MASTER OF SURGERY
REPORT FOR INAUGURAL

ANATOMY by
“WHOLE BODY DISSECTION”
COURSE

(WBD-MS2012)

conducted as part of the
MASTER OF SURGERY
DEGREE COURSE
UNIVERSITY OF SYDNEY
(August 6, 2012 to October 23, 2012)

by
George Ramsey-Stewart, James May, Lindsay W Wing and Annette Burgess
REPORT

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Lindsay WING. Nicholas MALUGA. Peter CHILD. Stephen TANG. Nelson AG
David EISINGER. Hong Chee CHEW. Ju-Li KOH. George I
Harry, Whole Body Dissection Course, Master of Surgery 2012

OSTINHO. Praveen RAVINDRAN. Omar MOULINE. Samuel DANCE. Veera J ALLU
AMSEY-STEWART. Dianna Li. Kevin WANG. Shwe PHYO HAN
INTRODUCTION

Following the reintroduction of the elective teaching of clinical anatomy, by whole body dissection to medical students, at Sydney Medical School, four successive elective courses have been held for final year students in their elective terms, in 2009, 2010, 2011 and 2012. These courses were popular and objectively resulted in good and measured acquisition of topographical anatomical knowledge\(^1\), \(^2\), \(^3\).

It was noted, from comments by surgical trainees acting as demonstrators for these courses, that there was a long standing and increasing need for a post-graduate anatomy dissection course in Sydney. This need was also expressed by many in the surgical community. Such a course was required to prepare post-graduate surgical trainees aspiring to “surgical education and training” (SET) posts of the Royal Australasian College of Surgeons.

It was also needed for those already admitted to SET programs, to prepare them for the exacting primary examinations of the College in anatomy. It was held by many that the gradual decline in anatomy teaching in a number of medical schools had rendered many of the graduates of these schools ill-prepared for such examinations.

After due consultation with the head of the Discipline of Anatomy and Histology, Associate Professor Kevin Keay, and the Faculty, and after some deliberation, it was decided to establish, and urgently mount, a whole body dissection course within the structure of the Master of Surgery degree Course at the University of Sydney.

The dissection course would be part of the coursework for the MS degree. The course would account for 4 Units of Study (i.e. SURG5027-30) and would accrue 24 credit points when successfully completed, (out of the 48 credit points required for the award of the MS degree). A “surgical anatomy stream” was identified within the MS degree course (with the completion of further anatomy related Units of Study) so that the degree of Master of Surgery (Surgical Anatomy) could be awarded by coursework.

The availability of this course was announced in September 2011. It was immediately oversubscribed. A number of applicants were interviewed and by November 2011, 12 candidates had been selected as participants. The course was to be conducted over twelve weeks (from August 6, 2012 to October 23, 2012).

Due to the intensive and concentrated nature of the course, participants were warned that attempting concomitant regular hospital employment (even with favourable working shifts) was not advisable for the duration of the course. This was not to be considered a part-time course.


