

# SCIENTIFIC REPORTS

## OPEN Publisher Correction: Telomerecat: A ploidy-agnostic method for estimating telomere length from whole genome sequencing data

Published online: 03 September 2018

James H. R. Farmery<sup>1</sup>, Mike L. Smith<sup>2</sup>, NIHR BioResource - Rare Diseases\* & Andy G. Lynch <sup>1,3</sup>

Correction to: *Scientific Reports* <https://doi.org/10.1038/s41598-017-14403-y>, published online 22 January 2018

The original version of this Article contained a typographical error in the spelling of the consortium member Patrick Yu-Wai-Man which was incorrectly given as Patrick Yu Wai Man.

In addition, a supplementary file containing additional algorithms and analysis was omitted from the original version of this Article.

These errors have now been corrected in the HTML and PDF versions of the Article.



**Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this license, visit <http://creativecommons.org/licenses/by/4.0/>.

© The Author(s) 2018

<sup>1</sup>Cancer Research UK Cambridge Institute, University of Cambridge, Li Ka Shing Centre, Robinson Way, Cambridge, CB2 0RE, UK. <sup>2</sup>European Molecular Biology Laboratory (EMBL), Genome Biology Unit, 69117, Heidelberg, Germany. <sup>3</sup>School of Mathematics and Statistics/School of Medicine, University of St Andrews, St Andrews, Fife, KY16 9SS, UK. \*A comprehensive list of consortium members appears at the end of the paper. Correspondence and requests for materials should be addressed to J.H.R.F. (email: [henry.farmery@cruk.cam.ac.uk](mailto:henry.farmery@cruk.cam.ac.uk))

