciences, University of Glasgow, UK
G.W. Humphreys	Cognitive Neuropsychology Centre, Dept of Experimental Psychology, South Parks Road, Oxford
N. DeMeyere	Cognitive Neuropsychology Centre, Dept of Experimental Psychology, South Parks Road, Oxford
A. Wong	Prince of Wales Hospital, Shatin, New Territories, Hong Kong
V. Mok	Prince of Wales Hospital, Shatin, New Territories, Hong Kong

Submitted Publications

1. Doubal FN, Ali M, Batty DG, Charidimou A, Eriksdotter M, Levine DA, Hoffmann-Apitius M, Kim Y-H, Mead G, Ritchie C, Mucke H, Russ TC, Stewart R, Whiteley W, Quinn TJ, Position Statement on Big data and data repurposing: Using existing data to answer new questions in vascular dementia research, Submitted to BMC Open 2015

Conference Presentations

1. Quinn TJ, Ali M, Lees KR, Demeyere N, Humphreys GW, Dichgans M, on behalf of the VISTA-Cognition Steering Committee, Development of an International Resource for Cognition and Mood Data in Stroke, Poster Presentation at UK Stroke Forum, Liverpool, UK, 2015
2. T.J. Quinn, M. Ali, K.R. Lees, N. Demeyere, GW Humphreys, M. Dichgans, on behalf of the VISTA-Cognition Steering Committee, Using Completed Trial Datasets for New Purposes: The VISTA Resources, International Congress on Vascular Dementia, Ljubljana, Slovenia, 2015

VISTA-StemCells

Message from the VISTA-StemCells Chair

We are pleased to announce the development of VISTA-StemCells. We aim for this archive to be inclusive. Target studies could include RCTs of exogenous stem cell transplantation, RCTs of cultured MSCs, RCTs of mobilisation of endogenous stem cells and natural history/ observational studies that include patients likely to be in the target group for stem cells studies. Further details on this archive will be made available as and when development plans a solidified.

Philip Bath
April 2016

Opportunities for Collaboration

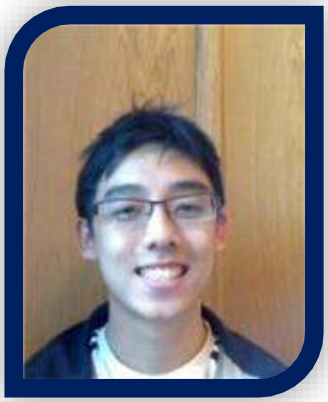
Undergraduate & Postgraduate Study

VISTA provides students with a unique opportunity to be part of an international research collaboration by carrying out a single or group of projects within the resource. Both undergraduate and postgraduate students can have access to a wealth of expertise provided by the Steering Committee members, who review and offer guidance on proposal and subsequent manuscripts. Statistical expertise is provided by a dedicated VISTA Biostatistician. VISTA has provided undergraduate students with their first taste of stroke research and has facilitated in depth studies that have contributed to doctoral theses. We encourage the submission of projects by such students across the VISTA network and welcome the involvement of all participating institutions in research exchanges.

Testimonials

Jia Wei Tan (2012-2013)

What were your experiences as a student on a VISTA Project?



I learnt about the strengths and weaknesses of retrospective data analyses, as well as the different statistical methods involved in the process. I learnt about the importance of evidence-based medicine and was able to appreciate the role clinical trials play in contributing to better health care.

What are your plans for the future?

I intend to pursue a career in interventional radiology and continue to involve research in my everyday work.

Kerrick Wei Xian Hesse (2013-2014)

What were your experiences as a student on a VISTA Project?

Taking on a VISTA project provided an opportunity very different to studying clinical medicine. It involved taking responsibility for a research project and deciding what direction to take with it. This was probably the biggest challenge, but also the most fulfilling part of the work. I learnt skills including academic writing skills, conducting systematic searches and using statistical software packages. I also got to work alongside people with different personalities and fields of expertise, collaborating to create a polished product. In the end, the year was a hugely positive experience and the greatest reward was seeing my work in a published format.

What are your plans for the future?

After completing some additional research projects, I will finish my final two years of medical school at the University of Glasgow.