# DISSECTING SCHEDULE AWBD - MS 2012

## NB: PRECOURSE ASSESSMENT FRIDAY AUGUST 3, 2012

<table>
<thead>
<tr>
<th>AUGUST</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>Pectoral region, breast, axilla.</td>
<td>Back, free upper limb, shoulder.</td>
<td>Shoulder joint, arm, forearm, hand.</td>
</tr>
<tr>
<td></td>
<td>Cham 1: 1-20-34</td>
<td>Cham 1: 35-62</td>
<td>Cham 1: 62-86</td>
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<tr>
<td></td>
<td>Dissect #: 1-7</td>
<td>Dissect #: 8-13</td>
<td>Dissect #: 14-19</td>
</tr>
<tr>
<td>Week 2</td>
<td>Forearm &amp; hand (cont.), joints of upper limb.</td>
<td>Ostology of thorax, walls of thorax, thoracic cavity.</td>
<td>Lungs, ant. middle &amp; post. mediastinum, heart.</td>
</tr>
<tr>
<td></td>
<td>Cham 1: 86-114</td>
<td>Cham 2: 1-29</td>
<td>Cham 2: 30-5</td>
</tr>
<tr>
<td></td>
<td>Dissect #: 20-29</td>
<td>Dissect #: 1-6</td>
<td>Dissect #: 7-13</td>
</tr>
<tr>
<td>Week 3</td>
<td>Heart (cont.), sup. mediastinum, joints of thorax.</td>
<td>Skull, cervical vertebrae, scap, temple, face.</td>
<td>Side of neck, back of neck, anterior triangle.</td>
</tr>
<tr>
<td></td>
<td>Cham 2: 57-82</td>
<td>Cham 3: 1-21</td>
<td>Cham 3: 21-43</td>
</tr>
<tr>
<td></td>
<td>Dissect #: 14-24</td>
<td>Dissect #: 1-3</td>
<td>Dissect #: 4-18</td>
</tr>
<tr>
<td>Week 4</td>
<td>Cranial cavity, ant. middle &amp; post. cranial fossae.</td>
<td>Deep dissect. neck, thyroid, parathyroid, major vessels &amp; nerves.</td>
<td>Deep dissect (cont.), prevertebral region, deep dissect face.</td>
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<tr>
<td></td>
<td>Cham 3: 43-64</td>
<td>Cham 3: 64-86</td>
<td>Cham 3: 86-104</td>
</tr>
<tr>
<td></td>
<td>Dissect #: 19-29</td>
<td>Dissect #: 30-34</td>
<td>Dissect #: 35-43</td>
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<tr>
<td>SEPTEMBER</td>
<td></td>
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<tr>
<td>Week 5</td>
<td>The orbit, parotid region.</td>
<td>Temporal and infratemp. region, submandibular region.</td>
<td>Mouth &amp; pharynx, cavity of nose.</td>
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<tr>
<td></td>
<td>Cham 3: 104-118</td>
<td>Cham 3: 118-135</td>
<td>Cham 3: 135-157</td>
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<td></td>
<td>Dissect #: 44-50</td>
<td>Dissect #: 51-62</td>
<td>Dissect #: 63-72</td>
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<td>Dissect #: 86-98</td>
<td>Dissect #: 1-4</td>
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<td>Cham 1: 137-150</td>
<td>Cham 1: 151-165</td>
<td>Cham 1: 165-181</td>
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<td></td>
<td>Dissect #: 5-11</td>
<td>Dissect #: 12-19</td>
<td>Dissect #: 20-23</td>
</tr>
<tr>
<td>Week 8</td>
<td>Front of leg, dorsum of foot, lateral side &amp; back of leg.</td>
<td>Back of leg (cont.), sole of foot (layers 1-6).</td>
<td>Joints of lower limb</td>
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<tr>
<td></td>
<td>Cham 1: 181-196</td>
<td>Cham 1: 197-241</td>
<td>Cham 1: 214-234</td>
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<td>Dissect #: 24-31</td>
<td>Dissect #: 32-40</td>
<td>Dissect #: 41-52</td>
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<td>OCTOBER</td>
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<tr>
<td>Week 9</td>
<td>Public Holiday</td>
<td>Ostology of abdo., abdominal wall, inguinal region.</td>
<td>Male external genitalia, loin, abdominal cavity, omental bursae.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cham 2: 83-104</td>
<td>Cham 2: 104-124</td>
</tr>
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<td>Cham 2: 124-141</td>
<td>Cham 2: 141-155</td>
<td>Cham 2: 155-172</td>
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<td>Dissect #: 26-33</td>
<td>Dissect #: 34-42</td>
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<td>Dissect #: 43-47</td>
<td>Dissect #: 1-4</td>
<td>Dissect #: 5-16</td>
</tr>
<tr>
<td>Week 12</td>
<td>Prostate &amp; male urethra, uterus &amp; female urethra, rectum &amp; anal canal.</td>
<td>Vessels, nerves, lymphatics, muscles &amp; joints of pelvis.</td>
<td>24 SUMMATIVE ASSESSMENT</td>
</tr>
<tr>
<td></td>
<td>Cham 2: 219-232</td>
<td>Cham 2: 232-244</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dissect #: 17-19</td>
<td>Dissect #: 20-24</td>
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</table>

![Figure 1](Prof G. Ramsey-Stewart, Anatomy, Univ. of Sydney, August 2012)
METHODS

The Master of Surgery dissection course followed the previously successful format used for the elective MB BS final year courses, in which the 34 dissecting days were covered over 8 weeks. However, it was felt that the MS post-graduate course should aim for a higher level of surgical anatomical knowledge. Accordingly it was decided to cover the 34 days of dissection over 12 weeks (dissecting on Mondays, Tuesdays and Wednesdays only of each week). Thus participants were allowed a more measured, reflective and contemplative learning experience, with time to thoroughly carry out the required reading and other tasks, out of dissecting class time.

