SUBJECT REVIEW REPORT

DEPARTMENT OF PATHOLOGY

FACULTY OF MEDICINE
UNIVERSITY OF PERADENIYA

29th to 31st August 2007

Review Team :
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CONTENTS

1. SUBJECT REVIEW PROCESS

The Quality Assurance and Accreditation (QAA) framework currently implemented in the University system in Sri Lanka, envisages reviewing all subjects and institutions in the national Universities of Sri Lanka. In keeping with this objective, the Quality Assurance and Accreditation Council of the University Grants Commission, Sri Lanka appointed a team of senior academics from the Universities of Colombo and Kelaniya to undertake a subject review in Pathology at the Faculty of Medicine, University of Peradeniya.

The Review Team comprised of:

Prof. Chandu de Silva (Review Chair)
Prof. Janaki Hewavisenthi
Prof. Nilanthi de Silva

The subject review was undertaken to evaluate the quality of the Pathology teaching programme at the Faculty of Medicine University of Peradeniya. The review visit was carried out by the above team from 29 – 31 August 2007 (see Annexure 1 for programme). The process used was acquisition of additional information through discussion of issues, and gathering of and analysis of evidence. These findings were then compared with the Self Evaluation Report (SER) presented by the Department of Pathology. The aim was to use all evidence to make a judgment as required by the Quality Assurance Programme on the quality of the eight review aspects listed below, as given in the Quality Assurance Handbook, for Sri Lankan Universities, published by the CVCD and UGC in July 2002:

1. Curriculum Design, Content and Review
2. Teaching, Learning and Assessment Methods
3. Quality of students, including student progress and achievement
4. Extent and Use of Student Feedback (Qualitative and Quantitative)
5. Postgraduate Studies
6. Peer Observation
7. Skills Development
8. Academic Guidance and Counselling

The Faculty is in the process of changing its MBBS curriculum at present. Students in the first, second and third years of study are following the new curriculum, while the more senior batches are following the old curriculum. The Pathology teaching programme for the last batch of students on the old curriculum is almost complete. Currently, the first batch of students on the new curriculum, and the last batch of students on the old curriculum receive inputs from the Pathology Department. Thus the review process covered both programmes.

The review processes adopted by the team were:

- **meetings** with the Vice-Chancellor; Director, Academic Affairs; Head of Department; academic and non academic staff in the Department; Senior Student Counsellors in the Faculty; and undergraduate and postgraduate students (see Annexure 2 for complete list of persons met during the visit).
- **observation** of teaching/learning sessions – 1 lecture and one revision practical for 4th year students on the old curriculum
- **inspection** of academic facilities: lecture halls, tutorial rooms, museum, laboratory and learning support facilities (library and e-library).
- **perusal** of documents (curriculum documents, timetables, handouts, examination papers, mark sheets, records of student feedback etc.).

2. BRIEF HISTORY OF THE UNIVERSITY, FACULTY AND THE DEPARTMENT

University of Peradeniya commenced with the inception of the University of Ceylon, on 1st July 1942 and shifted to Peradeniya on 6th October 1952. It is now one of the largest universities in the country, with over 10,000 internal students registered for its academic programmes in eight faculties and two postgraduate institutes.

The Peradeniya Medical School was established in 1961 and the first batch of 103 students was admitted in January 1962. The Peradeniya Medical School and Dental School were converted to an independent Medical and Dental Faculty in 1967. The School of Veterinary Science became a part of the Faculty in 1970. In 1980, Veterinary Medicine and Animal Science were separated to form a new Faculty of Veterinary Medicine and Animal Science. The Dental School became a separate Faculty in 1986. The Teaching Hospital, Peradeniya, the most significant addition to the Faculty of Medicine in recent years, was opened in June 1980. Currently, the Faculty has 15 Departments of study, including the Department of Pathology, and 2 Units.

The Department was one of the initial departments that comprised the Faculty at its inception in 1963. The Department contributes to the MBBS degree programme. The Pathology teaching programme for students on the old curriculum was in the 3rd and 4th years of the MBBS programme. The last batch of students on the old curriculum (2003/04 intake, 189 students) has completed 5 of the 6 terms in their teaching programme. For students on the new curriculum, departmental teaching activities start at the end of the 2nd year and continue through the 3rd and 4th years. Currently, there are 184 students who have completed the 2nd semester of the 2nd year (2004/05 intake, new curriculum).

Although the Department carries a relatively heavy teaching load, it has cadre provision for only one Chair and 7 other academic posts; these are occupied by 1 Professor, 3 Senior Lecturers and 3 Lecturers. One Senior Lecturer / Lecturer post is vacant at present; it has been kept vacant in the hope that a Chemical Pathologist can be recruited to the Department. Although the academic cadre is almost full now, the review team notes that the Department has had only 2 or 3 fully qualified teachers during 7 of the past 10 years.

Support staff in the Department includes a Chief Technical Officer, 7 other Technical Officers and 8 laboratory attendants. The post of departmental clerk is vacant. The department has one temporary pre-intern demonstrator at present.

Infrastructure available for the Pathology teaching programme includes a well-equipped lecture theatre with seating capacity for 200, a spacious museum that houses an excellent collection of pathology specimens, and a student laboratory for slide classes. This laboratory has a good video microscope and television for demonstration of slides, but the microscopes available for student use are fairly old, and most have poor optics. The entire department has only 3 computers, and one of these is currently out of service. The Department has a large histopathology laboratory as well as special laboratories for immuno-histochemistry and immuno-fluorescence. These laboratories cater to the heavy load carried by the department in providing diagnostic pathology services to a large number of public and private sector hospitals.

3. AIMS AND LEARNING OUTCOMES

The learning objectives for the General Pathology and Haematology components of the new MBBS curriculum are listed in **Annexure 3 and Annexure 4**. The learning objectives for the Clinical Pathology component are listed in **Annexure 5**. These were obtained from the documents made available during the review visit.

4. FINDINGS OF THE REVIEW TEAM

4.1 Curriculum Design, Content and Review

The medical curriculum in the Faculty of Medicine is undergoing a curriculum change at present, as a result of which the subject of Pathology is taught as part of the old curriculum to the AL 2003/2004 batch of students and as a component of the new curriculum to the AL 2004/2005 batch.

Old curriculum

Under the old curriculum students learn Pathology in the 3rd and 4th years together with Microbiology, Parasitology, Pharmacology, Forensic Medicine and Community Medicine. This is a traditional course where general pathology is taught in the 1st and 2nd terms of the 3rd year, whilst systemic pathology, clinical pathology and haematology are scheduled during the next three terms. This is followed by a final pre-examination term comprising tutorials and small group discussions. This curriculum also includes a clinical pathology appointment lasting for one month. The clinical appointment consists of one week at the blood bank, Teaching Hospital Peradeniya, one week of clinical pathology at the pathology laboratory, Teaching Hospital Peradeniya and two weeks of haematology and histopathology at the pathology laboratory General Hospital Kandy.

Detailed learning objectives have been identified for general pathology, haematology and clinical pathology lectures and the clinical pathology and haematology appointments. It was felt that a lot of time had been well-spent to formulate these objectives especially regarding the knowledge aspect, but the objectives for skills development were not clearly stated. These learning objectives were available to students before the lectures. There was no documentation of objectives for the systemic pathology component. The review team hopes that this aspect will be attended to in the systemic pathology content of the new curriculum. The objectives for haematology lectures and the clinical pathology appointment are very specific and detailed. These objectives, however, could be phrased in more behavioural terms. For example, the phrase “to know” should be replaced with “describe”, “enumerate” etc.

Major revisions of the old curriculum had not been done frequently. One example of revision is the introduction of applied general pathology lectures during the last few years. The review team feels that this change is good and will help the students to realize the clinical relevance of general pathology. Minor changes to the curriculum have been implemented depending on staff and student feedback on the teaching learning process.

New curriculum

The new curriculum is conducted on a semester system with credit rated modules and assessment based on Grade Point Averages. As opposed to traditional methods of teaching, the new curriculum will focus mainly on clinical relevance, self directed learning,

professional development and community oriented learning. There appears to be a well structured review process for planning and implementation of the new curriculum. A Curriculum Development Committee plans the curriculum review process. Implementation is carried out by the Curriculum Coordinating Committee and the X, Y and Z Committees. Academic members of the Department of Pathology participate in these meetings. Documentation of the meeting procedures is satisfactory.

In the new curriculum general pathology is taught in the Foundation for Clinical Practice Module during the last 5 weeks of the 2nd semester of the 2nd year, and in the Foundation Module conducted in the first 3 weeks of the 1st semester of the 3rd year. This will be followed by systemic pathology, clinical pathology and haematology. The review team congratulates the departmental staff for planning the concept of a foundation module which will give the students solid foundation knowledge of basic pathological processes before they embark on their clinical training. The contents and subject matter of the foundation module is very similar to the general pathology component of the old curriculum. A major change is that clinical pathology lectures have been included in this module. The subject of atherosclerosis has been introduced. Although a curriculum change is underway, and one of the main objectives of this change was to make the curriculum more clinically relevant, this does not appear to have been addressed sufficiently in the new general pathology learning objectives.