Nishant Kumar Mishra (PhD 2008-2011)

What were your experiences as a VISTA PhD student?

I had a wonderful experience of working in Glasgow in the mentorship of Professor Kennedy Lees. I joined the University of Glasgow in 2008 for a PhD after finishing a Stroke fellowship in Lausanne and stroke neurology training in Mumbai. For my training in Glasgow, I was awarded various scholarships from the University of Glasgow, the ORSAS of the British Government, and the European Stroke Organization. Professor Kennedy Lees and I worked closely on several research projects using the VISTA resources. We collaborated locally and globally, and we were able to answer various important research questions. Professor Lees trained me in applying rigorous research methods to answer simple but important clinical research questions. This would not have been possible without the access to the VISTA.

What are you doing now?

I am working at Stanford University. We are studying the use of perfusion imaging for patient selection for the reperfusion therapy.

What are your plans for the future?

In the future, I see myself running a stroke research group in a clinical department at a University setting.

Visiting Fellows

Benedikt Frank

What were your experiences as a VISTA Visiting Fellow?

Kindness, helpfulness, professional support and a wild countryside are the first words that come to my mind when I think of my 10 month in Glasgow. As a result of a perfect supervision, I got an optimal insight into the work with a big database.

As I was additionally gained the opportunity to take part at the ward rounds on the stroke unit and to work clinically in the stroke outpatient clinic at the Western-Infirmary Glasgow, there aroused numerous discussions with my colleagues in which we formulated clinically interesting scientific questions. I received plenty support to conceptualise the corresponding analysis-plans. After circulation of the proposals around the VISTA steering committee and after implementing their constructive and helpful advices, I could perform under close statistical supervision the required analyses. I hereby obtained a deep insight into programming with SAS. Finally, I was guided to draft scientifically sound manuscripts.

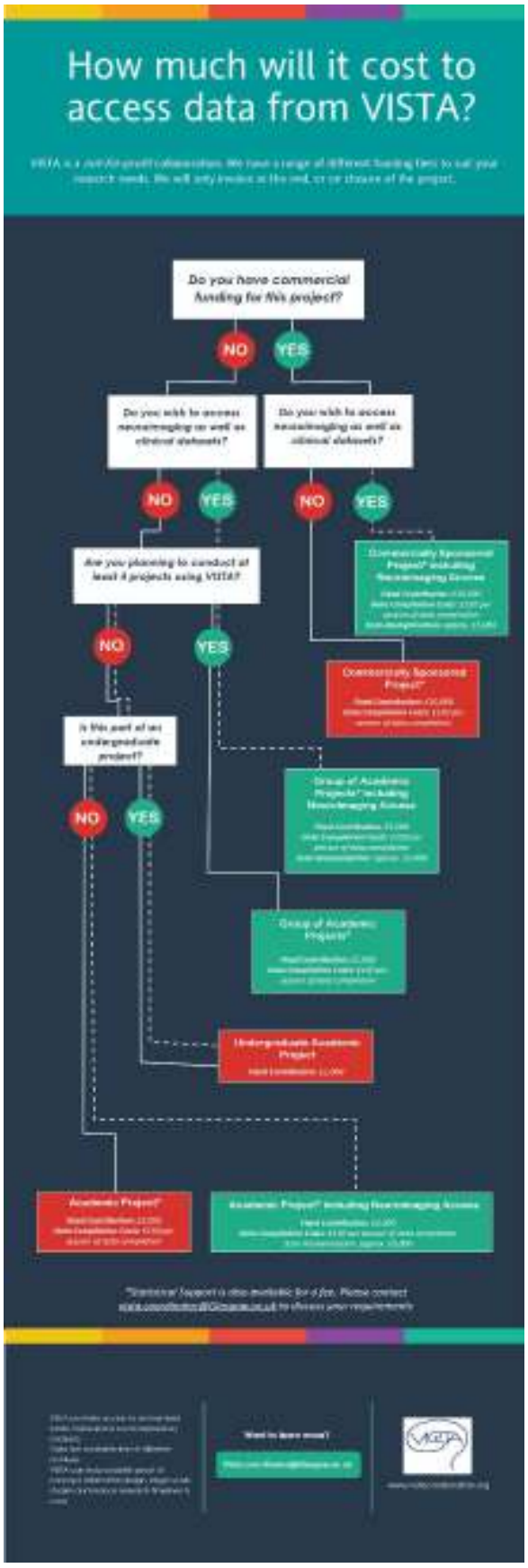
What are you doing now?