The Dissection Course closely followed Cunningham’s Dissection Manuals with some additions and modifications (Cunningham’s Manuals of Practical Anatomy, Romanes GJ, Volumes 1 to 3, 15th Edition, 1986, Oxford Medical Publications). It was also recommended to all participants that they should read and become familiar with Last’s Anatomy 9th Edition (Last’s Anatomy Regional and Applied, Editor RMH McMinn, 9th Edition, Churchill Livingstone) a text recommended by the RACS, and that they should possess a good quality anatomical atlas.

The Dissecting Schedule for each day’s dissection tasks, including the required pre-reading, was presented in colour-coded spreadsheet form (see Figure 1). This Schedule had to be strictly adhered to throughout the course by all participants.

The actual dissection instructions from the manuals were transcribed onto laminated colour-coded and numbered cards to be used at the dissection table. These were easily cleaned and were reusable (see Figure 2).

All diagrams from the dissection manuals were scanned and projected onto large screens in the dissection room to assist in the dissection tasks (see Figure 3).

The participants in the course were arranged alphabetically into two groups of 6 individuals (in accordance with group learning recommendations) (see Appendix 1). Each group was assigned a cadaver. All cadavers before embalming had been screened for blood-borne-viruses. For paired anatomical structures each group of six dissectors split into two groups of three for each cadaver (with regular rotation of one dissector, one assistant and one reader
of the dissection instructions).

Supervision was by eight specialist surgeons acting as Supervisors (see Appendix 2), who were present especially for their areas of expertise. At any one time there were at least two and often 3 or more Supervisors present. The Supervisors were present on an arranged roster system for their areas of expertise, and all had the status of Part-time Lecturers in Surgical Anatomy.

The format for each dissection day was as follows, -

1. 9:00 am Wilson Museum: 
Dissection briefing, lasting approximately 20 minutes, on the day’s dissection tasks, using Cunningham’s Diagrams, given by one of the participants on a Roster System (see Figure 4).

2. 9.30 am–12.30 pm Dissecting Room: Proceeding with dissection tasks for the day with Supervisors conducting ad hoc wet specimen or cadaver tutorials emphasizing clinical aspects.

3. 12.30-1.00 pm: Lunch break.

4. 1.00 pm Wilson Museum: 
Delivery of a short, approximately 20 minute, clinical or surgical anatomy lecture given by one of the specialist Supervisors, appropriate to the current dissection.

5. 1.30- 3.00 pm Dissecting Room: 
Completion of the dissecting tasks for the day and preparation for the next day’s dissection.

6. 3.00 pm Dissecting Room: 
Assessment of participants. Originally this took the form of a weekly viva voce examination, but this proved too time-consuming and interfered with the dissection schedule.

After a focus group meeting (chaired by Annette Burgess) the assessment was modified and the following became routine at 3pm each day, -

(a) Two station SCORPIO assessment daily, at 3pm
(b) At the end of each anatomical region a more formal assessment at 3pm by

MCQ’s (10 questions) and SPOT TESTS (5 identifications on each of 10 questions).

As well as the above assessments Formal
Assessments (by accurate identification of 5 tagged anatomical structures on each of four prospected wet specimens) giving a possible mark out of 20, were carried out Pre-course (baseline), Mid-course (a progress assessment) and End-course (a final assessment). It was felt that these marks were an accurate measure of the acquisition of anatomical knowledge and they were analysed statistically. (see Results page 5).

An Anonymous Student Evaluation and Feedback Questionnaire was completed at the end of the course by all participants. This included a set of 13 specific questions to be graded by Likert scale; a section for comments on the best and worst features of the course and a section for free open-ended comments on the course. This information was also analysed statistically (see Results page 6).

RESULTS

All evaluations were carried out with the approval of the University of Sydney Human Research Ethics Committee.

