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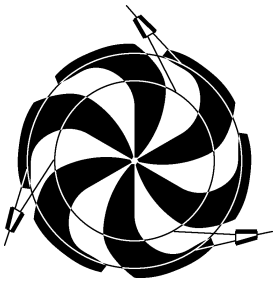

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CANADA'S NATIONAL LABORATORY FOR PARTICLE AND NUCLEAR PHYSICS

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UNDER A CONTRIBUTION FROM THE
NATIONAL RESEARCH COUNCIL OF CANADA

DECEMBER 2004

The contributions on individual experiments in this report are outlines intended to demonstrate the extent of scientific activity at TRIUMF during the past year. The outlines are not publications and often contain preliminary results not intended, or not yet ready, for publication. Material from these reports should not be reproduced or quoted without permission from the authors.

Appendix E

LIFE SCIENCES PROJECT PROPOSALS

The following lists life sciences project proposals received up to the end of 2003 (missing numbers cover proposals that have been withdrawn or replaced by later versions, rejected, or combined with another proposal). Page numbers are given for those experiments which are included in this Annual Report. Page

LS0. PET facilities [active], K.R. Buckley, E.T. Hurtado, P. Piccioni, W. Sievers *(TRIUMF)*, C. English, S. Jivan, S. Shah, C. Williams *(UBC–TRIUMF)* 125

LS1. Attenuation maps for quantitative SPECT [completed], A. Celler *(UBC–VH&HSC)*, S. McFarland *(UBC)*, S. Barney, M. Limber *(SFU)*

LS2. Synthesis of ^{18}F-glycosides as potential imaging agents for the study of glycosidase activity in the brain [completed], M.J. Adam *(TRIUMF)*, D. Lyster *(VH&HSC)*, G. Matte *(Halifax H.)*

LS3. Synthesis of radiopharmaceuticals for positron emission tomography [active], M.J. Adam, K.R. Buckley, E.T. Hurtado, J. Huser, S. Jivan, J.-M. Lu, T.J. Ruth *(TRIUMF)* 126

LS4. TR13 targets for PET radioisotope production [active], K. Buckley, T. Hurtado, T.J. Ruth, S.K. Zeisler *(TRIUMF)* 127

LS5. Production and on-line separation of ^{124}I from enriched tellurium [inactive], W.Z. Gelbart, E.T. Hurtado, T.J. Ruth, N.R. Stevenson, S.K. Zeisler *(TRIUMF)*, R.R. Johnson *(UBC)*

LS6. Bone calcium resorption studies in pre- and peri-menopausal women using accelerator mass spectrometry [completed], R.R. Johnson, A. Priestman, J.C. Prior *(UBC)*, A. Altman, W.Z. Gelbart, V. Sossi *(TRIUMF)*, D. Berkovits, S. Ghelberg, M. Paul *(Racah Inst., Hebrew U. Jerusalem)*, L.M. Shulman *(Chaim Sheba Med. Centre)*, R. Chechik *(Weizmann Inst.)*, E. Venzel *(SFU)*

LS7. PET 3D data quantification and integration into a research clinical environment [completed], K.S. Morrison, T.J. Ruth, V. Sossi, M.W. Stazyk *(UBC–TRIUMF)*, K.R. Buckley *(TRIUMF)*, J.S. Barney *(VH&HSC)*, D. Sirota, B.J. Snow *(UBC)*

LS8. Radiotracers for the physical and biosciences [active], L. Buchmann, T.J. Ruth, S.K. Zeisler *(TRIUMF)*, A.D.M. Glass, R.R. Johnson, M. Lowe, C.E.R. Orvig *(UBC)*, T.F. Budinger *(Lawrence Berkeley National Lab)* 128

LS10. Biological evaluation of radiohalogenated DNA aptamers [completed], H. Dougan *(TRIUMF)*, J.B. Hobbs, D.M. Lyster *(UBC)*, J.I. Weitz *(McMaster U.)*

LS11. Development of single photon imaging agents [inactive], D. Lyster *(UBC–VH&HSC)*, L. Alcorn, M. Hampong, T. Lutz, C. Vo *(UBC)*

LS12. A simulation platform for the design of position encoding multicrystal detectors [completed], A. Altman, C. Moisan, J.G. Rogers *(TRIUMF)*, E. Hoskinson, G. Tsang *(UBC)*

LS13. Utility of 2-[F-18]-fluoro-2-deoxy-d-glucose SPECT imaging in the evaluation of patients with solitary pulmonary nodules [completed], A. Celler, D. Lyster, D. Worsley *(UBC)*, M. Adam *(TRIUMF)*

LS14. Production of ^{127}Xe from cesium with 90–110 MeV protons [inactive], D. Pearce, J. Vincent *(TRIUMF)*