## Consortia NIHR BioResource - Rare Diseases

Aarnoud Huissoon<sup>4</sup>, Abigail Furnell<sup>5</sup>, Adam Mead<sup>6,7</sup>, Adam P. Levine<sup>8</sup>, Adnan Manzur<sup>9</sup>, Adrian Thrasher<sup>9,10</sup>, Alan Greenhalgh<sup>11</sup>, Alasdair Parker<sup>12</sup>, Alba Sanchis-Juan<sup>5</sup>, Alex Richter<sup>13</sup>, Alice Gardham<sup>9</sup>, Allan Lawrie<sup>14</sup>, Aman Sohal<sup>15</sup>, Amanda Creaser-Myers<sup>14</sup>, Amy Frary<sup>5</sup>, Andreas Greinacher<sup>16</sup>, Andreas Themistocleous<sup>7</sup>, Andrew J. Peacock<sup>17</sup>, Andrew Marshall<sup>18</sup>, Andrew Mumford<sup>19,20</sup>, Andrew Rice<sup>21</sup>, Andrew Webster<sup>22,23</sup>, Angie Brady<sup>24</sup>, Ania Koziell<sup>25</sup>, Ania Manson<sup>12</sup>, Anita Chandra<sup>12</sup>, Anke Hensiek<sup>12</sup>, Anna Huis in't Veld<sup>26</sup>, Anna Maw<sup>12</sup>, Anne M. Kelly<sup>12</sup>, Anthony Moore<sup>22,23</sup>, Anton Vonk Noordegraaf<sup>26</sup>, Antony Attwood<sup>5</sup>, Archana Herwadkar<sup>18</sup>, Ardi Ghofrani<sup>27</sup>, Arjan C. Houweling<sup>26</sup>, Barbara Girerd<sup>28</sup>, Bruce Furie<sup>29</sup>, Carmen M. Treacy<sup>30</sup>, Carolyn M. Millar<sup>21,31</sup>, Carrock Sewell<sup>32</sup>, Catherine Roughley<sup>33</sup>, Catherine Titterton<sup>5</sup>, Catherine Williamson<sup>34</sup>, Charaka Hadinnapola<sup>30</sup>, Charu Deshpande<sup>25</sup>, Cheng-Hock Toh<sup>35</sup>, Chiara Bacchelli<sup>10</sup>, Chris Patch<sup>25</sup>, Chris Van Geet<sup>36</sup>, Christian Babbs<sup>6,7</sup>, Christine Bryson<sup>5</sup>, Christopher J. Penkett<sup>5</sup>, Christopher J. Rhodes<sup>37</sup>, Christopher Watt<sup>5</sup>, Claire Bethune<sup>38</sup>, Claire Booth<sup>10</sup>, Claire Lentaigne<sup>21,31</sup>, Coleen McJannet<sup>5</sup>, Colin Church<sup>17</sup>, Courtney French<sup>5,12</sup>, Crina Samarghitean<sup>5</sup>, Csaba Halmagyi<sup>5</sup>, Daniel Gale<sup>23</sup>, Daniel Greene<sup>5,39,40</sup>, Daniel Hart<sup>41</sup>, David Allsup<sup>42</sup>, David Bennett<sup>6,7</sup>, David Edgar<sup>43</sup>, David G. Kiely<sup>14</sup>, David Gosal<sup>18</sup>, David J. Perry<sup>12</sup>, David Keeling<sup>44</sup>, David Montani<sup>28</sup>, Debbie Shipley<sup>11</sup>, Deborah Whitehorn<sup>5</sup>, Debra Fletcher<sup>5</sup>, Deepa Krishnakumar<sup>12</sup>, Detelina Grozeva<sup>45</sup>, Dinakantha Kumararatne<sup>12</sup>, Dorothy Thompson<sup>9</sup>, Dragana Josifova<sup>25</sup>, Eamonn Maher<sup>5,12</sup>, Edwin K. S. Wong<sup>46</sup>, Elaine Murphy<sup>47</sup>, Eleanor Dewhurst<sup>35</sup>, Eleni