1. DEMOGRAPHICS.

Of the 12 participants in the course 10 were male and 2 female. The mean age of the participants was 29.8 years (SD 3.4 years) with a range of 26 years to 35 years.

Nine of the participants received their medical degrees in Australia; (three from Sydney Medical School, one from University of Melbourne, one from the University of Tasmania, one from Monash University and three from University of NSW). The others received their medical degrees as follows, - one from UK, one from Burma (Myanmar),
and one from India. Five participants held prior degrees including Bachelors degrees in Science, Engineering and Physiology.

Three candidates were enrolled in Surgical Education and Training Programs in General Surgery (SET 1). The remaining nine students were also committed to a career in surgery, with three aspiring to General Surgery; one Neurosurgery; one Orthopaedics; one Cardiothoracic Surgery; one Head and Neck Surgery; and two undecided as to the speciality. All of these nine students were desirous of achieving SET status.

All participating students had had no anatomy instruction other than in their undergraduate degree. For only two, did this involve a whole body dissection, and both of these candidates were graduates from overseas medical schools.

2. ASSESSMENTS.

The marks scored by the 12 participants in the Pre-course, Mid-course and End-course assessments are represented by histograms in Figure 5. For each assessment the median mark, the interquartile range (IQR), and the range for the group of 12 participants are given.

Statistical comparison of the Pre-course results with each of the Mid-course and End-course results in turn, by Wilcoxon signed rank test evaluation showed a highly significant difference with \( p < 0.001 \) for each comparison.

![Dissection course test histograms for Pre-course, Mid-course and End-course assessments for WBD-MS2012](image)

It is felt that these results represent a highly significant acquisition of topographical anatomical knowledge by the participants in this whole body dissection course.
3. STUDENT EVALUATION AND FEEDBACK

Response Rate:

The response rate to the questionnaire was 100% (12/12).

General Assessment:

All 12 students (100%) rated the course as “very good” (from a range of “very good” to “very poor”). All students (100%) regarded the length of the course to be “about right”.

Specific Question Response:

Taking a mean response of > 4.0 on the Likert scale as favourable, the mean response to 13 specific questions about the course is summarised in Table 1. It can be seen that the course was highly valued by students, particularly the teaching provided within a clinical context by surgical clinicians; and the small group teaching methods.

Open ended Questions:

Participant responses to open ended questions identified three outstanding features of the course:

- **Clinical context** provided during tutorials, lectures and examinations (6/12 = 50%)
- **Amount of dissection** and the guidance provided by expert specialist surgeons in various areas (6/12 = 50%)
- **Course design** and organisation (5/12 = 42%)
- It was also emphasized that more intensive use of MCQ’s and SPOT Tests to mimic the RACS Primary exam should be used throughout the course (7/12 = 58%)

<table>
<thead>
<tr>
<th>No</th>
<th>Statement</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Teaching methods during the course were helpful to me.</td>
<td>4.9</td>
</tr>
<tr>
<td>2</td>
<td>Teaching resources during the course were helpful to me.</td>
<td>4.8</td>
</tr>
<tr>
<td>3</td>
<td>I received helpful supervision during the course.</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>The Cunningham’s Manuals used in the course were helpful for my learning.</td>
<td>4.2</td>
</tr>
<tr>
<td>5</td>
<td>I found the scanned and projected Cunningham’s Manual images useful to complete the dissections</td>
<td>4.6</td>
</tr>
<tr>
<td>6</td>
<td>I found the transcribed laminated dissection cards useful to complete dissections.</td>
<td>4.4</td>
</tr>
<tr>
<td>7</td>
<td>The prosected anatomical wet specimens were useful for my learning.</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>The Supervisors were helpful during the course.</td>
<td>5</td>
</tr>
<tr>
<td>9</td>
<td>The number of students per cadaver (6) was appropriate for learning.</td>
<td>4.1</td>
</tr>
<tr>
<td>10</td>
<td>The daily 9 am dissection briefings were useful.</td>
<td>4.7</td>
</tr>
<tr>
<td>11</td>
<td>The daily 1 pm lectures given by Supervisors were useful.</td>
<td>4.8</td>
</tr>
<tr>
<td>12</td>
<td>Teaching anatomy within a clinical context with supervision from clinicians improved my learning.</td>
<td>4.8</td>
</tr>
<tr>
<td>13</td>
<td>The instruments supplied were satisfactory.</td>
<td>4.3</td>
</tr>
</tbody>
</table>

**Table 1:**

Questionnaire responses using a five-point Likert scale ranging from 1 = “strongly disagree” to 5 = “strongly agree”.
Free Comments by Participants:

Spontaneous anonymous free comments included, -

• “The best organised and delivered anatomy teaching I’ve had. This is a high-yield course and I would highly recommend it to anyone interested in a surgical career”

• “Excellent course for students keen for a career in surgery and with clinical experience”.