Detailed objectives for the foundation module have been identified. Here again, the learning objectives specify required knowledge in great detail, but objectives for skills development are not identified.

The new curriculum will have a clinical pathology appointment which is identical to that of the old curriculum with regard to duration, objectives and learning/teaching methods. The review team is of the opinion that the Department of Pathology has an excellent opportunity to improve on this aspect of the pathology curriculum. As the new curriculum focuses on clinical relevance, the review team feels that skills development such as blood grouping and cross matching should be included in the clinical appointment with the objective of assessing the students on this important and clinically relevant skill. The curriculum review process has not yet finalized the objectives of the systemic pathology component.

4.2 Teaching, Learning and Assessment Methods

Old curriculum

The teaching / learning programme consisted of 144 hours of lectures, 22 hours of tutorials, 15 hours of small group discussions, 18 hours of practicals and 15 hours of revision practicals per student over a course of 6 terms. The 144 lecture hours covered 19 topics in General Pathology, 60 topics in Systemic Pathology, 12 topics in Haematology and 4 topics in Clinical Pathology. The tutorials, small group discussions and practical classes covered 45, 12 and 12 topics respectively.

Tutorials are conducted for the entire batch. They consist of discussion of questions which have been given to the students prior to the teaching session. The review team is aware that inclusion of the entire batch of students in a single tutorial class, although not ideal, was because of the severe shortage of academic staff in the past. In recent years there have been smaller group discussions. The small group discussions are conducted by dividing the batch into six groups, each consisting of approximately 30-35 students. These sessions consist of

discussion of museum specimens and questions. These sessions are mostly teacher orientated with very little discussion amongst the students, thus they are more like tutorials. The practical classes consist of examination of microscopy slides preceded by a demonstration of these slides using video microscopic facilities.

Assessment methods consist of an end of course examination comprising a 2 hour theory paper of four essay type questions, a 2 hour theory paper of 12 short essay questions, a 20 minute practical examination of 10 microscopy slides and a viva –voce examination (5 minutes per student). The final mark allocation is 70% for the theory component, 10% for the practical examination and 20% for the viva voce. There is no provision for continuous assessment.

New curriculum

The pathology teaching / learning programme in the foundation module consists of 52 hours of lectures, 3 hours of small group discussions, 3 hours of practical classes and 7 hours of museum classes per student over a period of 8 weeks. The students have 4 hours for self generated learning activities. The small group discussions, practical classes and the museum classes are similar to those of the old curriculum. The review team is happy that the rather ineffective method of having tutorial classes for the entire batch has been done away with in the new curriculum.

The assessment method for the foundation module has not been finalized although the current batch of students has completed 5 out of 8 weeks in the course. The planned assessment scheme includes both formative and summative assessments. The formative assessment will consist of preparation of a portfolio containing brief case reports that students see during their first clinical appointment. The students are expected to identify the basic pathological processes that they observe in the patients clerked by them. There will be a 5 minute viva voce based on the portfolio. The summative assessment is expected to include a 2 hour short answer theory paper with 12 questions contributing 80% of the marks and a viva voce examination contributing to 20% of the summative examination.

In both old and new curricula, the teaching learning activities are appropriate for the specified learning objectives with only a few exceptions. It is clear that the staff take a lot of trouble in preparing material of all sorts which include overhead projection material and Power Point presentations. The students, especially those who have completed the pathology course, were very appreciative of the hard work put in by the academic staff. In fact some of them felt that the Department of Pathology was the best organized department out of all the pre- and para-clinical departments. The review team noted however that computer assisted learning and internet resources currently have only a minor role in the teaching activities. This aspect of learning is limited to students being informed by the teachers about good web sites that provide information, image banks etc. The review team was impressed by the museum facility in the department and also the endeavor to mount pathology specimens in the Department itself. A technician has been trained for this purpose in Malaysia and he has been able to commence this procedure in the Department using locally manufactured equipment and machinery.

The range of assessment tools generally matches the expected learning outcomes of the old curriculum. Multiple choice questions have never been used as an assessment tool by the department. The review team is of the opinion that with the change of curriculum, the department should also consider introducing a wider range of assessment tools such as

multiple choice questions and objective structured practical examinations. Objectives of both the new and the old curricula do not identify accurate diagnosis of histopathology slides as a skill that has to be acquired during the study course, and yet the old curriculum has a practical examination of 12 slides.

4.3 Quality of Students, including Student Progress and Achievement

The students are recruited to the M.B.B.S degree course by the University Grants Commission based on the national education policy of the state. Therefore, neither the Medical Faculty of Peradeniya nor the Department of Pathology has any say in the recruitment process of the students.

Old Curriculum

As shown in Table 1 below, the pass rates are high, varying between 90 – 95%. The slight decrease in the pass rates of the March 2007 examination may be explained by the student unrest that prevailed at that time. Only 1-2 students have failed the repeat examination but this too has not resulted in the "drop out" of students from the course (See Table 2).

Distinctions have been awarded consistently, the number varying from 7 – 23 per batch. Similarly, 2 Gold Medals (Dr H. J. Huzari and Loos Gold Medal), two prizes (Irene Maralande Panabokke prize and Prof. G.E. Tennakoon prize) and a scholarship (Punchi Banda Panabokke and Irene Maralande scholarship) have been regularly awarded.

Table 1. Pass rate and award of distinctions in Pathology at the main examinations

Year	Total number of students	Number passed	Distinctions
July 2002	177	165 (93.2%)	07
July 2003	185	175 (94.6%)	18
May 2004	174	165 (94.8%)	12
January 2005	175	172 (98.3%)	23
October 2005	175	167 (95.4%)	11
June 2006	175	161 (91.5%)	12
March 2007	183	162 (88.5%)	07

Table 2. Referrals at repeat examinations

Year	Total number of students	Number referred
November 2002	12	01
December 2003	10	02
October 2004	9	01
May 2005	3	00
March 2006	8	00
January 2007	21	01

New curriculum

No assessments have taken place under the new curriculum

The review team is of the opinion that these levels of student progress and achievement are highly satisfactory.

4.4 Extent and Use of Student Feedback, Qualitative and Quantitative

According to documents made available to the review team during their visit, the department has obtained regular feedback from students on the performance of individual teachers as well as on the teaching activities conducted by the department. Most of the teachers have obtained feedback by inviting free comments from the students. On occasion, students have also been asked to complete structured questionnaires with rating scales and these have been analysed with the assistance of the Faculty's Medical Education Unit. Much of this feedback indicates that the teaching programme is generally satisfactory and that most students are happy with the Pathology programme.

Where students have indicated deficiencies, steps have been taken to correct them as far as possible. For example, when student have commented in 2003 on the lack of specific learning objectives for the Clinical Pathology appointment, this has been noted and learning objectives drawn up for each component of the appointment, and made available to the students.

Analysis of student feedback regarding the Foundation for Clinical Practice module in the new curriculum was also made available to the review team. Most students appear to be of the opinion that they had been provided with clear learning objectives, adequate guidance for self-learning and adequate facilities to learn essential skills. However, students also felt that the time provided for self-learning was inadequate and that the duration of the course was inadequate to achieve the desired learning outcomes.

4.5 Postgraduate Studies

The Department of Pathology undertakes training of post graduates for the Postgraduate Institute of Medicine, Colombo and is an accredited training center for Diploma in Pathology, MD (Histopathology), and MD (Haematology) courses.

At present there are 17 post graduate trainees attached to the Department of Pathology. This includes 7 Diploma in Pathology trainees, 4 MD (Histopathology) trainees, and 5 MD (Haematology) trainees. In order to train these postgraduates, the department has a well-equipped laboratory which undertakes not only in routine histopathology and cytopathology techniques, but also performs special stains, immunohistochemistry and immunofluorescence techniques. Further the department has an immense service component of 8,000 – 10,000 surgical pathology samples that enables the postgraduate trainees to develop excellent diagnostic skills.

The postgraduate trainees routinely attend clinico-pathological conferences conducted by the department which includes a weekly renal pathology meeting, a bi-weekly dermatopathology meeting and a monthly surgical case presentation session. Journal clubs are conducted regularly. These activities further enhance postgraduate training. Postgraduates are provided with opportunities to develop their teaching and communication skills by participating in the Clinical Pathology lectures and practical classes for undergraduate students.

The department staff supervises postgraduate research projects and writing up of case reports which are pre-requisites for board certification as a specialist..

The trainees are assessed as to their abilities in the form of 'mock' examinations prior to their examinations and feedback is provided. This provides excellent preparation for the examination.

One of the draw backs identified by the review team, also articulated by the trainees themselves, was the lack of books which could be accessed easily. The library and the department are closed to the trainees after 4.00 pm which is the time they do much of the reporting, and hence need books for reference.

The lack of an adequate number of computers in the department is also a cause for concern because postgraduate students need ready access to the internet.

4.6 Peer Observation

As stated in the Self-Evaluation Report, there is no formal practice of the peer observation process in the department. However, several informal practices within the department enable the academic staff to help each other in improving their teaching and assessment of students. For example, when junior staff members are assigned lectures, they discuss their lecture notes and presentations with the Professor before conducting the lecture.