Louka<sup>6,7</sup>, Elisabeth Rosser<sup>9</sup>, Elizabeth Chalmers<sup>48</sup>, Elizabeth Colby<sup>20</sup>, Elizabeth Drewe<sup>49</sup>, Elizabeth McDermott<sup>49</sup>, Ellen Thomas<sup>25</sup>, Emily Staples<sup>5,12</sup>, Emma Clement<sup>9</sup>, Emma Matthews<sup>50</sup>, Emma Wakeling<sup>24</sup>, Eric Oksenhendler<sup>51</sup>, Ernest Turro<sup>5,39,40</sup>, Evan Reid<sup>5,12</sup>, Evangeline Wassmer<sup>15</sup>, F. Lucy Raymond<sup>5,12</sup>, Fengyuan Hu<sup>5</sup>, Fiona Kennedy<sup>17</sup>, Florent Soubrier<sup>52</sup>, Frances Flinter<sup>25</sup>, Gabor Kovacs<sup>53</sup>, Gary Polwarth<sup>54</sup>, Gautum Ambegaonkar<sup>12</sup>, Gavin Arno<sup>22,23</sup>, Gavin Hudson<sup>5,12</sup>, Geoff Woods<sup>5,12</sup>, Gerry Coghlan<sup>55</sup>, Grant Hayman<sup>56</sup>, Gururaj Arumugakani<sup>57</sup>, Gwen Schotte<sup>26</sup>, H. Terry Cook<sup>58</sup>, Hana Alachkar<sup>18</sup>, Hana Lango Allen<sup>5</sup>, Hana Lango-Allen<sup>5</sup>, Hannah Stark<sup>5</sup>, Hans Stauss<sup>55</sup>, Harald Schulze<sup>59</sup>, Harm J. Boggard<sup>26</sup>, Helen Baxendale<sup>54</sup>, Helen Dolling<sup>5</sup>, Helen Firth<sup>12</sup>, Henning Gall<sup>27</sup>, Henry Watson<sup>60</sup>, Hilary Longhurst<sup>7</sup>, Hugh S. Markus<sup>5,12</sup>, Hugh Watkins<sup>6,7</sup>, Ilenia Simeoni<sup>5</sup>, Ingrid Emmerson<sup>62</sup>, Irene Roberts<sup>6,7</sup>, Isabella Quinti<sup>63</sup>, Ivy Wanjiku<sup>37</sup>, J. Simon R. Gibbs<sup>64</sup>, James Thaventhiran<sup>5</sup>, James Whitworth<sup>5,12</sup>, Jane Hurst<sup>9</sup>, Janine Collins<sup>61</sup>, Jay Suntharalingam<sup>65</sup>, Jeanette Payne<sup>66</sup>, Jecko Thachil<sup>67</sup>, Jennifer M. Martin<sup>30</sup>, Jennifer Martin<sup>5</sup>, Jenny Carmichael<sup>12</sup>, Jesmeen Maimaris<sup>10</sup>, Joan Paterson<sup>12</sup>, Joanna Pepke-Zaba<sup>54</sup>, Johan W. M. Heemskerk<sup>68</sup>, Johanna Gebhart<sup>69</sup>, John Davis<sup>5</sup>, John Pasi<sup>61</sup>, John R. Bradley<sup>12</sup>, John Wharton<sup>37</sup>, Jonathan Stephens<sup>5</sup>, Julia Rankin<sup>70</sup>, Julie Anderson<sup>5</sup>, Julie Vogt<sup>15</sup>, Julie von Ziegenweldt<sup>5</sup>, Karola Rehnstrom<sup>5</sup>, Karyn Megy<sup>5</sup>, Kate Talks<sup>71</sup>, Kathelijne Peerlinck<sup>36</sup>, Katherine Yates<sup>30</sup>, Kathleen Freson<sup>36</sup>, Kathleen Stirrups<sup>5</sup>, Keith Gomez<sup>23,72</sup>, Kenneth G. C. Smith<sup>5,12</sup>, Keren Carss<sup>5</sup>, Kevin Rue-Albrecht<sup>37</sup>, Kimberley Gilmour<sup>10</sup>, Larahmie Masati<sup>37</sup>, Laura