

Development of IAEA/NUS Internet Diploma Course In Tissue Banking

Aziz Nather, M.B.B.S., F.R.C.S.(Ed), F.R.C.S.(Glas), M.D.,
*Glyn O. Phillips, D.Sc, Ph.D, Hon. D.Sc, Hon. L.L.D., F.R.C.S.,
**Chang Hseuh Fun,
***Lim May Ying, Lillian,

Director, IAEA/NUS Regional Training Centre, NUH Tissue Bank, Singapore;
**Technical Advisor to DDG, International Atomic Energy Agency, Cardiff, United Kingdom*
***System Analyst, Dean's Office, Medicine, National University of Singapore*
****Analyst Programmer, Centre for Instructional Technology (CIT), National University of Singapore*

INTRODUCTION

Bone and soft tissue transplantation is increasingly done as high quality tissue grafts are made available by more tissue banks in the Asia-Pacific Region¹. The emphasis is on quality control of tissues processed to avoid potential disease transmission. Despite the recent developments, tissue engineering has not contributed to much applications in Orthopaedic and Reconstructive Surgery. Indeed, so far, only autologous chondrocyte transplantation has been successfully applied clinically. However, the indication for this new technology is limited.

BACKGROUND

Singapore played a key role in providing training for technologists and health care workers associated with radiation sterilisation and tissue banking for Member States of RCA (Asia-Pacific Region).

Under RAS 7/008: Radiation Sterilisation of Tissue Grafts with national funding (\$225,500) by the National Science and Technology Board, a purpose-built Regional Training Centre (RTC) was set up in July 1997 and the International Atomic Energy Agency (IAEA) Draft Curriculum converted into Multi-Media Curriculum. National University of Singapore (NUS) developed an NUS Diploma in Tissue Banking – a distance learning Diploma Course of one-year duration, using the Multi-Media Curriculum as the core syllabus for the Diploma Course^{2,3}.

The first batch of students was registered in November 1997 with 18 participants. 12 participants completed the one-year distance learning programme and convoked on 16 October 1998. Among them, 4 had done well with distinction, 5 with credit and 3 with pass only. The second batch convoked in March 2001, 2 with distinction, 5 with credit and 8 with pass only. The third batch of 21 students,

registered in April 2000, included 3 participants from Latin America (Brazil – 2, Chile – 1) and 1 from Slovakia. They graduated in March 2001 with 1 distinction, 5 credits and 11 with pass only. The fourth batch of 20 students, having among them 3 from Africa (Algeria – 1, Zambia – 2), and 2 from Europe (Greece – 1, Slovakia – 1) registered in April 2001. They are due for examination in March 2002. It is clear that the Regional Training Centre in Singapore has successfully fulfilled its role to provide Diploma training for technologists and health care workers in tissue banking.

INSTRUCTIONAL MATERIALS FOR INTERNET DELIVERY

Under RAS 7/008 by courtesy of the Singapore Government, the IAEA Draft Curriculum on Tissue Banking has been converted into Multi-Media Curriculum in April 1998 and distributed to all tissue banks in Member States. This Curriculum is available in electronic form, which could be adapted for Internet use. In July 2000, an update to the Multi-Media Curriculum has been produced as a textbook entitled 'Radiation and Tissue Banking'. This book edited by Professor Glyn Phillips is also available in the electronic form. Nather edited another book "Scientific Basis of Tissue Transplantation" and this book will be released in October 2001.

RAS 7/008 has therefore accumulated a wealth of instructional materials for Internet delivery:-

- Multi-Media Curriculum
 - Guide to Curriculum
- Module 0: Historical Background
 - 1: Rules and Regulations
 - 2: Organisation
 - 3: Quality Assurance
 - 4: Procurement
 - 5: Processing
 - 6: Distribution and Utilisation
 - 7: Future Developments in Tissue Banking
- Audio-Cassette with instructions on how to use the Curriculum
- Compact Disc/Videotapes demonstrating procurement and processing techniques for various tissues
- Slide Sets demonstrating Case Studies from the Region

Correspondence should be sent to:
Dr Aziz Nather
Department of Orthopaedic Surgery
National University Hospital
5 Lower Kent Ridge Road
Singapore 119074

- Update to Multi-Media Curriculum – Textbook entitled “Radiation and Tissue Banking”
- Textbook on Basic Sciences Component entitled “Scientific Basis of Tissue Transplantation” published as “Advances in Tissue Banking Volume 5”

NEED FOR AN INTERNET DIPLOMA COURSE

Currently the distance learning Course – NUS Diploma Course in Tissue Banking is structured into two phases:-

- Phase I – two weeks Foundation Course (face to face) in Regional Training Centre (NUH Tissue Bank)
- Three sets of Distance Learning Assignments sent by RTC at quarterly intervals
- Phase II – one week Evaluation Course (face to face) in RTC (NUS Diploma Examination). Students who pass will be awarded an NUS Diploma in Tissue Banking.

IAEA currently funds the costs for overseas lecturers and students from 13 Member States for the two-week Phase I Foundation Costs. On the average, this amounts to about US \$100,000 per course. By running an Internet Course, a face-to-face Phase I Course need not be held with enormous cost-savings for IAEA. Also, due to budgetary constraints of IAEA, the distance learning Diploma Course has been largely restricted to one participant from each country under RAS 7/008. An Internet Course will encourage more participants from Member States to enrol. It will also facilitate participants from other regions such as Africa and parts of Europe to join the training in Singapore. IAEA has directed the RTC in Singapore to consider developing such an Internet Diploma Course since October 2000.