Also, most of the staff members have participated in the teaching methodology workshop conducted by the Medical Education Unit in the Faculty. During this workshop, each participant is given an opportunity to conduct a mini-lecture under observation by senior colleagues and fellow participants and to obtain feedback from them.

Examination questions are set by staff members and each question and model answer or marking scheme is discussed and reviewed with the Professor or Head of Department. Answer scripts that have been given borderline marks by the first examiner are discussed in conference by all the senior staff in the Department, before determination of the final mark.

4.7 Skills Development

The review team does not agree with the idea expressed in the Self-Evaluation Report that 'skills in relation to Pathology are not important at undergraduate level'. There are several skills required of medical graduates, that could be best acquired in the Pathology course, which have however, not been expressed very clearly in the learning outcomes of the department. This has already been emphasized in Section 4.2. This is especially relevant to Clinical Pathology and Haematology. Skills development is most likely to succeed if teaching learning and assessment methods in pathology are designed to enable the acquisition of the required skills in this field.

Most of the skills in Pathology, which an undergraduate might be expected to have, can be acquired during the Clinical Pathology appointment, which is of 1 month's duration. To achieve this objective, the clinical pathology appointment needs to be better organized. The students appeared unaware of the objectives drawn up for this appointment. They expressed the need for some reorganization of this appointment, because of overlap in the different components. The students also felt that it would be useful to have an assessment following the appointment rather than testing it at the final year surgical OSPE.

4.8 Academic Guidance and Counseling

Academic guidance and counseling takes the form of those failing the summative examination meeting with the chief examiner who discusses their weak points and gives them feedback regarding their performance at the examination.

The students do not find adequate time to approach the academic staff during the course to clarify their doubts and concerns even though the staff have made themselves available for such meetings.

5. CONCLUSIONS

1. Curriculum Design, Content and Review

Strengths/Good Practices

1. Introduction of a new curriculum with General Pathology taught in a foundation module.
2. Detailed objectives identified for General Pathology component of the new foundation module, Haematology, Chemical Pathology and the Clinical Pathology appointment.
3. Subject content of the old and new curricula are comprehensive.

Weaknesses

1. There are no objectives for the systemic pathology component of the old curriculum.
2. Objectives for skills development are not identified.
3. The need for clinical relevance could be better addressed in the new General Pathology learning objectives

2. Teaching, Learning and Assessment Methods

Strengths/Good practices

1. Most teaching and learning methods are appropriate for the desired learning outcomes.
2. The teaching-learning methods are highly appreciated by the students.
3. Small group discussions and museum classes provide opportunities for interactive learning.

Weaknesses

1. Limited range of assessment tools: multiple choice questions and OSPEs have not been used at all.
2. The practical examination in the old curriculum does not evaluate any listed objective.
3. Students identified several shortcomings in the Clinical Pathology appointment.
4. Assessment methods for the new curriculum have not been finalized.
5. Lack of continuous assessments in the old curriculum.

3. Quality of Students, including Student Progress and Achievements

Strengths/Good Practices

1. Excellent pass rates.
2. No drop-outs for the course due to failure in Pathology.
3. Distinctions and prizes in Pathology have been awarded regularly.

Weaknesses

None of note

4. Extent and use of Student Feedback

Strengths Good practices

1. Students routinely asked to give feedback on performance of individual teachers as well as on components of the teaching programme.
2. Student feedback has been used to improve specific aspects of the teaching programme

Weaknesses

1. No mechanism for informing students of follow-up action resulting from their feedback

5. Postgraduate Studies

Strengths/Good practices

Wide range of diagnostic material, many laboratory techniques in use, and up-to-date laboratory facilities which enable the department to function as a centre of excellence in postgraduate training in histopathology and haematology.

Qualified academic staff to supervise postgraduate training, both research and diagnostic

Clinico-pathological meetings and journal clubs held regularly

Continuous, in-training evaluation of postgraduates

Postgraduates are given a regular opportunity to teach undergraduates

Weaknesses

1. Lack of ready access to books for use by trainees
2. Inadequate computer facilities for trainees within the department

6. Peer Observation

Strengths/Good practices

1. Junior staff members prepare their lectures with guidance from the Professor.
2. Probationary lectures have an opportunity to get feedback from peers on their teaching skills, during the educational methodology workshop

Weaknesses

1. Absence of a set procedure for departmental staff to provide each other with feedback on their teaching practices

7. Skills Development

Strengths/Good practices

1. The presence of a 4-week clinical pathology appointment provides an excellent opportunity for skills development in a clinical setting.

Weaknesses

1. Students do not adequately utilize the opportunity for acquiring skills as these have not been identified in the curriculum
2. The present structure of the Clinical pathology appointment is not conducive to skills development

8. Academic Guidance and Counseling

Strengths/Good practices

1. Counseling of students following summative end-of-course examination
2. Academic staff are available for guidance of students

Weaknesses

None of note

Based on the observations made during the visit by the review team and discussed above, the eight aspects were judged as follows:

Aspect reviewed	Judgment given
Curriculum design, content and review	Satisfactory
Teaching, learning and assessment	Satisfactory
Quality of students, including student progress and achievement	Good
Extent and use of student feedback	Good
Postgraduate studies	Good
Peer observation	Satisfactory
Skills development	Unsatisfactory
Academic guidance and counseling	Good

The overall judgment is suspended

6. RECOMMENDATIONS

1. Develop learning objectives for the systemic pathology component of the curriculum as early as possible.
2. The Department should consider identifying Pathology-related skills required of medical graduates, and develop learning objectives for such skills.
3. The Department should consider highlighting the clinical relevance of General Pathology by using appropriate teaching learning methods
4. The Department should consider introducing a wider range of tools for assessment of medical students, such as multiple choice questions and Objective Structured Practical Examinations.
5. The Clinical Pathology appointment should be better structured, with better learning objectives, and teaching-learning and assessment methods.

6. The Faculty should finalize regulations for assessment of students following the new curriculum as early as possible.
7. The university should provide increased computer facilities for academic and non-academic staff, and postgraduate trainees in the department
8. The Department should consider drawing up a regular programme for academic staff to provide each other with feedback on their teaching practices

7. ANNEXES

Annex 1. Programme for Pathology Subject Review

Day 1: Wednesday 29.08.2007

8.00 – 9.00 am	Meeting of QAAC Representative with Review Team
9.00 – 9.30 am	Meeting with Vice-Chancellor, Director / Academic Affairs and Medical Faculty Representative / IQAU
9.30 – 10.00 am	Discuss Review visit programme with Head of Dept
10.00 – 10.15 am	Tea
10.15 – 11.00 am	Presentation on Self-Evaluation Report by Professor
11.00 – 12.30 pm	Meeting with academic staff
12.30 – 1.30 pm	Lunch
1.30 – 2.30 pm	Observation of facilities in department
2.30 – 5.30 pm	Observe documents

Day 2: Thursday, 30.08.2007

9.00 – 9.45 am	Meeting with 3rd year students
9.45 – 11.00 am	Observe facilities: Library, E-library, Teaching Hospital Peradeniya
11.00 – 12.00 am	Meeting with non-academic staff
12.00 – 1.30 pm	Meeting with postgraduate students
1.30 – 2.00 pm	Lunch
2.00 – 2.40 pm	Meeting with final year students
2.40 – 3.15 pm	Observe teaching (Dr DM Dissanayake, lecture for 4th years)
3.15 – 4.00 pm	Meeting of reviewers
4.00 – 5.00 pm	Meeting with 4th year students

Day 3: Friday 31.08.2007

9.00 – 10.00 am	Meeting with student counsellors
10.00 – 10.15 am	Tea
10.15 – 11.30 am	Meeting of reviewers and report writing
11.30 – 1.00 pm	Wrap-up meeting with Departmental staff
1.30 – 2.30 pm	Lunch
2.30 – 3.00 pm	Observe teaching (revision practical for 4th years)

Annex 2. List of persons met by the Review Team

1. Vice-Chancellor, University of Peradeniya

2. Director/Academic Affairs, University of Peradeniya and Medical Faculty Representative in IQAU

3. Members of the academic staff in Department of Pathology
   Prof Neelakanthi Ratnatunge, Professor of Pathology
   Dr Dhammika Manike Dissanayake, Head of Department
   Dr Rukmini Gunawardena, Senior Lecturer
   Dr Roshika Waduge, Senior Lecturer
   Dr Sulochana Wijethunge, Lecturer
   Dr D Jayakody, Lecturer
   Dr EH Siriweera, Lecturer

4. Non-academic staff members in Dept of Pathology
   Ms Sujatha Ramadasa, Chief Technical Officer
   Mr AT Herath, Technical Officer
   Mr GHD Shilan Chandraprabha, Technical Officer
   Mr Prasad Karunaratne, Technical Officer
   Ms Damayanthi Tennakoon, Technical Officer
   Ms N Herath, Technical Officer
   Mr VS Gunarathne, Laboratory Attendant
   Mr EG Muthubanda, Laboratory Attendant
   Mr SC Senarathna, Laboratory Attendant
   Mr Sisira Bandara, Laboratory Attendant

