CURRICULUM VITAE **DECEMBER 2019**

NEIL T. PARKIN

DATA FIRST CONSULTING, INC.

PERSONAL DETAILS

DATE OF BIRTH: March 26, 1963 PLACE OF BIRTH: Montreal, Quebec, Canada
CITIZENSHIP: USA and Canada LANGUAGES: English and French

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SKILLS AND FOCUS

I am a laboratory scientist and virologist with academic training in biochemistry and molecular biology. I have worked in the biotech and diagnostics industry, as well as in a global public health setting at the World Health Organization, and have broad international experience working with laboratories in resource-limited settings. I am seeking to apply my strong scientific, organizational and analytical skills to global health problems particularly in the area of HIV diagnostics including viral load, early infant diagnosis, and drug resistance testing.

EDUCATION

- Ph.D. in Biochemistry, McGill University, Montreal: February 1990
- B.Sc. (honors) in Biochemistry, McGill University, Montreal: May 1985

RESEARCH AND PROFESSIONAL EXPERIENCE

October 2009-present

Founder and Executive Director, Data First Consulting, Inc., Belmont, CA. I provide scientific consulting services to various clients in industry and public health organizations, including technical writing (publications, grants and technical reports), sequence analysis, drug resistance data analysis and interpretation, laboratory quality assurance guidance, project management, meeting organization, and strategic advice. Highlights of my consulting work since 2009 include:

- World Health Organization: key contributor on laboratory aspects of the HIV Drug Resistance Surveillance program, including conducting a training workshop in Ho Chi Minh City, Vietnam, and on-site assessment of laboratories for membership in the HIVDR Laboratory Network in the following countries: Botswana, Canada, Cuba, Ethiopia, Mexico, South Africa, Uganda, USA
- FIND (Foundation for Innovative New Diagnostics): HIV Incidence Assays - optimal use of existing assays and new biomarker discovery for improved assays

- Halteres Associates: market assessment for point of care viral load and early infant diagnosis testing
- Diagnostic and pharmaceutical companies: data analysis, preparation of figures and tables, and manuscript writing

July 2008-October 2009

Scientist (P5), World Health Organization, Geneva, Switzerland. As the virologist on the HIV Drug Resistance Team, I played a lead role in the technical aspects of laboratory implementation of the WHO Global HIV Drug Resistance (HIVDR) Strategy at the level of participating countries, WHO regions, and globally within the WHO HIVDR Laboratory Network. Responsibilities included oversight of WHO HIVDR laboratory operational research projects; development and delivery of a laboratory training package for a 4-day workshop on HIVDR genotyping, first held in Dakar, Senegal in 2009; and to provide tools for analysis of the quality of sequences submitted by network laboratories. Participated in several training workshops in Africa and Asia, as a presenter and facilitator, working with laboratory technicians, principal investigators, and public health officials. Performed on-site assessment of laboratories for membership in the HIVDR Laboratory Network in the following countries: Canada, Cote d'Ivoire, France, Netherlands, Senegal, Spain, Uganda and the United Kingdom

December 1996- June 2008

Senior Scientific Director (2005-2008), Monogram Biosciences (formerly ViroLogic, Inc.), South San Francisco, CA; **Scientific Director** (2001-2005), ViroLogic, Inc., South San Francisco, CA.

Oversight and analysis of the ViroLogic genotype-phenotype database. PhenoSenseGT and GeneSeq HIV interpretation (genotype interpretation rules and phenotype-genotype discordance interpretation). New assay development (HIV integrase phenotype and genotype, HCV phenotype and genotype). Obtained NIH SBIR phase 1 grant for HCV and subtype C HIV projects. Directly or indirectly supervised up to 4 Scientists, 2 Senior Research Associates, and one Research Associate.

Senior Scientist (1999-2001), ViroLogic, Inc., South San Francisco, CA.