LS15. Investigation of frame realignment on the reproducibility of ^{18}F-6-fluorodopa positron emission tomography [inactive], K.S. Morrison, T.J. Ruth *(UBC–TRIUMF)*, B.J. Snow *(UBC)*

LS17. Table-top radiocarbon facility [inactive], W. Gelbart, R.B. Schubank *(TRIUMF)*, E. Venczel *(UBC–SFU)*, S. Calvert, R.R. Johnson, J. Nagel, T. Peterson, V. Sossi *(UBC)*, D.E. Nelson *(SFU)*, J. Prior, K. Schoenholzer, R. Sutton, V. Walker *(UBC–VH&HSC)*, R. Middleton *(U. Pennsylvania)*, M. Paul *(Hebrew U. Jerusalem)*, J. Clague, L. Jackson, J. Lutenauer, D. Templeman-Kluit *(Geological Survey of Canada)*, R.N. McNeely, J.-S. Vincent *(GSC Ottawa)*, V. Barrie *(Pacific Geoscience Center)*, D. Prior, K.R. Robertson, G. Vilks *(Bedford Inst. Oceanography)*, R. Brown, S. Wang *(Elemental Research Inc.)*, J. Vogel *(Lawrence Livermore National Lab)*, A.E. Litherland *(U. Toronto)*, S. Dias, S. Sood *(Ontario Hydro)*, H.R. Andrews, R.M. Brown, R.J. Cornett *(AECL)*, D.B. Carlisle *(Environment Canada)*, J. Carron, A. Kabir, R.C.J. Wilkinson *(Canadian Centre for Inland Waters)*, R. Gephart, P. Molton, D. Robertson *(Batelle Pacific Northwest Labs)*

LS18. Cooperative development of ^{82}Sr-Rb generators for human use in Canada [completed], J. Vincent *(TRIUMF)*, R. Beanlands *(U. Ottawa Heart Inst.)*, B. Bowen *(McMaster U.)*, W. Dickie *(Nordion Int.)*

LS19. An ^{15}O-water generator: a feasibility study [inactive], K.R. Buckley, T.J. Ruth *(TRIUMF)*

LS20. Prototype heat-pipe water target for ^{18}F-production [inactive], K.R. Buckley, E.T. Hurtado, T.J. Ruth *(TRIUMF)*, J.W. Lenz *(private consultant)*

LS21. Aluminum kinetics in plants [inactive], A. Glass, R.R. Johnson, L. Oliveira *(UBC)*, K. Buckley, Z. Gelbart *(TRIUMF)*, D. Berkovitz, M. Paul *(Hebrew U. Jerusalem)*, E. Venczel *(SFU)*

LS22. Virtual national biomedical tracer facility [inactive], T.J. Ruth, J.S. Vincent *(TRIUMF)*, E.J. Peterson, D. Phillips *(Los Alamos National Lab)*

LS24. Scanning for early detection and staging of breast cancer: a comparative study using FDG PET and MIBI SPECT [inactive], P.F. Cohen, P. Klimo *(Lions Gate H.–UBC)*, M. Cackette *(EBCO Industries Ltd.)*, J. Whiffen *(JALORN)*, V. Sossi *(TRIUMF–UBC)*, J. Porter *(Nordion Int.)*, R.R. Johnson *(UBC)*

LS25. 3D PET in human neuroreceptor studies: quantification and reconstruction [completed], K.S. Morrison, T. Oakes, T.J. Ruth, V. Sossi *(UBC–TRIUMF)*, K.R. Buckley *(TRIUMF)*, M. Krzywinski, M. Schulzer, J. Stoessl *(UBC)*

LS26. A gaseous planar positron source for routine 3D PET normalization [completed], T. Oakes, T.J. Ruth, V. Sossi *(UBC–TRIUMF)*, K. Buckley, S. Jivan, R. MacDonald *(TRIUMF)*

LS27. The feasibility and efficacy of using 2-(F-18)-fluoro-2-deoxy-D-glucose (18-FDG) to evaluate children with musculoskeletal neoplasm [deferred], R. Anderson, J. Davis, D. Lyster, H.R. Nadel, T.J. Ruth, M. Stilwell, D. Worsley *(UBC)*

LS28. Evaluation of potentially viable myocardium with dobutamine myocardial SPECT imaging [completed], H. Abbey, A.-Y. Fung, L. Hook, D.M. Lyster, D.F. Worsley *(VH&HSC)*, M. Adam, S. Jivan *(TRIUMF)*

LS29. Production and distribution of FDG for clinical studies [completed], D. Lyster, D. Worsley *(VH&HSC)*, P. Cohen *(Lions Gate H.)*, H. Nadel *(Children's H.)*, M.J. Adam, S. Jivan, T.J. Ruth, V. Sossi *(TRIUMF)*