Scelsi<sup>73</sup>, Laura Southgate<sup>34</sup>, Lavanya Ranganathan<sup>37</sup>, Lionel Ginsberg<sup>55</sup>, Lisa Devlin<sup>43</sup>, Lisa Willcocks<sup>12</sup>, Liz Ormondroyd<sup>6,7</sup>, Lorena Lorenzo<sup>61</sup>, Lorraine Harper<sup>74</sup>, Louise Allen<sup>12</sup>, Louise Daugherty<sup>5</sup>, Manali Chitre<sup>12</sup>, Manju Kurian<sup>10</sup>, Marc Humbert<sup>28</sup>, Marc Tischkowitz<sup>5,12</sup>, Maria Bitner-Glindzicz<sup>9</sup>, Marie Erwood<sup>5</sup>, Marie Scully<sup>47</sup>, Marijke Veltman<sup>5</sup>, Mark Caulfield<sup>75</sup>, Mark Layton<sup>31</sup>, Mark McCarthy<sup>7</sup>, Mark Ponsford<sup>76</sup>, Mark Toshner<sup>54</sup>, Marta Bleda<sup>5,30</sup>, Martin Wilkins<sup>37</sup>, Mary Mathias<sup>77</sup>, Mary Reilly<sup>50</sup>, Maryam Afzal<sup>20</sup>, Matthew Brown<sup>5</sup>, Matthew Rondina<sup>78</sup>, Matthew Stubbs<sup>21,31</sup>, Matthias Haimel<sup>5,30</sup>, Melissa Lees<sup>9</sup>, Michael A. Laffan<sup>21,31</sup>, Michael Browning<sup>79</sup>, Michael Gattens<sup>12</sup>, Michael Richards<sup>57</sup>, Michel Michaelides<sup>22,23</sup>, Michele P. Lambert<sup>80,81</sup>, Mike Makris<sup>82</sup>, Minka De Vries<sup>83</sup>, Mohamed Mahdi-Rogers<sup>84</sup>, Moin Saleem<sup>20</sup>, Moira Thomas<sup>85</sup>, Muriel Holder<sup>25</sup>, Mélanie Eyries<sup>52</sup>, Naomi Clements-Brod<sup>5</sup>, Natalie Canham<sup>24</sup>, Natalie Dormand<sup>86</sup>, Natalie Van Zuydam<sup>7</sup>, Nathalie Kingston<sup>5</sup>, Neeti Ghali<sup>24</sup>, Nichola Cooper<sup>31</sup>, Nicholas W. Morrell<sup>5,12</sup>, Nigel Yeatman<sup>61</sup>, Noémi Roy<sup>6,7</sup>, Olga Shamardina<sup>5</sup>, Omid S. Alavijeh<sup>8</sup>, Paolo Gresele<sup>87</sup>, Paquita Nurden<sup>88</sup>, Patrick Chinnery<sup>5,12</sup>, Patrick Deegan<sup>12</sup>, Patrick Yong<sup>89</sup>, Patrick Yu-Wai-Man<sup>5,12</sup>, Paul A. Corris<sup>11</sup>, Paul Calleja<sup>5</sup>, Paul Gissen<sup>9,23</sup>, Paula Bolton-Maggs<sup>90</sup>, Paula Rayner-Matthews<sup>5</sup>, Pavandeep K. Ghataorhe<sup>37</sup>, Pavel Gordins<sup>91</sup>, Penelope Stein<sup>12</sup>, Peter Collins<sup>92</sup>, Peter Dixon<sup>34</sup>, Peter Kelleher<sup>31</sup>, Phil Ancliff<sup>9</sup>, Ping Yu<sup>5</sup>, R. Campbell Tait<sup>93</sup>, Rachel Linger<sup>5</sup>, Rainer Doffinger<sup>5,12</sup>, Rajiv Machado<sup>94</sup>, Rashid Kazmi<sup>95</sup>, Ravishankar Sargur<sup>96</sup>, Remi Favier<sup>97</sup>, Rhea Tan<sup>5,12</sup>, Ri Liesner<sup>77</sup>, Richard Antrobus<sup>13</sup>, Richard Sandford<sup>5,12</sup>, Richard Scott<sup>9</sup>,