Resistance Test Vector Assembly process development project team leader, managing interdisciplinary efforts to improve the throughput of the PhenoSense Assay in the clinical reference laboratory. Oversight and analysis of the ViroLogic database of clinical testing data (genotypes and phenotypes). Advisor for technical issues related to commercial operation of PhenoSense and GeneSeq assays. PhenoSenseGT (combination phenotype/genotype resistance assay) commercial launch team member. Research projects include the relationship between protease inhibitor genotype, phenotype, and clinical response; the application of resistance testing technology for early detection of resistant HIV-1, new HIV targets (integrase, envelope), and new viruses (HCV). Supervised one Scientist and one Research Associate.

Scientist (1996-1999), ViroLogic, Inc., South San Francisco, CA.

Part of a team of scientists developing a phenotypic HIV-1 drug susceptibility test. Responsible for developing methods for extraction and amplification of HIV RNA from patient blood samples, preparing libraries of patient sequences in resistance test vectors, and performing genotypic and phenotypic resistance assays. Primary contact for collaboration with a local hospital AIDS clinic. Maintained a database of patient sample information and test results. Assisted in technology transfer from R&D to the clinical reference laboratory and member of the PhenoSenseHIV Assay commercial launch project team. Research into the relationship between protease inhibitor genotype, phenotype, and clinical response.

September 1993 - December 1996

Scientist III and Program Leader, Aviron, Mountain View, CA.

Responsible for the development of an engineered live attenuated influenza A virus vaccine and overseeing the transition of the candidate vaccine strains from pre-clinical to clinical testing. This involved familiarity with GLP, GMP and project management. Supervised one Research Associate. Attended an American Management Association Seminar entitled "Improving Your Project Management Skills: The Basics For Success"; learned basic project management skills including goal setting, work breakdown structures, critical path calculations, GANTT and PERT charts, resource planning and balancing, and risk analysis. Promoted from Scientist II to III in August 1995.

February 1990 - August 1993

Postdoctoral fellow, Laboratory of Dr. Harold E. Varmus; Department of Microbiology and Immunology, University of California, San Francisco. Major project: Analysis of *Wnt-1* proto-oncogene function. Minor project: Ribosomal frameshifting in HIV-1 and MMTV.

September 1985 - February 1990

Graduate Studies, Laboratory of Dr. Nahum Sonenberg; Department of Biochemistry, McGill University, Montreal, Quebec, Canada. Project: Regulation of Gene Expression by the 5' Untranslated Region of Eukaryotic mRNAs.

REFERENCES: *available upon request*

PEER-REVIEWED PUBLICATIONS

1. Low-abundance drug-resistant HIV-1 variants in antiretroviral drug-naïve individuals: A systematic review of detection methods, prevalence, and clinical impact. Mbunkah HA, Bertagnolio S, Hamers RL, Hunt G, Inzaule S, Rinke de Wit TF, Paredes R, **Parkin NT**, Jordan MR, Metzner KJ; WHO HIVResNet working group. J Infect Dis. 2019 Dec 6. pii: jiz650. doi: 10.1093/infdis/jiz650. [Epub ahead of print] PMID: 31809534
2. Integrase strand transfer inhibitor (INSTI)-resistance mutations for the surveillance of transmitted HIV-1 drug resistance. Tzou PL, Rhee SY, Descamps D, Clutter DS, Hare B, Mor O, Grude M, **Parkin N**, Jordan

MR, Bertagnolio S, Schapiro JM, Harrigan PR, Geretti AM, Marcelin AG, Shafer RW. J Antimicrob Chemother. 2019 Oct 16. pii: dkz417. doi: 10.1093/jac/dkz417. [Epub ahead of print] PMID: 31617907