LS31. Auger electron emitters for therapy-physics and chemistry [inactive], D. Pearce, T.J. Ruth, J. Vincent, A. Zyuzin *(TRIUMF)*, V. Kokhanyuk, V. Kravchuk, B.L. Zhuikov *(INR Moscow)*

LS32. ^{18}F-$H_2{}^{18}$O supply to the University of Alberta [completed], S.A. McQuarrie, J.R. Mercer *(U. Alberta)*, A.J.B. McEwan *(CCI)*, R.R. Johnson *(UBC–EBCO)*, T.J. Ruth *(UBC–TRIUMF)*

LS33. Evaluation and improvement of a dual head coincidence camera [active], K.S. Morrison, T.J. Ruth, V. Sossi *(UBC–TRIUMF)*, M. Krzywinski *(UBC)*, P. Cohen *(Lions Gate H.)*, P. Klimo *(Lions Gate H.–UBC)*, T.K. Lewellen, D.A. Mankoff *(U. Washington)* 129

LS34. Production of ^{103}Pd [inactive], R.R. Johnson, R. Pavan *(UBC)*, M. Cackette, K.L. Erdman *(EBCO Industries Ltd.)*, Z. Gelbart *(TRIUMF)*

LS35. Development of F-18 labelled nitroimidazole PET imaging agents for tissue hypoxia [active], M.J. Adam *(TRIUMF)*, K. Skov *(BCCRC–UBC)*, S. Evans, C. Koch, A. Kachera *(U. Pennsylvania)*, I. Baird, B. James *(UBC)* 129

LS37. Feasibility of ^{125}Xe implantation as a ^{125}I brachytherapy source [completed], D. Ottewell, T. Ruth, J. Vincent, A. Zyuzin *(TRIUMF)*

LS38. Dopaminergic tracers kinetic modeling with minimally invasive scanning procedures [completed], G. Chan, M. Krzywinski, T.J. Ruth, V. Sossi *(UBC–TRIUMF)*, J. Holden *(U. Wisconsin)*, D. Doudet, J. Stoessl *(UBC)*

LS39. Positron emission profiling (PEP) for pulp and paper fluid dynamic studies [active], M. Martinez, J. Olson *(UBC)*, M.J. Adam, K. Buckley, S. Jivan, T.J. Ruth, V. Sossi *(TRIUMF)* 130

LS40. F-18 FDG cardiac PET scans using a coincidence PET/SPECT camera to assess myocardial viability in patients with fixed abnormalities and low ejection fractions on gated sestamibi stress tests [completed], P.F. Cohen, J. Imrie, K. Woo *(Lions Gate H.)*, D. Worsley *(Vancouver General H.)*, V. Sossi *(TRIUMF–UBC)*, T. Ruth *(UBC–TRIUMF)*, R.R. Johnson *(UBC)*

LS41. Impact of the ADAC coincidence PET camera in the management of selected cancer patients [completed], P.F. Cohen, J. Imrie, K. Woo *(Lions Gate H.)*, J. Powe *(Vancouver General H.)*, V. Sossi *(TRIUMF–UBC)*, T. Ruth *(UBC–TRIUMF)*, R.R. Johnson *(UBC)*

LS42. Configuration modeling and image reconstruction studies on a depth encoding research tomograph [active], T. Ruth, V. Sossi *(UBC–TRIUMF)*, V. Astakhov *(UBC)*, K. Buckley *(TRIUMF)*, S. Houle *(Centre Addiction & Mental Health, Toronto)*, C. Moisan *(U. Laval)* 131

LS43. Positron emission mammography system (PEM) [deferred], K. Buckley, S. Jivan, T.J. Ruth, V. Sossi *(TRIUMF)*, M. Stilwell *(B.C. Women's H.)*, P. Gordon *(UBC)*, H. Nadel *(Children's H.)*

LS44. Development of a high-speed formation (areal density) measurement system for paper [active], M. Avikainen, S. Heath, M. Martinez, J. Olson *(UBC)*, K. Buckley, T.J. Ruth, M. Salomon *(TRIUMF)* 130

LS45. Modelling genetic risk for ionizing radiation exposure in space [deferred], J.G. de Boer, J. Holcroft, S. Zhang *(U. Victoria)*

LS46. Modelling of the dopaminergic system in more severely affected PD patients [completed], T.J. Ruth, V. Sossi *(UBC–TRIUMF)*, J. Holden *(U. Wisconsin)*, R. de la Fuente-Fernandez, D. Doudet, C.S. Lee, M. Schulzer, J. Stoessl *(UBC)*