5. Undergraduate students
   a. Seven from 2004 / 2005 admission year (new curriculum)
   b. Four from 2002 / 2003a admission year (old curriculum, completed Pathology exams)
   c. Twelve from 2003 / 2004 admission year (old curriculum, completed 5 terms of the Pathology course)

6. Postgraduate students
   a. Diploma in Pathology trainees
      i. Dr CPK Rajapaksha
      ii. Dr PM Ratnayake
      iii. Dr KRWMGKKP Rathnayake
      iv. Dr SI Majitha
      v. Dr WDPI Imbulpitiya
   b. MD trainees
      i. Dr EH Siriweera (Histopathology)
      ii. Dr D Jayakody (Haematology)
      iii. Dr CLM Gamage (Haematology)
   c. Post-MD trainees
      i. Dr S Wijetunge (Histopathology)
      ii. Dr BMS Bandaranayake (Haematology)
      iii. Dr WDP Vidyarathe (Haematology)

d. MPhil student
    i. Ms MSF Shihana

7. Student Counselors:
    a. Ms Arosha Perera, Student Counsellor, Career Guidance Unit
    b. Dr Indika Gawarammana, Senior Student Counsellor, Faculty of Medicine
    c. Dr Udaya Dangahadeniya, Senior Student Counsellor, Faculty of Medicine

Annex 3: Learning objectives for General Pathology

Acute inflammation

The student should

01. be able to describe the basic function of acute inflammation.
    i.e. that it is a protective response, and occurs only in living tissue.
02. appreciate that there can be harmful effects too.
03. appreciate that inflammation is not synonymous with infection.
04. be able to enumerate causes of acute inflammation.
05. be able to describe the characteristics of inflammation described by Celsus. i.e.: the 5 cardinal signs and their pathogenesis.
06. read about experimental work done by Julius Cohnheim and other experimental work.
07. know the triggering factors of acute inflammation.
08. apprectiate that acute inflammation is essentially a vascular event.
09. know the types of blood vessels involved in acute inflammation.
10. be able to describe the vascular changes that bring about the cardinal signs of acute inflammation
11. know the patterns of responses:
    ie: immediate transient response,
    delayed persistent response,
    immediate persistent response,
    Lewis's triple response
12. be able to describe the types of exudates, ie: fluid and cells.
13. be able to name the cells involved in the acute inflammatory process and their functions.
14. be able to describe the concepts and mechanism of neutrophil emigration.
15. be able to describe chemotaxis.
16. be able to name the chemical mediators of inflammation and their modes of action.
17. be able to describe the factors that modify the inflammatory response.
18. be able to describe the harmful effects of inflammation.
19. be able to describe tthe natural sequalae of acute inflammation ie: resolution, suppuration etc.
20. be able to explain the terms 'exudate', 'transudate', 'pavementing', 'margination', and 'emigration of leucocytes', 'chemotaxis', 'oedema', 'permeability', 'resolution' etc.
21. be able to describe the different types of inflammatory exudates and be able to correlate this with the aetiology of the inflammation.
22. describe the clinical manifestation of acute inflammation.
23. be able to describe the principles of treatment of acute inflammatory conditions
24. be able to name the laboratory investigations that are used for diagnosis of an acute inflammatory process
25. be able to describe the process of suppuration

26. be able to explain the term abscess and empyema
27. be able to explain the term 'pus'
28. be able to describe the sequalae of an abscess in different tissues, organs and locations, and the clinical features in each case
29. be able to explain the principles of treatment of an abscess

Chronic inflammation

The students should

01. be able to describe the concept of chronic inflammation.
02. be able to name the cells involved in this process.
03. be able to describe the functions of each of these cells.
04. be able to describe the mechanisms underlying the functions of these cells.
05. be able to name the causes of chronic inflammation and the broad categories of chronic inflammation.
06. be able to describe the end result of chronic inflammation ie: organisation, fibrosis – endarteritis obliterans.
07. be able to name the lesions caused by chronic inflammatory diseases – with examples.
08. be able to describe the secondary effects of chronic inflammation. ie. Epithelial dysplasia, metaplasia, neoplasia, amyloidosis etc.
09. be able to explain the term granulomatous inflammation
10. be able to describe a granuloma
11. be able to describe the difference between granuloma and granulation tissue.
12. know classifications of granulomata.
13. know the causes of granulomatous inflammation.
14. be able to describe the differences in each type of granuloma.
15. be able to describe the end result of granulomatous inflammation.
16. be able to describe the lesions and pathogenesis of lesions of the following diseases. Tuberculosis, leprosy, Rheumatic fever syphylis, filariasis, leishmaniasis, schistosomiasis, fungal infection, actinomyocosis.
17. be able to describe the pathogenesis of common clinical chronic inflammatory conditions – chronic ulcers, infections like tuberculosis, leprosy
18. atuoimmune disease, ulcerative colitis, Crohn's disease, cirrhosis of the liver, chronic osteomyelitis, chronic pyelonephritis etc. strictures, adhesions scars etc:
19. be able to list the differences between acute and chronic inflammation.
20. be able to name the biologically active products of macrophages and lymphocytes.
21. be able to describe the functions of the biologically active products.
22. be able to explain the meaning of the term 'cold' abscess – ie in Tuberculosis?

Wound healing

Student should be able to-

1. define the terms-a. repair b. regeneration c. restitution.
2. name the components of the extra cellular matrix[ECM] and how they are synthesized.
3. describe how collagen is formed.
4. outline the biochemistry of collagen turnover.[synthesis and degradation]
5. list the factors necessary for normal collagen synthesis.
6. recall the processes involved in the formation of granulation tissue.
7. differentiate between labile, stable and permanent cells and give examples for each type of cell.
8. outline the basic steps in the healing process.
9. describe the process of remodelling.

10. list the molecular events in cell growth.
11. understand what growth factors are.
12. name the growth factors needed for repair and regeneration.
13. describe how growth factors are synthesized and how their functions are controlled.
14. explain what cyclins and chalones are.
15. describe contact inhibition.
16. recall that the well known trophic hormones also play a vital role in the healing process.
17. recall the structure of surface epithelium, and epithelial organs.
18. recall that tissue can heal by regeneration and restitution.
19. recall the tissues that heal by repair.
20. name the tissue that is utilised for repair.
21. define the term 'organisation', and give examples of this process in different pathological conditions.
22. recall the steps in the healing of a clean surgical wound ie healing by primary union[1st intention]
23. describe the healing of a large open skin wound i.e. healing by secondary union[2nd intention]
24. explain the concept of delayed primary suture.
25. explain the differences in these types of healing.
26. explain the differences between 'wound contraction' and 'contracture'
27. name the factors that affect wound healing-favourably and adversely.
28. list the complications of healing in different tissues-e.g. skin, intestine ,brain ,urinary tract, liver, bone, myocardium, lung, kidney etc.
29. explain the concept of wound strength.
30. list the factors affecting wound strength.
31. explain the concept of wound failure.
32. describe the process of fracture healing.
33. name the factors affecting fracture healing.
34. list the complications of fractures.
35. apply the knowledge of the general process of healing in different systems, in relevant diseases, and work out the clinical effects.

Spread of malignant tumours

The student should be able to

1. define what metastasis is.
2. define the process of metastasis.
3. describe the mechanism and factors involved in metastasis. i.e. receptors, enzymes.
4. name the methods of spread of malignant tumours.
5. differentiate carcinoma – in – situ from invasive carcinoma.
6. describe the other types of spread (with well known clinical examples)
   - intraneural
   - perineural
   - intracavity
   - trans coelomic
   - trans pleural
   - via CSF

   spread along epithelial lined surfaces (lung, carcinoma of lip, Paget's disease of the nipple, etc)
7. name the tissue resistant to tumour invasion.
8. define the concept "field of tumour".

9. name the factors controlling metastatic potential.
10. explain the concept of tumour progression.
11. describe lymphatic spread, and associated clinical features.
12. describe the concept of regional node involvement.
13. define ‘ skip metastasis’ and explain its pathogensis.
14. explain the meaning of sentinel node biopsy.
15. discuss the pathogenesis of lymphadenopathy in malignancy.
16. explain the soil and seed hypothesis.
17. explain the homing properties of tumours.
18. describe the mechanism of vascular invasion.
19. name the common sites where blood borne metastasis occur, giving examples for each.
20. explain the relationship between tumour invasion and vascular thrombosis.
21. explain the concept of retrograde venous spread.
22. differentiate between osteolytic and osteosclerotic secondaries.
23. differentiate between Grading and Staging of tumours.

Cell response to injury

At the end of this class the student should be able to describe the

01. structure of the cell and the cell / stromal relationship.
02. structure of the cells and the functions of its component parts.
03. general metabolic activities and functions of each cell component, and their interdependency.
04. protective mechanisms in the cells to counteract injury during the normal course of daily metabolism.
05. injurious agents affecting cellular structure and function.
06. locations or sites of injury in the cell.
07. functions that are affected when a cell or component is injured.
08. biochemical (functional) and structural changes – that occur as a result of injury. (Structural means – the changes that occur to the structure, which can then be visualised macroscopically, microscopically (Light and EM).
09. process of non-lethal, sublethal and lethal injury.
10. meaning of the term “degeneration” and necrosis.
11. diseases and conditions causing fatty change, haemosiderosis, haemachromatosis and lysomal storage diseases etc. and other metabolic diseases.
12. concepts of connective tissue abnormalities.
13. meaning of the terms – hyaline, mucoid and myxoid change/ degeneration, adiposity (as opposed to fatty change) etc.
14. concept of apoptosis.
15. conditions where apoptosis occurs.
16. basic steps in apoptosis.
17. differences between apoptosis and necrosis.