Richard Trembath<sup>34</sup>, Rita Horvath<sup>62</sup>, Rob Hadden<sup>84</sup>, Rob V. MackenzieRoss<sup>65</sup>, Robert Henderson<sup>9</sup>, Robert MacLaren<sup>22</sup>, Roger James<sup>5</sup>, Rohit Ghurye<sup>61</sup>, Rosa DaCosta<sup>86</sup>, Rosie Hague<sup>48</sup>, Rutendo Mapeta<sup>5</sup>, Ruth Armstrong<sup>12</sup>, Sadia Noorani<sup>98</sup>, Sai Murng<sup>85</sup>, Saikat Santra<sup>15</sup>, Salih Tuna<sup>5</sup>, Sally Johnson<sup>46</sup>, Sam Chong<sup>50</sup>, Sara Lear<sup>99</sup>, Sara Walker<sup>14</sup>, Sarah Goddard<sup>100</sup>, Sarah Mangles<sup>101</sup>, Sarah Westbury<sup>19,20</sup>, Sarju Mehta<sup>12</sup>, Scott Hackett<sup>4</sup>, Sergey Nejentsev<sup>5</sup>, Shahin Moledina<sup>9</sup>, Shahnaz Bibi<sup>10</sup>, Sharon Meehan<sup>37</sup>, Shokri Othman<sup>37</sup>, Shoshana Revel-Vilk<sup>102</sup>, Simon Holden<sup>12</sup>, Simon McGowan<sup>7</sup>, Simon Staines<sup>5</sup>, Sinisa Savic<sup>57</sup>, Siobhan Burns<sup>55</sup>, Sofia Grigoriadou<sup>61</sup>, Sofia Papadia<sup>5,39</sup>, Sofie Ashford<sup>5</sup>, Sol Schulman<sup>29</sup>, Sonia Ali<sup>37</sup>, Soo-Mi Park<sup>12</sup>, Sophie Davies<sup>12</sup>, Sophie Stock<sup>5</sup>, Souad Ali<sup>37</sup>, Sri V. V. Deevi<sup>5</sup>, Stefan Gräf<sup>5</sup>, Stefano Ghio<sup>73</sup>, Stephen J. Wort<sup>86</sup>, Stephen Jolles<sup>76</sup>, Steve Austin<sup>103</sup>, Steve Welch<sup>4</sup>, Stuart Meacham<sup>5</sup>, Stuart Rankin<sup>5</sup>, Suellen Walker<sup>9</sup>, Suranjith Seneviratne<sup>55</sup>, Susan Holder<sup>24</sup>, Suthesh Sivapalaratnam<sup>41</sup>, Sylvia Richardson<sup>5</sup>, Taco Kuijpers<sup>104</sup>, Taco W. Kuijpers<sup>104</sup>, Tadbir K. Bariana<sup>23,72</sup>, Tamam Bakchoul<sup>16</sup>, Tamara Everington<sup>105</sup>, Tara Renton<sup>84</sup>, Tim Young<sup>5</sup>, Timothy Aitman<sup>21,106</sup>, Timothy Q. Warner<sup>61</sup>, Tom Vale<sup>7</sup>, Tracey Hammerton<sup>5</sup>, Val Pollock<sup>17</sup>, Vera Matser<sup>5</sup>, Victoria Cookson<sup>9</sup>, Virginia Clowes<sup>24</sup>, Waseem Qasim<sup>10</sup>, Wei Wei<sup>5,12</sup>, Wendy N. Erber<sup>107</sup>, Willem H. Ouweland<sup>5,108</sup>, William Astle<sup>5</sup>, William Egner<sup>96</sup>, Wojciech Turek<sup>5</sup>, Yvonne Henskens<sup>83</sup> & Yvonne Tan<sup>55</sup>