3. Performance comparison of the Maxim and Sedia Limiting Antigen Avidity assays for HIV incidence surveillance. Sempa JB, Welte A, Busch MP, Hall J, Hampton D, Facente SN, Keating SM, Marson K, **Parkin N**, Pilcher CD, Murphy G, Grebe E; Consortium for the Evaluation and Performance of HIV Incidence Assays (CEPHIA). PLoS One. 2019 Jul 26;14(7):e0220345. doi: 10.1371/journal.pone.0220345. eCollection 2019. PMID: 31348809
4. Bioinformatic data processing pipelines in support of next-generation sequencing-based HIV drug resistance testing: the Winnipeg Consensus. Ji H, Enns E, Brumme CJ, **Parkin N**, Howison M, Lee ER, Capina R, Marinier E, Avila-Rios S, Sandstrom P, Van Domselaar G, Harrigan R, Paredes R, Kantor R, Noguera-Julian M. J Int AIDS Soc. 2018 Oct;21(10):e25193. doi: 10.1002/jia2.25193. PMID: 30350345
5. Computational analysis of antibody dynamics identifies recent HIV-1 infection. Seaton KE, Vandergrift NA, Deal AW, Rountree W, Bainbridge J, Grebe E, Anderson DA, Sawant S, Shen X, Yates NL, Denny TN, Liao HX, Haynes BF, Robb ML, **Parkin N**, Santos BR, Garrett N, Price MA, Naniche D, Duerr AC; CEPHIA group, Keating S, Hampton D, Facente S, Marson K, Welte A, Pilcher CD, Cohen MS, Tomaras GD. JCI Insight. 2017 Dec 21;2(24). pii: 94355. doi: 10.1172/jci.insight.94355. [Epub ahead of print] PMID: 29263306
6. HIV-1 drug resistance before initiation or re-initiation of first-line antiretroviral therapy in low-income and middle-income countries: a systematic review and meta-regression analysis. R K Gupta, J Gregson, **N Parkin**, H Haile-Selassie, A Tanuri, L Andrade Forero, P Kaleebu, C Watera, A Aghokeng, N Mutenda, J Dzangare, S Hone, Z Z Hang, J Garcia, Z Garcia, P Marchorro, E Beteta, A Giron, R Hamers, S Inzaule, L M Frenkel, M H Chung, T de Oliveira, D Pillay, K Naidoo, A Kharsany, R Kugathasan, T Cutino, G Hunt, S Avila Rios, M Doherty, M R Jordan, S Bertagnolio. Lancet Infect Dis. 2017 Nov 30. pii: S1473-3099(17)30702-8. doi: 10.1016/S1473-3099(17)30702-8
7. Assays for estimating HIV incidence: updated global market assessment and estimated economic value. Morrison CS, Homan R, Mack N, Seepolmuang P, Averill M, Taylor J, Osborn J, Dailey P, **Parkin N**, Ongarello S, Mastro TD. J Int AIDS Soc. 2017 Nov;20(3). doi: 10.1002/jia2.25018. PMID: 29165892
8. HIV drug resistance in African infants and young children newly diagnosed with HIV: a multicounty analysis. Jordan MR, Penazzato M, Cournil A, Vubil A, Jani I, Hunt G, Carmona S, Maphalala G, Mthethwa N, Watera C, Kaleebu P, Chakanyuka Musanhu C, Mtapuri-Zinyowera S, Dzangare J, Peeters M, Yang C, **Parkin N**, Bertagnolio S. Clin Infect Dis. 2017 Aug 8. doi: 10.1093/cid/cix698. [Epub ahead of print] PMID: 29020335
9. Moving towards a reliable HIV incidence test - current status, resources available, future directions and challenges ahead. Murphy G, Pilcher CD, Keating SM, Kassanjee R, Facente SN, Welte A, Grebe E, Marson K, Busch MP, Dailey P, **Parkin N**, Osborn J, Ongarello S, Marsh K, Garcia-Calleja JM. Epidemiol Infect. 2017 Apr;145(5):925-941. doi: 10.1017/S0950268816002910. Epub 2016 Dec 22. PMID: 28004622
10. HIV-1 Protease, Reverse Transcriptase, and Integrase Variation. Rhee SY, Sankaran K, Varghese V, Winters MA, Hurt CB, Eron JJ, **Parkin N**, Holmes SP, Holodniy M, Shafer RW. J Virol. 2016 Jun 10;90(13):6058-70. doi: 10.1128/JVI.00495-16.
11. HIV-1 Drug Resistance Mutations: Potential Applications for Point-of-Care Genotypic Resistance Testing. Rhee SY, Jordan MR, Raizes E, Chua A**, Parkin N**, Kantor R, Van Zyl GU, Mukui I, Hosseinipour MC, Frenkel LM, Ndembi N, Hamers RL, Rinke de Wit TF, Wallis CL, Gupta RK, Fokam J, Zeh C, Schapiro JM, Carmona S, Katzenstein D, Tang M, Aghokeng AF, De Oliveira T, Wensing AM, Gallant JE, Wainberg MA, Richman DD, Fitzgibbon JE, Schito M, Bertagnolio S, Yang C, Shafer RW. PLoS One. 2015 Dec 30;10(12):e0145772. doi: 10.1371/journal.pone.0145772