After these 10 month in Glasgow I returned to my former hospital, the University Clinic of Essen in Germany. Currently, I am completing my clinical training in the department of Neurology in the electrophysiology- and doppler/duplex-laboratory. Scientifically, I work on the management of novel oral anticoagulants as primary and secondary prevention.

What are your plans for the future?

I will keep on trying to combine my clinical and scientific ambitions.

VISTA Fee Structure



General VISTA Publications

1. Ali M, Bath PMW, Curram J, Davis SM, Diener HC, Donnan GA, Fisher M, Gregson BA, Grotta JC, Hacke W, Hennerici MG, Hommel M, Kaste M, Marler JR, Sacco R, Teal P, Wahlgren NG, Warach S, Weir CJ and Lees KR. The Virtual International Stroke Trials Archive. Stroke 2007;38:1905-1910.
2. Diener HC, Weimar C, Ali M, Lees KR, Die virtuelle internationale Schlaganfallstudien-Archiv (VISTA) – Bedeutung für die Schlaganfallforschung, Akt Neurol 2009;36:174-179Weimar C, Ali M, Lees KR, Donnan GA, Diener HC, for the VISTA Steering Committee. The Virtual International Stroke Trials Archive (VISTA) – Results and impact on future stroke trials and management of stroke patients. International Journal of Stroke 2010; 5: 103-109.
3. Weimar C, Ali M, Lees KR, Donnan GA, Diener HC, for the VISTA Steering Committee. The Virtual International Stroke Trials Archive (VISTA) – Results and impact on future stroke trials and management of stroke patients. International Journal of Stroke 2010; 5: 103-109.
4. Ali M, Bath P, Brady M, Davis S, Diener H-C, Donnan G, Fisher M, Hacke W, Hanley DF, Luby M, Tsivgoulis G, Wahlgren N, Warach S, Lees KR, on behalf of the VISTA Steering Committees, Development, Expansion and Use of a Stroke Clinical Trials Resource for Novel Exploratory Analyses, International Journal of Stroke 2012;7: 133-138

VISTA General Information

Data Access Procedure

Anonymised data can be accessed by submitting a proposal via the "Data Request" link on the VISTA website (www.vistacollaboration.org). The proposal will be reviewed by the relevant VISTA Steering Committee. Following approval, the anonymised analysis dataset will be compiled and made available through the VISTA Analysis Platform.

For general information on a particular resource, or to ascertain the feasibility of a proposed project within VISTA, please contact the relevant coordinator; details are available in the next section.

Data Contribution Procedure

Data from stroke studies can be contributed through the "Data Contribution" link on the VISTA website (www.vistacollaboration.org). Anonymised data, accompanying data documentation and nominations of Steering Committee members to represent the study can be uploaded directly via this link.

Websites

VISTA: www.vistacollaboration.org

VICCTA www.viccta.org

VISTA-Imaging: https://stir.seton.org

Email Addresses

Acute: vista.acute@glasgow.ac.uk

Rehab: vista.rehab@glasgow.ac.uk / Myzoon.ali@gcu.ac.uk

ICH: vista.ich@glasgow.ac.uk

VISTA-ICH Scans: wmould1@jhmi.edu

Prevention: vista.prevention@glasgow.ac.uk

Plus: vista.plus@glasgow.ac.uk

Endovascular: vista.endovascular@glasgow.ac.uk

Cognition: vista.cognition@glasgow.ac.uk

Imaging: mlluby@seton.org

Coordinator: vista.collaboration@glasgow.ac.uk/ Myzoon.ali@glasgow.ac.uk

Statistician: Rachael.macisaac@glasgow.ac.uk

VICCTA Fellow: Azmil.Abdul-Rahim@glasgow.ac.uk

VISTA/VICCTA Coordinator

VISTA/VICCTA Biostatistician

VISTA-Imaging Coordinator

VICCTA Fellow