Tuberculosis

The learner should be able to

1. name the causative organism of tuberculosis.
2. describe the granulomatous lesion of tuberculosis.
3. explain the pathogenesis of a tuberculous granuloma.
4. describe the sequelae of such a granuloma.

5. describe the differences in the components of the granuloma in a non sensitized and a previously sensitized host.
6. discuss the role of BCG vaccination in sensitizing the host.
7. define the concept of I^{ry} tuberculosis.
8. name the lesions of I^{ry} tuberculosis and describe them.
9. describe the Ghon focus and I^{ry} complex of Ranke.
10. name the complications of I^{ry} tuberculosis.
11. define the concept of II^{ry} or post primary tuberculosis.
12. name the lesions of post primary tuberculosis and describe them.
13. explain the differences in I^{ry} and post primary tuberculosis.
14. explain the mechanism of the differences mentioned in 13.
15. explain the pathogenesis of metastatic tuberculosis.
16. name the lesions and complications of extrapulmonary tuberculosis.
17. name the tests available for the diagnosis of tuberculosis.
18. explain why these tests are useful and how they are interpreted.

Necrosis

Student should be able to –

1. understand what cell death is.
2. define the term necrosis.
3. describe the macroscopic and microscopic features necrotic tissue/cells.
4. outline the basic processes taking place during necrosis.
5. differentiate between autolysis and heterolysis.
6. name the morphological types of necrosis and describe the macroscopic appearances (i.e. coagulative, liquifective, caseous, fat necrosis, Zenkers, gangrenous, piecemeal, fibrinoid necrosis, interphase necrosis) and their pathogenesis. Give examples of different types of necrosis enumerated .
7. name the biochemical changes occurring in the different types of necrosis.
8. describe the clinical effects of necrosis-
    a. Alteration of functions of organs or tissues.
    b. Release of contents of necrotic cells into circulation.
    c. Systemic effects.
    d. Local effects
    e. Bacterial infection.
9. understand that acute inflammation is seen in the viable tissue around a focus of necrosis.
10. name the laboratory investigations that would be useful to detect necrosis in the living person.
11. discuss the outcome of necrosis.

Apoptosis

12. define the term apoptosis.
13. discuss the clinicopathological significance of apoptosis giving examples.
14. Name the steps in apoptosis and the controlling factors.
15. discuss the entities associated with abnormal apoptosis.
16. differentiate between apoptosis and necrosis.
17. define the term reperfusion injury.
18. give examples and possible mechanisms of reperfusion injury.
19. Apply the knowledge of the general process of necrosis in systems in relevant diseases and workout the clinical effects.

Thrombosis

At the end of the learning session the student should be able to,

01. recall the normal haemostatic process.
02. recall the nature and function of platelets.
03. recall the coagulation cascade.
04. describe the normal physiological mechanisms available for prevention of excessive thrombosis/coagulation.
05. recall the normal fibrinolytic activity.
06. recall the histology of blood vessels.
07. recall the normal function of the endothelial cell.
08. define a thrombus?
09. define a clot and describe the fundamental difference between a thrombus and a clot.
10. describe the 03 basic factors that promote thrombosis.
11. recall Rudolph Virchow's triad of predisposing factors of thrombosis.
12. recall the clinical examples and instances for each of these main factors.
13. describe red, pale and mixed thrombi?
14. recall 13, in relation to the different varieties of thrombi arising in arteries, veins and capillaries.
15. recall 13, and 14, in relation to formation of thrombi in fast flowing systems, and slow blood flow systems.
16. describe the lines of Zahn and how these are visualised.
17. describe the difference between antemortem thrombus and a postmortem clot.
18. describe the natural sequelae to thrombosis, ie. Lysis, organisation, recanalisation, fibrosis, calcification, embolisation, clot retraction, inflammation of blood vessels.
19. recall the pathogenesis of thrombosis of deep veins of the leg.
20. recall the steps in formation of a venous thrombus.
21. describe a platelet thrombus, corralline thrombus, occluding thrombus, and a consecutive clot.
22. explain what is meant by propagation of a thrombus.
23. describe the sequelae of venous thrombosis.
24. recall the sequelae and complications of venous thrombosis of deep leg veins, retinal veins, superior saggital sinus, cavernous sinus and vein of Galen.
25. describe what is meant by a mural thrombus.
26. describe what is meant by thrombophlebitis.
27. describe what is meant by phlebothrombosis
28. recall the special types of venous thrombosis – ie. phelgmasia alba dolens, phlegmasia cerulae dolens, thrombophoebitis migrans.
29. recall diseases associated with venous thrombosis.
30. recall the causes and effects of arterial thrombosis.
31. describe the causes of increased platelet adhesiveness.
32. describe the causes of a hypercoagulable states
33. describe what is meant by Disseminated Intravascular Coagulation (DIC).
34. describe the causes of DIC.
35. apply the knowledge of the general process thrombosis in systems, in relevant diseases, and work out the clinical effects.

Embolism

At the end of the learning session student should be able to,

01. define an embolus.
02. name the commonest type of emboli.

03. list the other types of emboli.
04. name the two major categories of embolism.
05. name the commonest source of pulmonary emboli.
06. name the other, but uncommon sources.
07. describe the sites of lodgement of pulmonary emboli.
08. describe the clinicopathological effects of pulmonary emboli.
09. describe the fate of a pulmonary embolus.
10. name the sources of systemic emboli.
11. name the major sites of lodgement of systemic emboli.
12. describe the situations where amniotic fluid embolism AFÉ (infusion) occur.
13. describe the clinical features of AFE.
14. describe the microscopic features seen in the pulmonary circulation, at post mortem in amniotic fluid infusion.
15. describe the features attributed to pulmonary and cardiac decompensation, in amniotic fluid embolism.
16. describe what is meant by barotrauma.
17. describe how air or gas gain access to the circulation.
18. describe how vascular occlusion is caused.
19. describe what is meant by Caisson disease – ' decompression sickness'.
20. explain the mechanism of gas embolism in 19.
21. describe the types of decompression sickness.
22. describe what occurs in the acute form and in the chronic form of 21.
23. explain how fat embolism occur.
24. describe the clinical manifestations of fat embolism.
25. describe the pathogenesis of fat embolism and its clinical effects.
26. describe clinico-pathological features of Massive pulmonary embolism (it– causes sudden dramatic respiratory collapse) and to describe the mechanisms implicated.
27. recall that tumour emboli – can cause secondary deposits, and consumption coagulopathy and also the fact that tumour emboli can occur in lymphatics too.
28. recall that parasites and foreign bodies can produce granulomata at sites of lodgement.
29. describe the parenchymal cells that can embolise. (Parenchymal cells, bone marrow, syncytiotrophoblasts from placenta, hepatocytes after laceration of liver, brain tissue following head injury and birth trauma, pancreas after partial pancreatectomy)
30. describe what is meant by micro emboli – ie.atheromatous and platelets.
31. describe where micro emboli occur and their clinical significance.
32. describe what is meant by a septic embolus and their effects.
33. describe what is meant by a bland embolus and their effects.
34. describe the foreign bodies known to embolise.
35. describe how to differentiate between a pulmonary embolus and a post mortem clot, lodged in the pulmonary trunk.
36. apply the concept of embolism in disease conditions and work out the pathogenesis of the disease and the clinical effects.
37. apply the knowledge of the general process of embolism to systems, in relevant diseases, and work out the clinical effects.

Ischaemia and Infarction

At the end of this module the students should be able to;

01. define an endartery.
02. Recall the concept of collateral arterial and venous circulation.
03. explain the term ischaemia.

04. explain that ischaemia is a relative phenomenon. It's occurrence is controlled by tissue perfusion, and the metabolic status of the tissue.
05. explain that if perfusion cannot meet the metabolic demand, tissue necrosis results.
06. enumerate the causes of altered tissue perfusion ie.
    a. arterial insufficiency
    b. capillary occlusion
    c. venous drainage insufficiency.
07. define the term ' infarct'.
08. explain the meaning of the term infarction. Latin – 'infarcire'
09. describe the types of infarction
    a. Pale - red
    b. Arterial – venous
    c. Septic – bland
10. explain the pathological processes that take place when an end artery is occluded
11. explain the pathological processes that occur when venous drainage is occluded and the mechanism of venous infarction
12. describe the sequelae of an infarct (ie: inflammation, organisation, fibrosis, calcification, secondary infection).
13. enumerate the causes and decscribe the macroscopic and microscopic features of infarcts of the
    a. brain
    b. heart
    c. liver
    d. spleen
    e. kidney
    f. intestine
    g. bone
    h. limbs
14. explain the factors that control the development of an infarct
15. describe the clinical features of infarction
16. name the laboratory tests that might be altered when infarction occurs. Explain why this occur.
17. apply the knowledge of the general process infarction and ischaemia in systems, in relevant diseases, and work out the clinical effects.