REQUIREMENTS FOR AN INTERNET COURSE

For the student

A survey form has been sent to all National Co-ordinators of RAS 7/008 to study the existing hardwares and softwares available in Member States.

The student's requirement includes:-

- Access to a computer
- 486 or equivalent processor
- 16 MB of RAM or greater
- 2 Gb hard drive or greater
- Version 3 of Netscape Navigator/ Internet Explorer or similar
- 56 Kbps modem
- CD-ROM drive
- Printer

For the training centre

- A Web Server plus backup Web Server
- Programmers
- Database experts
- System analysts
- Multi-media developers
- Materials developed should meet international

standards

- An on-line repository/ database
- In-built security features including pass-word protected access for registered students
- Development of CD-ROM Package of Course Materials as an addition to Internet Materials – especially useful for participants in countries unable to access web-site due to inadequate information technology facilities

Implementation Plan

The following is the plan designed for a structured delivery of Diploma Course Materials and Distance Learning Assignments starting in April 2002:-

QUARTER 1

MODULE 1

- > On-line registration with NUS
- > First quarter release of Course Syllabus
 - Module 0: Historical Background
 - Module 1: Rules and Regulations (plus update)
 - Module 2: Organisation (plus update)

- Slides accompanying Modules
- Basic Sciences: Anatomy
 - Matrix biology and physiology of tissues
 - Immunology
- Recommended textbook

- > Self-Assessment Questions
- > On-line results of Self-Assessment Performance
- > First quarter release of Distance Learning Assignments

QUARTER 2

MODULE 2

- > On-line results of Q1 Distance Learning Assignments
- > Second quarter release of Course Syllabus
 - Module 3: Quality Assurance (plus update)
 - Module 4: Procurement (plus update)
 - Module 5: Processing (plus update)
- Slides accompanying Modules
- CD/ Video-tapes demonstrations on Modules 4 and 5
- Basic Sciences
- Recommended textbook

- > On-line Self-Assessment Questions
- > On-line results of Self-Assessment Performance
- > Second quarter release of Distance Learning Assignments

QUARTER 3

MODULE 3

- > On-line results of Q2 Distance Learning Assignments
- > Third quarter release of Course Syllabus
 - Module 6: Distribution and Utilisation
 - Module 7: Future developments in Tissue Banking (plus update)

- Slides accompanying Modules
- CD/ Video-tapes demonstration on Module 6
- Basic Sciences: Biology of healing of allografts
 - Biomechanics of allografts

- Update to Curriculum: "Radiation and Tissue Banking"
New developments in scientific aspects
Role of biosynthetic skin replacements

- > Video Conferencing/ Web casting of tissue transplantation practice
- > On-line Self-Assessment Questions
- > On-line results of Self-Assessment Performance
- > Third quarter release of Distance Learning Assignments including practical assignments

QUARTER 4 FACE TO FACE EVALUATION

- One week examination in NUS
- Assessment of Practical Assignments
- Theory exam
- Practical exam (Objective Structured Practical Exam)
- Viva
- Compulsory for authentication/ Validation of student's identity and performance
- Award of NUS Diploma Certificates/ Convocation
Dean's Office NUS has approved that NUH Tissue Bank convert the Distance Learning Course into an Internet Course.

The NUS Project Team comprises of:-

- Associate Professor Aziz Nather
Director NUH Tissue Bank
- Ms Chang Hseuh Fun
System Analyst, Dean's Office (Manager of Web Server)
- Ms Lim May Ying Lilian
Analyst Programmer, Centre for Instructional technology (CIT)
- Ms Sia Jia Ling

Research Assistant, NUH Tissue Bank

- Dr Wang Lihui
Manager, NUH Tissue Bank

The IAEA Project Team includes:-

- Mr Jorge Morales Pedraza
Interregional Project Manager, IAEA
- Professor Glyn O. Phillips
Technical Advisor to DDG, IAEA
- Mr Emlyn Phillips
Programme Developer, IAEA

This development is extremely important as this will be the first Diploma Course conducted by NUS on the web leading to a full NUS Diploma certification in Singapore. In the field of tissue banking, it will also be the first such Internet Course made available worldwide.

The following has been developed to date:-

- Setting up of a Web Page
- On-line registration with NUS for Phase I Course – April 2001
- Conversion of Modules 4 and 5 into Internet Material
- On-line Theory and Practical Tests in Smart Rooms with each student on a PC with auto-marking
- On-line Feedback Evaluation for Phase I Course – April 2001

ACKNOWLEDGMENTS

The authors would like to thank the Dean's Office and the Centre for Instructional Technology, NUS for the technical support given to develop this Internet Course and also Ms Sia Jia Ling, Dr Wang Li Hui and Ms Chun Suet Mei, Bernardette for all technical assistance provided in the preparation of this manuscript

REFERENCES

1. Nather A. Tissue Banking in the Asia Pacific Region : Current Status and Future Developments. Journal of Orthopaedic Surgery, 1999; 7; 2 : 89-93.
2. Nather A. Diploma Training for Technologists in Tissue Banking. Cell and Tissue International, 2000; 1 : 41-44.
3. Nather A. Tissue Banking in Asia Pacific Region – The Asia Pacific Association of Surgical Tissue Banking. In : Phillips G. O., Strong D. M., Von Versen R., Nather A., ed. Advances in Tissue Banking, Volume 3. World Scientific Publishing Ltd. Singapore, New Jersey, London and Hong Kong. 1999 : 419-425.