<sup>4</sup>Birmingham Heartlands, Bordesley Green E, Birmingham, B9 5SS, UK. <sup>5</sup>University of Cambridge, The Old Schools, Trinity Lane, Cambridge, CB2 1TN, UK. <sup>6</sup>Oxford University Hospitals NHS Foundation Trust, John Radcliffe Hospital, Headley Way, Headington, Oxford, OX3 9DU, UK. <sup>7</sup>University of Oxford, University Offices, Wellington Square, Oxford, OX1 2JD, UK. <sup>8</sup>Centre for Nephrology, University College London, UCL Medical School, Rowland Hill Street, London, NW3 2PF, UK. <sup>9</sup>Great Ormond Street Hospital for Children NHS Foundation Trust, Great Ormond Street, London, WC1N 3JH, UK. <sup>10</sup>UCL Great Ormond Street Institute of Child Health, 30 Guilford St, London, WC1N 1EH, UK. <sup>11</sup>Newcastle Freeman Hospital, Freeman Rd, High Heaton, Newcastle upon Tyne, NE7 7DN, UK. <sup>12</sup>Cambridge University Hospitals NHS Foundation Trust, Addenbrookes Hospital, Hills Rd, Cambridge, CB2 0QQ, UK. <sup>13</sup>University Hospitals Birmingham, Mindelsohn Way, Edgbaston, Birmingham, B15 2TH, UK. <sup>14</sup>Sheffield CRF, Royal Hallamshire, Royal Hallamshire Hospital, Glossop Road, Sheffield, S10 2JF, UK. <sup>15</sup>Birmingham Children's Hospital NHS Foundation Trust, Steelhouse Ln, Birmingham, B4 6NH, UK. <sup>16</sup>Institute for Immunology and Transfusion Medicine, Ernst-Moritz-Arndt-University of Greifswald, Domstraße 11, 17489, Greifswald, Germany. <sup>17</sup>Golden Jubilee National Hospital, Agamemnon St, Clydebank, G81 4DY, UK. <sup>18</sup>Salford Royal NHS Foundation Trust, Stott Ln, Salford, M6 8HD, UK. <sup>19</sup>University Hospitals Bristol NHS Foundation Trust, Trust Headquarters, Marlborough Street, Bristol, BS1 3NU, UK. <sup>20</sup>University of Bristol, Senate House, Tyndall Avenue, Bristol, BS8 1TH, UK. <sup>21</sup>Imperial College, Kensington, London, SW7 2AZ, UK. <sup>22</sup>Moorfields Eye Hospital NHS Foundation Trust, 162 City Road, London, EC1V 2PD, UK. <sup>23</sup>University College London, Gower St, Bloomsbury, London, WC1E 6BT, UK. <sup>24</sup>London North West Healthcare NHS Trust, Northwick Park Hospital, Watford Road, Harrow, HA1 3UJ, UK. <sup>25</sup>Guy's and St Thomas' NHS Foundation Trust, St Thomas' Hospital, Westminster Bridge Road, London, SE1 7EH, UK. <sup>26</sup>VU University Medical Center, De Boelelaan, 1117, 1081, HV, Amsterdam, Netherlands. <sup>27</sup>University of Giessen, Ludwigstraße 23, 35390, Gießen, Germany. <sup>28</sup>University of South Paris, 15 Rue Georges Clemenceau, 91400, Orsay, France. <sup>29</sup>Beth Israel Deaconess Medical Centre, Harvard Medical School, 330 Brookline Ave, Boston, MA, 02215, USA. <sup>30</sup>Department of Medicine, University of Cambridge, Addenbrooke's Hospital, Hills Rd, Cambridge, CB2 0SP, UK. <sup>31</sup>Imperial College Healthcare NHS Trust, The Bays, St Mary's Hospital, South Wharf Road, London, W2 1NY, UK. <sup>32</sup>Scunthorpe General Hospital, Cliff Gardens, Scunthorpe, DN15 7BH, UK. <sup>33</sup>Haemophilia Centre, Kent & Canterbury Hospital, East Kent Hospitals University Foundation Trust, Ethelbert Road, Canterbury, Kent, TN24 0LZ, UK. <sup>34</sup>King's College, Strand, London, WC2R 2LS, UK. <sup>35</sup>The Roald Dahl Haemophilia Centre, Royal Liverpool Hospital, Prescott St, Liverpool, L7 8XP, UK. <sup>36</sup>Department of Cardiovascular Sciences, Center for Molecular and Vascular Biology, University of Leuven, Oude Markt 13, 3000, Leuven, Belgium. <sup>37</sup>Imperial and Hammersmith Hospitals, Du Cane Rd, Shepherd's Bush, London, W12 0HS, UK. <sup>38</sup>Plymouth Hospital, Derriford Road, Crownhill, Plymouth, Devon, PL6 8DH, UK. <sup>39</sup>Department of Haematology, University of Cambridge, Wellcome Trust Mrc Bldg, Addenbrookes Hospital, Hills Rd, Cambridge, CB2 0XY, UK. <sup>40</sup>MRC-BSU, Cambridge Institute of Public Health, Forvie Site, Robinson Way, Cambridge Biomedical Campus, Cambridge, CB2 0SR, UK. <sup>41</sup>The Royal London Hospital, Barts Health NHS Trust, Whitechapel Rd, Whitechapel, E1 1BB, UK. <sup>42</sup>Department of Haematology, Castle Hill Hospital, Hull and East Yorkshire NHS Foundation Trust, Castle Road, Cottingham, HU16 5JQ, UK. <sup>43</sup>Royal Hospitals Belfast, Trust Headquarters, A Floor, Belfast City Hospital, Lisburn Road, Belfast, BT9 7AB, UK. <sup>44</sup>Oxford Haemophilia and Thrombosis Centre, Oxford University Hospitals NHS Trust, The Churchill Hospital, Churchill Hospital, Oxford, OX3 7LE, UK. <sup>45</sup>University of Cambridge (CIMR Medical Genetics), Cambridge Institute for Medical Research, University of Cambridge, Cambridge Biomedical Campus, Wellcome Trust/MRC Building, Hills Road, Cambridge, CB2 0XY, UK. <sup>46</sup>National Renal Complement Therapeutics Centre, Newcastle University, Royal Victoria Infirmary - Victoria Wing, Newcastle upon Tyne, NE1 4LP, UK. <sup>47</sup>University College London Hospitals NHS Foundation Trust, 235 Euston Rd, Bloomsbury, London, NW1 2BU, UK. <sup>48</sup>Royal Hospital for Children, NHS Greater Glasgow and Clyde, 1345 Govan Rd, Glasgow, G51 4TF, UK. <sup>49</sup>Nottingham University Hospitals NHS Trust, Hucknall Rd, Nottingham, NG5 1PB, UK. <sup>50</sup>The National Hospitals for Neurology and Neurosurgery, UCLH and UCL, National Hospital for Neurology & Neurosurgery, Queen Square, London, WC1N 3BG, UK. <sup>51</sup>Hopital St Louis, 1 Avenue Claude Vellefaux, 75010, Paris, France. <sup>52</sup>University of Sorbonne, 75005, Paris, France. <sup>53</sup>University of Graz, 8010, Universit ätspl. 3, 8010, Graz, Austria. <sup>54</sup>Papworth Hospital, Papworth Everard, Cambridge, CB23 3RE, UK. <sup>55</sup>Royal Free Hospital, Pond St, Hampstead, London, NW3 2cvG, UK. <sup>56</sup>Epsom & St Helier