Hypertrophy/Hyperplasia

At the end of this module the students should be able to;

01. define the terms hypertrophy/hyperplasia
02. describe the classifications for hyperplasia / hypertrophy.
03. explain the cellular changes that occur in a tissue/organ when it undergoes hypertrophy/hyperplasia.
04. recall that nutrition and energy is required for hypertrophy/hyperplasia to occur, and to maintain the cell in a hypertrophic/ hyperplastic state.
05. recall that growth factors control 04.
06. describe the types of cells that can undergo hypertrophy/hyperplasia.
07. describe the cellular mechanism / process of hyperplasia/ hypertrophy
08. describe the stimuli for hypertrophy/hyperplasia (causes of hypertrophy)
09. recall that if adequate blood is not supplied to a hypertrophic organ – cell death can result.

10. describe the macroscopic appearance of a tissue or organ that has undergone hypertrophy/ hyperplasia
11. describe the clinical examples of hyperplasia/ hypertrophy..
12. explain the pathogenesis of each of the conditions mentioned in 11.
13. describe the clinical effects of these conditions.
14. describe the advantages and disadvantages of hypertrophy and hyperplasia .
15. know the difference between: aplasia,hypoplasia, hyperplasia, dysplasia, , atrophy, hypertrophy, dystrophy.
16. apply the knowledge of the general processes hyperplasia and hypertrophy in systems, in relevant diseases, and work out the clinical effects

Atrophy

At the end of this module the students should be able to;

1. describe the term atrophy.
2. enumerate the types of atrophy.
3. describe the cellular changes in atrophy.
4. describe the cellular mechanism leading to atrophy including the various proteolytic mechanisms and apoptosis.
5. describe why lipofuscin granules increase in atrophy.
6. describe the macroscopic and microscopic appearances of an organ that has undergone atrophy
7. describe the clinical effects of atrophy
8. explain what is meant by brown atrophy.
9. apply the knowledge of the general process atrophy in systems, in relevant diseases, and work out the clinical effects.

Pigmentation

At the end of this module the students should be able to;

01. describe a pigment
02. describe the term pigmentation
03. describe the term depigmentation
04. enumerate the two major types of pigments
05. describe the categories of endogenous pigments
06. describe the melanin pigment, and the cells that synthesize it
07. name the conditions leading to excessive melanin pigmentation
08. describe the causes of decreased pigmentation
09. describe the entity Ochronosis
10. define the pigment in Ochronosis
11. name the pigments derived from haemoglobin.
12. describe the colour change that occur in a contusion/bruise and explain why this happens.
13. describe haemosiderin and it's derivation
14. name the instances of haemosiderin deposition in tissues and name the diseases
15. describe how haemosiderin is demonstrated in tissues
16. describe the effects of haemochromatosis and the cause of this disease
17. describe how bile is derived
18. describe hyperbilirubinaemia, and the different types of hyperbilirubinaemia and causes of this entity
19. describe the colour of tissue that is stained with bile and state the effects of the different types of hyperbilirubineamia in cells and tissues
20. describe the lipofuscin pigment
21. describe the derivation of lipofuscin

22. name the conditions that lead to accumulation of lipofuscin in cells
23. recall that unlike haemosiderin and unconjugated bile, lipofuscin is not toxic to cells
24. name the common exogenous pigments
25. describe the entities anthrocosis, and pneumoconiosis
26. recall that carotene, Silver, Lead, Mercury all cause pigmentation.
27. describe what is 'Wilson's disease'
28. describe the Kayser – Fleischer ring and describe the disease "Wilson's disease"
29. apply the knowledge of the general process pigmentation to systems, in relevant diseases, and work out the clinical effects.

Calcification

At the end of this module the students should be able to;

01. define heterotopic or pathological calcification.
02. define dystrophic calcification.
03. define metastatic calcification.
04. describe the macroscopic and microscopic appearances of calcium deposits.
05. name the special staining techniques that are used to demonstrate calcium, in tissue.
06. recall that both types of calcification can be intra or extracelluar.
07. give examples of dystrophic calcification.
08. describe the clinical effects of dystrophic calcification.
09. describe the mechanism underlying dystrophic calcification.
10. recall calcinosis univerasalis
11. describe tumoral calcinosis
12. recall chondrocalcinosis
13. give examples of metastatic calcification.
14. describe the causes of hypercalcaemia
15. name the sites of calcification in metastatic calcification.
16. explain the pathogenesis of metastatic calcification.
17. explain the clinical effects of metastatic calcification.
18. describe the clinical implications of calcification/
19. describe the examples of calcification – which is of use in diagnostic radiology
20. apply the knowledge of the general process calcification, to systems, in relevant diseases, and work out the clinical effects.

Amyloidosis/ β Fibrillosis

At the end of the learning session student should be able to:

1. define the term amyloidosis and to state why it is also called β fibrillosis.
2. describe the nature of amyloid.
3. describe the circumstances in which amyloid is deposited in tissue.
4. describe the composition of amyloid and the different types of amyloid.
5. state the exact place where amyloid is deposited.
6. describe the microscopic appearance of amyloid.
7. describe the staining characteristics of amyloid.
8. describe the pathogenesis of amyloid deposits.
9. describe the pathological effects of amyloid on parenchymal cells.
10. describe the different classifications used to categorize amyloidosis i.e. primary and secondary, localized and systemic, etc.
11. name the diseases that predispose to deposition of amyloid.
12. name the main locations of amyloid deposition in conditions mentioned in 11.
13. describe the localized form of amyloidosis.

14. name the familial amyloidosis syndromes.
15. discuss the clinical effects of amyloidosis i.e. physical signs
16. describe how amyloidosis is diagnosed.
17. apply the knowledge on the general process of amyloidosis to relevant diseases and workout the clinical effects.

Oedema

At the end of the learning session student should be able:

01. to describe the anatomy of the tissue microcirculation: arterioles, capillaries, venules and lymphatics.
02. to describe the forces governing the exchange of fluid between the tissue and the microcirculation.
03. to describe the physiological mechanisms responsible for salt and water balance in the body.
04. to define the term oedema.
05. to describe the basic causes of oedema categorized under the following principal changes:
    - increased hydrostatic pressure.
    - reduced oncotic pressure.
    - increased capillary permeability.
    - lymphatic obstruction
    - retention of salt and water.
06. to describe the mechanism of formation of exudatory oedema
07. to compare and contrast the qualities of exudatory oedema fluid and transudatory oedema fluid i.e. describe the differences between an exudates and a transudate.
08. to categorize oedema as localized and generalized oedema.
09. to name causes of generalized oedema and localized oedema with examples.
10. to describe sequelae of oedema, with clinical manifestations, in the following situations:
    a. pulmonary oedema
    b. cerebral oedema (recall that brain does not have lymphatics).
    c. limb oedema
    d. lymphatic oedema (lymphoedema)
    e. inflammatory oedema
    f. venous oedema
11. to describe the causes, effects and pathology of
    a. cardiac oedema
    b. renal oedema
    c. hepatic oedema
    d. nutritional oedema.
12. to describe the clinical differences between pitting oedema and non pitting oedema.
13. to describe the physiological mechanisms which are responsible for preventing development of oedema in the lower limbs of a normal human being when standing.
14. to describe the changes that occur in closed compartments due to oedema: Compartment syndrome.
15. to list the processes that inure lymphatics
16. to describe the clinicopathological outcome due to injured lymphatics.

Hyperaemia and Congestion

At the end of the learning session student should be able:

01. to define the process hyperaemia.

02. to describe the types of hyperaemia. (active and passive)
03. to define the process congestion.
04. to describe the causes of active hyperaemia.
05. to describe the causes of passive hyperaemia.
06. to describe the concept of chronic venous congestion.
07. to describe the effects of active hyperaemia.
08. to describe the effects of passive hyperaemia.
09. to describe the macroscopic and microscopic appearances of the brain, lungs, liver, spleen, intestine, when these organs are congested acutely and chronically. (describe both acute and chronic categories)
10. to enumerate the causes of acute and chronic congestion, in the organs mentioned in 09.
11. to describe the clinical effects of acute and chronic congestion.
12. to apply the knowledge on the general processes oedema and congestion to relevant diseases, and work out the clinical effects.

Atherosclerosis

Student should be able to-

1. define the term atherosclerosis and explain the basis for this nomenclature.
2. name the arteries commonly involved.
3. name which area of the aorta is usually involved.
4. explain the clinical manifestations- i.e. Myocardial infarction, Cerebral Infarcts, Gangrene of legs, Mesenteric occlusion.
5. name the risk factors-Age, Sex, Diabetes etc.
6. identify the two morphological lesions- Atheromatous plaque
   Fatty streak
7. describe the macroscopy of the atheromatous plaque.
8. name the components of the atheromatous plaque.
9. describe the microscopy of the atheromatous plaque.
10. describe the foam cell.
11. describe the complications-Expansion,Calcification,Ulceration, Thrombosis, Haemorrhage, Aneurysm formation.
12. describe the macroscopy of the fatty streak.
13. name the components of the fatty streak.
14. describe the pathogenesis of atherosclerosis-chronic inflammation initiated by injury to endothelium.
15. describe a concentric and eccentric plaque, and explain the clinical significance of these two morphological types.