• “The single BEST anatomy course I am aware of in this country!!”

• “The supervisors were excellent. I felt my anatomical knowledge is vastly improved.”

• “This is easily the best and most beneficial course in the entire Masters of Surgery”.

One participant who successfully completed the course while also employed full time in a hospital residency post advised against duplicating his situation in the future. He felt he was severely disadvantaged and would have gained much more from the course if studying full time.

Focus Group Details:

A focus group was conducted by Annette Burgess in the 4th week of the course because of some participant dissatisfaction with the weekly time consuming individual viva voce assessments.

As a result, the vivas were abandoned in favour of more extensive use of daily SCORPIO tutorials and the use of MCQ’s and SPOT Tests at the completion of each body regional dissection so as to mimic more closely the techniques used in the College of Surgeons Primary examinations.

DISCUSSION and CONCLUSION

Considering the following,-

1. Overwhelming demand for this course as shown by immediate oversubscription when course announced,

2. Hard evidence of significant improvement in topographical anatomical knowledge by statistical evaluation of assessments,

3. Particularly positive and favourable participant response to the course as revealed in the anonymous student feedback and evaluation,

it is evident that this course should become a regular Unit of Study in the coursework program for the Master of Surgery degree of the University of Sydney. This dissection course when combined with associated anatomy based or related Units of Study should constitute a “surgical anatomy stream” within the coursework for the Master of Surgery and allow the award of the Master of Surgery (Surgical Anatomy) degree.

Future courses should not admit participants who are unable to devote themselves to
full time study during the 12 week period of the course. They will be unable to get maximum benefit from the course.

As far as possible there should be an emphasis on frequent formative assessments of participants (by daily SCORPIO assessments) and frequent summative assessments of participants (by MCQ’s and SPOT Tests) at the end of each regional dissection, so mimicking as closely as possible the evaluation methods used by the College of Surgeons in the Primary Examination. These assessments should be in addition to the formal summative Mid-course and End-course practical wet specimen assessments.

EPILOGUE

Subsequent to the completion of the WBD-MS2012 course, 10 of the 12 participants have now graduated with the degree of Master of Surgery (Surgical Anatomy) in May 2013.

Of the three participants who were already surgical trainees on SET programs two have now been successful in their RACS Primary examinations and one has been partly successful. (February and June 2013)
APPENDIX 1

Participants in WBD-MS2012: -

GROUP 1

1. AGOSTINHO Nelson
2. ALLU Veera
3. CHEW Hong Chee
4. DANCE Samuel
5. HAN Shwe
6. KOH Ju-Li

GROUP 2

7. LI Diana
8. MALUGA Nicholas
9. MOULINE Omar
10. RAVINDRAN Praveen
11. TANG Stephen
12. WANG Kevin
APPENDIX 2

Supervisors in WBD-MS2012:

1. Professor Michael Besser
2. Professor Tim Cartmill
3. Dr. Peter Child
4. Dr. David Eisenger
5. Professor James May
6. Dr. Allan Meares
7. Professor Sydney Nade
8. Professor George Ramsey-Stewart
9. Dr. Marlene Strathdee
10. Dr. Lindsay Wing

Discipline of Anatomy & Histology, University of Sydney, Whole Body Dissection Course, Master of Surgery 2012

Samuel DANCE, Kevin WANG, Praveen RAINDRAN, George RAMSEY-STEWARD, Nelson AGOSTINHO, Veera J ALLU, Peter CHILD, David EISINGER, Omar MOULINE, Hong Chue CHEW, Dianna LI, Ju-Li KOH, Stephen TANG, Lindsay WING, Shwe PHYO HAN
Luncheon

Held at "The Grandstand" on completion of the course, 24th of October 2012.
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2013