LS47. PET imaging of recurrent prostate cancer with 2-F-18-fluoromethy-dimethy-2-hydroxyethylammonia (FCH), [deferred], M. Gleave, D. Lyster, J. Powe, D. Worsley *(Vancouver General H.–UBC)*, M. Adam *(TRIUMF)*, H. Abbey *(Vancouver General H.)*

LS48. Anorexia nervosa: autonomic dysfunction, the brain and the heart [completed], A.S. Belzberg, C.L. Birmingham, C. Kerr, G.P. Sexsmith, M. Stilwell *(St. Paul's H.)*, M.J. Stock *(St. George's H.)*, P. Beumont *(U. Sydney, Aust.)*, V. Sossi *(UBC–TRIUMF)*

LS49. ^{18}F FDG cardiac PET scans using a third generation coincidence camera to assess myocardial viability in patients who are candidates for cardiac transplantation [inactive], A.S. Belzberg, S. Chan, A. Ignaszewski, M. Kiess, G. Sexsmith, M. Stilwell *(St. Paul's H.)*, V. Sossi *(TRIUMF–UBC)*

LS50. Antisense imaging nucleic acids for Parkinson's disease [active], M. Adam, H. Dougan, T.J. Ruth *(TRIUMF)*, J.B. Hobbs, D.M. Lyster, J. Stoessl *(UBC)*, A.I. Kassis *(Harvard U.)* 131

LS51. Auger therapy for prostate cancer [active], H. Dougan, T.J. Ruth, J.S. Vincent *(TRIUMF)*, C.C. Nelson, P.S. Rennie *(Prostate Centre)*, C.M. Ludgate *(UBC–U. Victoria)*, D.M. Lyster *(UBC)* 131

LS52. Comparison of commercial FDG synthesis systems [completed], T.J. Ruth *(UBC/TRIUMF)*, M. Adam, K. Buckley, S. Jivan *(TRIUMF)*, D. Lyster *(UBC)*, R. McDonald *(IPET)*

LS53. Synthesis of ^{99m}Tc and ^{186,188}Re sugar derivatives [active], M.J. Adam *(TRIUMF)*, C. Orvig *(UBC)*, S. Bayly, C. Fisher *(TRIUMF/UBC)*, M. Abrams *(AnorMED)* 132

LS54. Wavelet reconstruction for high resolution three-dimensional positron emission tomography [deferred], C.-H. Chen, A. Rahmim, K. Raywood *(UBC)*, T.J. Ruth, V. Sossi *(UBC/TRIUMF)*

LS55. Detection of metastases in intermediate thickness melanoma with ^{18}FDG and a coincidence hybrid scanner [inactive], A. Belzberg, G. Sexsmith, M. Stilwell *(St. Paul's H./UBC)*, A. Lee *(Surrey Memorial H.)*, T.J. Ruth *(UBC/TRIUMF)*

LS56. Synthesis of radiolabelled nucleotides and oligonucleotides [active], M.J. Adam, H. Dougan, A. Studenov *(TRIUMF)*, J. Wilson *(Cross Cancer, Edmonton)*, J. Hobbs *(UBC)* 132

LS57. Quantitative imaging with the Concorde MicroPET [active], A. Rahmin, V. Sossi *(UBC)*, K. Raywood, T.J. Ruth *(UBC–TRIUMF)*, K. Buckley, P. Piccioni *(TRIUMF)*, C. Thompson *(Montreal Neurological Inst.)*, S. Lapi *(SFU)* 132

LS58. Production and distribution of FDG for clinical studies [deferred], D. Lyster *(UBC)*, J. Powe, D. Worsley *(VH&HSC)*, P. Cohen *(Lions Gate Hospital)*, H. Nadel *(Children's Hospital)*, M. Stilwell *(BC Women's Hospital)*, A. Belzberg *(St. Paul's Hospital)*, K. Buckley, T. Hurtado, S. Jivan, P. Piccioni, T.J. Ruth *(TRIUMF)*, M. Kovacs *(EBCO Tech.)*

LS69. In vivo studies on regulation of dopamine turnover using a Parkinson's disease rat model and a microPET [active], D. Doudet, C. Lee, A. Phillips, V. Sossi, E. Vandervoort *(UBC)*, M.-L. Camborde, R. Koernelson, S. McCormick *(UBC–TRIUMF)*, T.J. Ruth *(TRIUMF)*, J. Holden *(U. Wisconsin)* 134

LS70. Quantification of high resolution brain imaging [active], K. Cheng, A. Rahmin, V. Sossi, E. Vandervoort *(UBC)*, S. Blinder, M.-L. Camborde, K. Raywood, T. Ruth *(UBC–TRIUMF)*, K. Buckley, P. Picciotto *(TRIUMF)*, C. Thompson *(Montreal Neurological Inst.)*, S. Lapi *(SFU)* 134