General aspects of tumours /Introduction to tumour pathology

The learner should be able to

1. define the lesion ‘tumour’/neoplasm.
2. explain the origination of this term ‘tumour’.
3. explain why the study of tumours is important in clinical practice.
4. differentiate the process of neoplasia, from hypertrophy, hyperplasia, metaplasia and dysplasia, all of which are disorders of growth and differentiation.
5. define the lesions ‘hamartoma’ and ‘choristoma’.
6. explain how tumours are named, i.e. nomenclature.
7. explain how tumours are named according to biological behavior and histogenesis.

8. describe the nomenclature of tumours arising from epithelia, mesenchymal tissue, totipotent cells, embryonic pluripotent cells, endocrine cells, melanin producing cells, haemopoietic cells, and neural cells.
9. describe vagaries in nomenclature.
10. name the three broad categories of tumours, as named according to biological behavior.
11. describe the morphological and behavioral differences of the three categories.
12. explain the concept of borderline malignant tumours, taking ovarian tumours as an example.
13. explain the meaning of the term 'grading' of a malignant tumour.
14. explain the meaning of the term 'staging' of a malignant tumour.
15. explain the importance of knowing about grading and staging.
16. describe the factors that control/affect the growth of a tumour.
17. explain the term 'doubling time' of a tumour.
18. describe the macroscopic appearance of benign and malignant tumours.
19. explain the clinical effects due to physical the presence of tumours.
20. explain the term dysplasia.
21. describe the morphological features of dysplastic cells and tissue, according to the severity of dysplasia.
22. relate the changes of dysplasia to the development of neoplasms.
23. name the methods available to assess the degree of a malignancy.
24. explain the TNM system of staging of tumours.

Early Diagnosis of Tumour

The student should be able to –

1. describe the importance of early diagnosis of tumours.
2. define the term preneoplasia.
3. describe the significance of preneoplasia, giving examples seen in clinical practice. e. g. GIT
4. mention the procedures for early diagnosis of tumours in:
   breast – FNA, mammography
   thyroid – FNA
   cervix – Pap smear
   GUT – cytology
   Lung – bronchial wash, bronchial brush, biopsy
5. know the procedures and method of collection of the above.
6. name familial causes and the methods available for prevention of these tumours.

Paraneoplastic syndromes

At the end of the learning session the student should be able:

1. to define the term paraneoplastic syndrome
2. to list the causative factors of paraneoplastic syndromes e.g.
   a. Biologically active substances produced by the tumour eg. Hormones, ectopic hormones
   b. Immunoglobulins synthesised by the tumours
   c. Autoimmune phenomena
   d. Formation of soluble immune complexes
   e. Secretion of substances not yet identified
3. to explain that paraneoplastic syndromes may represent the earliest manifestation of an occult neoplasm

4. to explain that in affected patients these may represent significant clinical problems and may even be lethal
5. to explain that they may mimic metastatic disease and therefore need treatment.
6. to describe (giving examples) paraneoplastic syndromes belonging to following groups
    a. Endocrinopathies
    b. Ectopic hormone production
    c. Neuromyopathic
    d. Dermatologic effects
    e. Clubbing of fingers and Hypertrophic osteoarthropathy
    f. Vascular and haematological effects
7. to explain that hypercalcaemia is the most common paraneoplastic syndrome and is often underdiagnosed
8. to describe the different mechanisms of hypercalcaemia describing
    a. Hypercalcaemia caused by skeletal metastasis due to resorbtion of bone factors released by tumour cells
        i. PG
        ii. Factors with PTH like activity
    b. Hypercalcaemia associated with haematological malignancies eg. Myeloma, ALL, lymphoma due to release of bone resorbing peptides like
        i. OAF
        ii. TNF alpha
        iii. IL-1
    c. Non metastatic hypercalcaemia (humoral hypercalcaemia of malignancies) caused by PTH related protein.
        i. Squamous carcinoma of lung
        ii. Ca of pancreas
9. to define the tumour markers are
10. to describe different groups of tumour markers
11. to explain clinical uses of tumour markers
12. to give examples of tumour markers

Applied General Pathology – Picture story.

- Be able to enumerate the general pathological processes and clinical features in each case.
- Be able to mane relevant investigations for the diagnosis of each condition.

1. Acute meningitis.
2. Cerebral space occupying lesion.
3. Myocardial hypertrophy.
4. Myocardial infarction with mural thrombosis.
5. Pulmonary TB cavity.
6. Lobar pneumonia.
7. Arterial thrombosis.
8. Peptic ulcer – stomach.
9. Barrett's oesophagus.
10. Pyloric stenosis.
11. Leather bottle stomach due to CA stomach.
12. Typhoid ulcers.
13. Crohn's disease – linear ulcers.
14. Colon- ulcerative colitis.

15. Colon – polyps and carcinoma.
16. Bone fractures.
17. Bone tumours.
18. Liver - hepatitis.
19. lymphoedema
    - Arm
    - Breast
20. Pulmonary embolism.
21. Splenomegaly.
22. Crohn's stricture.
23. Hyperplastic TB – intestine.
24. TB adenitis.
25. Fungating tumour.
26. Congested liver.
27. Amyloid liver.
28. Fatty liver.
29. Naevus.
30. Wart / papilloma.

Annex 4: Learning objectives for Haematology

The series of lectures on haematology include 18 lectures (45 minute):

1. Haemopoiesis
2. Red cell & anaemia
3. White cells
4. Hypochromic and microcytic anaemia
5. Iron metabolism
6. Macrocytic anaemia
7. Myelodysplasia and Aplastic anaemia
8. Haemolytic anaemia
9. Thalassaemias and haemoglobinopathies
10. Chronic Myeloproliferative disorders
11. Acute leukaemias
12. Chronic leukaemias
13. Myeloma and paraproteinaemia
14. Normal Haemostasis
15. Bleeding disorders due to platelet defects
16. Coagulation disorders
17. Blood products
18. Adverse effects of transfusion

The learning objectives are provided under each heading

Haemopoiesis:

1. To know how to define the terms Haemopoiesis, granulopoiesis and thrombopoiesis and leucopoiesis
2. To know the normal structure of the bone marrow
3. To know how the pleuripotent stem cells give rise to different mature blood cells
4. To know the sites of haemopoiesis in embryo, fetus, infant, child and adult and to describe the term extramedullary haemopoiesis

5. To know the growth factors and cytokines involved in haemopoiesis and their roles in regulating the process of haemopoiesis.
6. To know the process of erythropoiesis, granulopoiesis, thrombopoiesis and lymphopoiesis describing the different cells involved in each step.
7. To know the therapeutic uses of erythropoietin and colony stimulating factors
8. Describe the investigations that are performed in order to study the abnormalities of haemopoietic process and bone marrow structure

Red cell and anaemia

1. To know the adaptive responses to anaemia
2. To know the symptoms and signs of anaemia
3. To understand the mechanisms of production of anaemia
4. To understand the morphological classification and diagnostic approaches to anaemia.

Haemolytic anaemia

1. To know the tests for recognizing
    a) That red cells are being destroyed at an excessive rate
    b) That the marrow is producing cells at a rate in excess of normal
2. To understand the mode of inheritance, biochemical basis, clinical and laboratory features of hereditary spherocytosis.
3. To understand the role of glucose6 phosphate dehydrogenase in glucose metabolism and in the pathogenesis and clinical characteristics of haemolytic anaemia associated with the deficiency of this enzyme
4. To understand the role of autoantibodies in the production of haemolytic anaemia and to know the types of disease with which they are associated.
5. To know some of the causes of non immune acquired haemolytic anaemia

Thalassaemias and haemoglobinopathies

1. To understand the ways in which abnormalities in the structure and rate of synthesis of globin chains cause clinical and hematological abnormalities
2. To know the clinical and laboratory manifestations of beta thalassaemias major, minor, alpha thalassaemic syndromes sickle cell anaemia and haemoglobin E disease and Hb E/β thalassaemia

Hypochromic microcytic anaemia

1. To know about the dietary sources, mechanisms of absorption, sites of storage and method of plasma transportation of iron and the mechanism and extent of iron loss in men and women.
2. To know the iron deficiency in all ages and in both sexes
3. To know the various stages of iron deficiency and progression from iron depletion to iron deficiency anaemia
4. To know the mode of presentation of iron deficiency anaemia
5. To know the changes in the morphology of re cells, in the red cell indices, in the plasma iron levels and in the bone marrow associated with iron deficiency
6. To know how to differentiate between the anaemia due to chronic disorders and that due to iron deficiency
7. To know the principals of treatment of iron deficiency both by the oral and parenteral routes
8. To know the causes of hypochromic microcytic red cells other than iron deficiency
9. To understand the causes and consequences of iron overload