12. Hepatitis C virus drug resistance-associated substitutions: State of the art summary. Lontok E, Harrington P, Howe A, Kieffer T, Lennerstrand J, Lenz O, McPhee F, Mo H, **Parkin N**, Pilot-Matias T, Miller V. Hepatology. 2015 Nov;62(5):1623-32. doi: 10.1002/hep.27934. Epub 2015 Jul 30. PMID: 26095927.
13. Summary of presentations from the International Workshop on Antiviral Drug Resistance: Meeting the Global Challenge, 3–7 June 2014, Berlin, Germany. **Parkin N**. Antiviral Therapy 2014 2014; 19:701-717.
14. Measurement of HIV-1 Viral Load for Drug Resistance Surveillance using Dried Blood Spots: Literature Review and Modeling of Contribution of DNA and RNA. **Parkin NT.** AIDS Rev. 2014 Jul-Sep;16(3):160-71.
15. Infrequent Development of Resistance in Genotype 1-6 Hepatitis C Virus-Infected Subjects Treated With Sofosbuvir in Phase 2 and 3 Clinical Trials. Svarovskaia ES, Dvory-Sobol H, **Parkin N,** Hebner C, Gontcharova V, Martin R, Ouyang W, Han B, Xu S, Ku K, Chiu S, Gane E, Jacobson IM, Nelson DR, Lawitz E, Wyles DL, Bekele N, Brainard D, Symonds WT, McHutchison JG, Miller MD, Mo H Clin Infect Dis. 2014 Dec 15;59(12):1666-74. doi: 10.1093/cid/ciu697. Epub 2014 Sep 28. PMID: 25266287
16. Field Study of Dried Blood Spot Specimens for HIV-1 Drug Resistance Genotyping. Parry CM*, **Parkin N***, Diallo K*, Mwebaza S, Batamwita R, DeVos J, Bbosa N, Lyagoba F, Magambo B, Jordan MR, Downing R, Zhang G, Kaleebu P, Yang C, Bertagnolio S. J Clin Microbiol. 2014 Aug;52(8):2868-75.
17. E138A in HIV-1 reverse transcriptase is more common in subtype C than B: Implications for rilpivirine use in resource-limited settings. Sluis-Cremer N, Jordan MR, Huber K, Wallis CL, Bertagnolio S, Mellors JW, **Parkin NT**, Richard Harrigan P. Antiviral Res. 2014 Jul;107:31-4.
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21. Novel method to assess antiretroviral target trough concentrations using in vitro susceptibility data. Acosta EP, Limoli KL, Trinh L, **Parkin NT**, King JR, Weidler JM, Ofotokun I, Petropoulos CJ. Antimicrob Agents Chemother. 2012 Nov;56(11):5938-45.
22. Genotyping External Quality Assurance in the World Health Organization HIV Drug Resistance Laboratory Network During 2007–2010. **Parkin, N**, Bremer, J and Bertagnolio, S. Clin Infect Dis. 2012 May;54 Suppl 4:S266-72.
23. Evaluation Of In-House Genotyping Assay Performance Using Dried Blood Spot Specimens In The Global WHO Laboratory Network. **Parkin N**, deMendoza C, Schuurman R, Jennings C, Bremer J, Jordan M, and Bertagnolio S. Clin Infect Dis. (2012) 54 Suppl 4: S273-S279.
24. Update on World Health Organization HIV Drug Resistance Prevention and Assessment Strategy: 2004-2011. Jordan MR, Bennett DE, Wainberg MA, Havlir D, Hammer S, Yang C, Morris L, Peeters M, Wensing AM, **Parkin N**, Nachega JB, Phillips A, De Luca A, Geng E, Calmy A, Raizes E, Sandstrom P, Archibald CP, Perriëns J, McClure CM, Hong SY, McMahon JH, Dedes N, Sutherland D, Bertagnolio S. Clin Infect Dis. 2012 May;54 Suppl 4:S245-9.
25. Comparison of HIV-1 RNA Measurements Using Plasma and Dried Blood Spots (DBS) in the Automated Abbott Real Time Viral Load Assay. Arredondo M, Garrido C, **Parkin N**, Zahonero N, Bertagnolio S, Soriano V, de Mendoza C. J Clin Microbiol. 2012 Mar;50(3):569-72