University Hospitals NHS Trust, Wrythe Ln, Sutton, Carshalton, SM5 1AA, UK. <sup>57</sup>Leeds Teaching Hospitals NHS Foundation Trust, Great George Street, Leeds, West Yorkshire, LS1 3EX, UK. <sup>58</sup>Centre for Complement and Inflammation Research, Imperial College, London, SW7 2AZ, UK. <sup>59</sup>Lehrstuhl für Experimentelle Biomedizin, Universitätsklinikum Würzburg, Josef-Schneider-Straße 2, 97080, Würzburg, Germany. <sup>60</sup>Aberdeen Royal Infirmary, Foresterhill, Aberdeen, AB25 2ZN, UK. <sup>61</sup>Barts Health NHS Trust, Turner St, Whitechapel, London, E1 1BB, UK. <sup>62</sup>Newcastle University, Newcastle upon Tyne, NE1 7RU, UK. <sup>63</sup>Sapienza Università di Roma, Piazzale Aldo Moro, 5, 00185, Roma, RM, Italy. <sup>64</sup>National Heart & Lung Institute, Imperial College, Dovehouse Street, London, SW3 6LR, UK. <sup>65</sup>Royal United Bath Hospitals, Combe Park, Avon, BA1 3NG, UK. <sup>66</sup>Department of Haematology, Sheffield Children's Hospital NHS Foundation Trust, Western Bank, Sheffield, S10 2TH, UK. <sup>67</sup>Haematology Department, Manchester Royal Infirmary, Oxford Rd, Manchester, M13 9WL, UK. <sup>68</sup>Maastricht University, Minderbroedersberg 4-6, 6211, LKZ, Maastricht, Netherlands. <sup>69</sup>Medical University of Vienna, Spitalgasse 23, 1090, Wien, Austria. <sup>70</sup>Royal Devon & Exeter NHS Foundation Trust, Barrack Road, Exeter, Devon, EX2 5DW, UK. <sup>71</sup>Haematology Department, Royal Victoria Infirmary, Queen Victoria Rd, Newcastle upon Tyne, NE1 4LP, UK. <sup>72</sup>The Katharine Dormandy Haemophilia Centre and Thrombosis Unit, Royal Free London NHS Foundation Trust, Pond St, Hampstead, London, NW3 2QG, UK. <sup>73</sup>San Matteo, Pavia, Viale Camillo Golgi, 19, 27100, Pavia, PV, Italy. <sup>74</sup>Birmingham University NHS Foundation Trust, Level 1, Queen Elizabeth Hospital Birmingham, Mindelsohn Way, Edgbaston, Birmingham, B15 2GW, UK. <sup>75</sup>Queen Mary University of London, Mile End Rd, London, E1 4CS, UK. <sup>76</sup>University Hospital Wales, Cardiff and Vale UHB Headquarters, University Hospital of Wales (UHW), Heath Park, Cardiff, CF14 4XW, UK. <sup>77</sup>Department of Haematology, Great Ormond Street Hospital for Children NHS Trust, Great Ormond Street, London, WC1N 3JH, UK. <sup>78</sup>Madsen Health Center, 555 Foothill Dr, Salt Lake City, UT, 84112, USA. <sup>79</sup>Leicester Royal Infirmary, Infirmary Square, Leicester, LE1 5WW, UK. <sup>80</sup>Department of Pediatrics, Perelman School of Medicine at the University of Pennsylvania, 34th Street & Civic Center Boulevard, Philadelphia, PA, 19104, USA. <sup>81</sup>Division of Hematology, Children's Hospital of Philadelphia, 3401 Civic Center Blvd, Philadelphia, PA, 19104, USA. <sup>82</sup>Royal Hallamshire NHS Foundation Trust, Glossop