Macrocytosis and macrocytic anaemia

1. To understand the relationship between the terms macrocytic, megaloblastic, vitamin B12 deficiency and folate deficiency
2. To know the dietary sources, mechanisms of absorption, extent and site of storage and the mechanism and the rate of loss from the body of both vitamin B12 and folate
3. To be aware of the causes of B12 deficiency and folate deficiency
4. To know the symptoms and signs of B12 deficiency referable to the gastrointestinal tract, central nervous system, peripheral nerves, and the cardiovascular and haematological systems.
5. To understand the method of differentiation of megaloblastic anaemia due to B12 deficiency from that due to folate deficiency
6. To understand the principals of treatment with both B12 and folate
7. To know the B12 and folate independent causes of macrocytosis

White cell abnormalities

1. To know the more common conditions causing reductions and increases in the absolute counts of various types of white cells in the blood
2. To be familiar with aetiology, pathogenesis, clinical and haematological features and methods of diagnosis of infectious mononucleosis
3. To be aware of some of the inherited and acquired causes of abnormal granulocyte morphology and function

Acute and chronic leukaemias

1. To understand the classification of leukemia into acute lymphoblastic, acute myeloblastic, chronic lymphocytic and chronic granulocytic based on the clinical picture and the cytological findings and to be aware of further subclassicications
2. To have broad understanding of the nature of leukaemia and of aetiological factors in haematological neoplasia
3. To understand pathogenic mechanisms responsible for clinical and laboratory features of these disease
4. To know the natural history of the main types of leukaemia and the effects of treatment on it
5. To know the basic principals of treatment in acute leukaemia, CGL and CLL

Myeloproliferative disorders

1. To know the features common to this group of disorders
2. To know the pathogenesis, clinical and laboratory manifestations and the natural history of the four main types of chronic myeloproliferative disorders and current approaches to therapy
3. To understand the differential diagnosis of polycythaemia, a high platelet count and myelofibrosis

Melodysplastic syndromes and aplastic anaemia

1. To understand the concept and classification of myelodysplasia
2. To know the aetiology of acquired aplastic anaemia, including the drugs that have been most commonly reported to cause this disease.
3. To know the clinical & laboratory features, the natural history and the principals of treatment of acquired aplastic anaemia
4. To understand the differences between the aplastic anaemia and pure red cell aplasia

Myeloma and paraproteinaemias

1. To understand the meaning of the term paraprotein and to know the various clinical situations in which a paraprotein may be found
2. To have a moderately detailed knowledge of the pathology, clinical features and laboratory diagnosis of myelomatosis and to understand the principals of treatment of this disorder.

Haemostasis, abnormal bleeding and anticoagulant therapy

1. To know the morphology and function of platelets and the relationship between the concentration of platelets in peripheral blood and the extent of bleeding
2. To know about the diseases associated with
    a) A Failure of platelets production
    b) A shortened platelet survival (ITP)
3. To know the main sequence of events in both intrinsic and extrinsic pathway
4. To understand normal fibrinolysis and the principals of fibrinolytic pathway
5. To know the principals underlying tests for the intrinsic system, extrinsic system and final common pathway of blood coagulation, including the prothrombin time, APTT and thrombin time
6. To know the principals of investigation of a patient suspected of having a haemostatic defect
7. To know the mode of inheritance, clinical presentation, method of diagnosis and principals of treatment of haemophilia, Factor VIIII, Factor IX deficiency and VWD.
8. To know the effects of vitamin K deficiency and liver disease on the clotting mechanism
9. To know the alterations in the haemostatic and fibrinolytic mechanisms associated with disseminated intravascular coagulation and the causes of DIC
10. To understand the principles of anticoagulant therapy with heparin and warfarin and to know about the laboratory control of such therapy
11. To be aware of the natural anticoagulant mechanisms in blood and the concept of the pre-thrombotic state (thrombophilia)

Blood transfusion Medicine

1. To know about the inheritance of the ABO system and the type and distribution of associated antibodies
2. To know the distribution and mode of inheritance of the D antigen of the Rh system
3. To know the principles involved in the selection of donor blood of suitable ABO and Rh groups for a recipient, and the principles of the cross-match, including the antiglobulin test
4. To know the hazards of blood transfusion and massive transfusion
5. To know how to investigate a patient suspected of having an incompatible blood transfusion
6. To understand the principles of requesting blood including specimen collection and labeling.
7. To know the pathogenesis, clinical features and the principles underlying the treatment and prevention of haemolytic disease of the newborn due to anti-D
8. To know the principles of antenatal care concerned with predicting both the presence and severity of HDN due to anti-D

Annex 5: Learning objectives for Clinical Pathology

Objectives for Clinical Pathology Lectures

1. **Requesting Laboratory Investigations: 1 hour lecture**
   a. To know the uses of laboratory investigations
   b. To know when a clinician should requesting an investigation
   c. To know how to select a suitable laboratory test
   d. To know how often we should investigate patients
   e. To know when an investigation is urgent
   f. To know the different methods to asses a laboratory report (Extreme value, constellation and preceding value control)
   g. To know the clinicians contribution to valid laboratory tests

2. **Specimen collection: 2 hour lecture**
   a. To know the necessary information to be included in a request form.
   b. To know the different anticoagulants to be used and different containers
   c. To know the appropriate time for collection of the specimen
   d. To know the importance of preparation of patients for investigations
   e. To know the effect of different procedures before the venepuncture (posture, drugs & infusions) and the effects of technique of venepuncture (venous stasis, haemolysis)
   f. To know the effect of haemolysis, delayed separation of plasma or serum, exposure to light & refrigeration of whole specimen on the results
   g. To know different types of blood specimens(Venous, arterial and capillary) and the procedure for collection.
   h. To know different types of urine specimens and the procedure & instructions to be given to the patients

3. **Interpreting laboratory reports: 1 hour lecture**
   a. To know how to interpret laboratory tests
   b. To know the role of the laboratory for valid results
   c. To know the meaning of normal range and reference range
   d. To know how to calculate the reference range
   e. To know that the analytical results are affected y both analytical and biological variation.
   f. To know what is meant by normal and abnormal results
   g. To know how to decide whether the result is different from the previous result
   h. To know how to interpret the results in relation to clinical findings.
   i. To know the specificity, sensitivity, efficiency, predictive value of a laboratory test
   j. To know what is meant by near patient testing

4. **Interpreting haematological investigations: 2 hour lecture**
   a. To know the tests included in a full blood count
   b. To know the commonly requested haematological investigations
   c. To know the physiological changes of Hb value in neonate, infant, childhood, adult male & female& in pregnancy
   d. To know the changes in red cell count (polycythaemia, anaemia)

e. To know the Definition of anaemia and classification of anaemia according to the morphology and red cell indices
f. To know the physiological changes of WBC/DC in neonate, infant, child below 6 yrs, adult & pregnancy
g. To know the Clinical significance and common causes of leucopenia, neutropenia, neutrophil leucocytosis, lymphocytosis (absolute and relative)
h. To know the Clinical significance of platelet count and causes of abnormally high and low platelet counts
i. To know the Clinical significance of ESR and causes of high ESR
j. To know the tests included in a coagulation profile, BT, CT, PT, APTT & platelet count
k. To know the importance of reticulocyte count
l. To know the basic laboratory tests necessary for investigation of haemolytic anaemia

5. Interpreting biochemical investigations: 2 hour lecture

a. To know the commonly used biochemical investigations in diagnosis and management
b. Common laboratory procedures that can affect the results of a biochemical tests (eg. Delayed separation of plasma or serum)
c. To know the common causes of laboratory errors of blood sugar, hypoglycaemia, hyperglycaemia
d. To know the common test used in assessing the glycaemic control of the diabetic patients, their limitationa and advantages
e. To know the tests included in the lipid profile and interpretation of the lipid profile.
f. To know the tests included in the Renal function test and interpretation of the renal function test
g. To know the tests included in the liver function test and interpretation of the liver function tests
h. To know the commonly requested enzymes, laboratory factors affecting the results, physiological conditions and pathological conditions with high enzyme values

6. Interpreting urine reports: 1 hour lecture

a. To know the commonly requested urine tests (urine sugar, urine albumin, urine deposit, urine full report, creatinine clearance, urine for specific gravity, 24 hour urinary protein excretion, creatinine clearance, urine for micro albuminuria)
b. To know the advice given to the patients and importance of preparation of the patients for these investigations
c. To know the basic procedure for performing urine ward tests
d. To know the importance of abnormalities of urine deposit (different types of cells and casts)
e. To know how to relate the urine biochemical tests with the urine deposit and the causes for likely incompatibilities
f. To know the common special urine tests (urine for Bence Johns proteins, urine for haemosiderinuria, urinary protein electrophoresis)

7. **SGLA: 2hour**
    a. To demonstrate the procedure for collection of venous blood sample and a finger prick specimen
    b. To practice the procedure for venepuncture in the skills laboratory under the supervision of a teacher (practice on a volunteer)
    c. To show different kinds of specimen containers, syringes, and other equipment necessary for blood collection
8. **Tutorial :1 hour**
    a. Identification of laboratory errors in the reports issued (problems in collection of the specimen (collection into the incorrect container, haemolyzed sample, delayed separation of plasma, exposure of the sample to sunlight, specimen collection from a drip arm)

Total 11 hours

9. To know the correct procedures in specimen collection and transport in histological, cytological and frozen section procedures.