26. Interplay Between Single Resistance-Associated Mutations in the HIV-1 Protease and Viral Infectivity, Protease Activity, and Inhibitor Sensitivity. Henderson GJ, Lee SK, Irlbeck DM, Harris J, Kline M, Pollom E, **Parkin N**, Swanstrom R. Antimicrob Agents Chemother. 2012 Feb;56(2):623-33.
27. Sequence Quality Analysis Tool for HIV Type 1 Protease and Reverse Transcriptase. Delong AK, Wu M, Bennett D, **Parkin N**, Wu Z, Hogan JW, Kantor R. AIDS Res Hum Retroviruses. 2012 Aug;28(8):894-901
28. Sequence and Phenotypic Analysis for Resistance Monitoring in Hepatitis C Virus Drug Development: Recommendations From the HCV DRAG. Kwong AD, Najera I, Bechtel J, Bowden S, Fitzgibbon J, Harrington P, Kempf D, Kieffer TL, Koletzki D, Kukolj G, Lim S, Pilot-Matias T, Lin K, Mani N, Mo H, O'Rear J, Otto M, **Parkin N**, Pawlotsky JM, Petropoulos C, Picchio G, Ralston R, Reeves JD, Schooley RT, Seiwert S, Standring D, Stuyver L, Sullivan J, Miller V; under the auspices of the Forum for Collaborative Human Immunodeficiency Virus Research and on behalf of the HCV Drug Development Advisory Group (HCV DRAG), for the Sequence Analysis Working Group (SAWG) and Phenotype Analysis Working Group (PAWG). Gastroenterology. 2011 Mar;140(3):755-60.
29. Performance of the Abbott RealTime HIV-1 Viral Load Assay Is Not Impacted by Integrase Inhibitor Resistance-Associated Mutations. Young TP, Cloherty G, Fransen S, Napolitano L, Swanson P, Herman C, **Parkin NT**, Hackett J Jr. J Clin Microbiol. 2011 Apr;49(4):1631-4.
30. In Vitro Characterization of GS-8374, a Novel Phosphonate-Containing Inhibitor of HIV-1 Protease with Favorable Resistance Profile. Callebaut C, Stray K, Tsai L, Williams M, Yang ZY, Cannizzaro C, Leavitt SA, Liu X, Wang K, Murray BP, Mulato A, Hatada M, Priskich T, **Parkin N**, Swaminathan S, Lee W, He GX, Xu L, Cihlar T. Antimicrob Agents Chemother. 2011 Apr;55(4):1366-76.
31. Dried blood spots for HIV-1 Drug Resistance and Viral Load Testing: A Review of Current Knowledge and WHO Efforts for Global HIV Drug Resistance Surveillance. Bertagnolio S, **Parkin NT**, Jordan M, Brooks J, García-Lerma JG. AIDS Rev. 2010 Oct-Dec;12(4):195-208.
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38. Underwood MR, Ross LL, Irlbeck DM, Gerondelis P, Rouse E, St. Clair MH, Trinh L, **Parkin N**, Lanier ER. Sensitivity of Phenotypic Susceptibility Analyses for Nonthymidine Nucleoside Analogues Conferred by K65R or M184V in Mixtures with Wild-Type HIV-1. J Infect Dis. 2009 Jan 1;199(1):84-8.

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41. McColl DJ, Chappey C, **Parkin NT**, Miller MD. Prevalence, genotypic associations and phenotypic characterization of K65R, L74V and other HIV-1 RT resistance mutations in a commercial database. Antivir Ther. 2008;13(2):189-97.

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