Road, Sheffield, S10 2JF, UK. <sup>83</sup>Maastricht University Medical Centre, Postbus, 5800, 6202, AZ, Maastricht, Netherlands. <sup>84</sup>King's College Hospital NHS foundation trust, Denmark Hill, Brixton, London, SE5 9RS, UK. <sup>85</sup>Gartnavel General Hospital, NHS Greater Glasgow and Clyde, 1055 Great Western Rd, Glasgow, G12 0XH, UK. <sup>86</sup>Royal Brompton Hospital, Sydney St, Chelsea, London, SW3 6NP, UK. <sup>87</sup>University of Perugia, Piazza dell'Università, 06123, Perugia, PG, Italy. <sup>88</sup>Institut Hospitalo-Universitaire LIRYC, PTIB, Hôpital Xavier Arnoz, Pessac, Avenue du Haut Lévêque, 33604, Pessac, France. <sup>89</sup>Frimley Park Hospital, Portsmouth Rd, Frimley, Camberley, GU16 7UJ, UK. <sup>90</sup>NHS Blood and Transplant, Manchester Blood Centre, Plymouth Grove, Manchester, M13 9LL, UK. <sup>91</sup>Hull & East Yorkshire Hospitals NHS Trust, Anlaby Rd, Hull, HU3 2JZ, UK. <sup>92</sup>Arthur Bloom Haemophilia Centre, University Hospital of Wales Heath Park, Cardiff, Wales, Heath Park Way, Cardiff, CF14 4XW, UK. <sup>93</sup>Glasgow Royal Infirmary, NHS Greater Glasgow and Clyde, 84 Castle St, Glasgow, G4 0SF, UK. <sup>94</sup>University of Lincoln, Brayford Pool, Lincoln, LN6 7TS, UK. <sup>95</sup>Southampton General Hospital, University Hospital Southampton NHS Foundation Trust, Tremona Road, Southampton, Hampshire, SO16 6YD, UK. <sup>96</sup>Sheffield Teaching Hospitals, Herries Road, Sheffield, S5 7AU, UK. <sup>97</sup>Haematological Laboratory, Trousseau Children's Hospital, 26 Avenue du Dr Arnold Netter, 75012, Paris, France. <sup>98</sup>Sandwell and West Birmingham Hospitals, Dudley Road, Birmingham, West Midlands, B18 7QH, UK. <sup>99</sup>Norfolk & Norwich University Hospital, Colney Ln, Norwich, NR4 7UY, UK. <sup>100</sup>University Hospitals of North Midlands, Royal Stoke University Hospital, Newcastle Road, Stoke-on-Trent, ST4 6QG, UK. <sup>101</sup>Haemophilia, Haemostasis and Thrombosis Centre, Hampshire Hospitals NHS Foundation Trust, Aldermaston Rd, Basingstoke, RG24 9NA, UK. <sup>102</sup>Hadassah-Hebrew University Hospital, Jerusalem, 91120, Israel. <sup>103</sup>Department of Haematology, Guys and St Thomas' NHS Foundation Trust, Guy's Hospital, Great Maze Pond, London, SE1 9RT, UK. <sup>104</sup>Emma Children's Hospital AMC, Meibergdreef 9, 1105, AZ, Amsterdam-Zuidoost, Netherlands. <sup>105</sup>Salisbury Hospital, Salisbury NHS Foundation Trust, Odstock Rd, Salisbury, SP2 8BJ, UK. <sup>106</sup>University of Edinburgh, Old College, South Bridge, Edinburgh, EH8 9YL, UK. <sup>107</sup>Pathology and Laboratory Medicine, University of Western Australia, Crawley, Western Australia, 35 Stirling Hwy, Crawley, WA, 6009, Australia. <sup>108</sup>Wellcome Trust Sanger Institute, Wellcome Trust Genome Campus, Hinxton, CB10 1SA, UK.