

**MOLECULAR PATHOLOGY
RESEARCH FELLOWSHIP ATTACHMENT PROGRAMME
IN SGH**

Components	Information
1. Division/ Department	Pathology/ Molecular Pathology
2. Title of Programme	Research Fellowship Training in Cytogenetics (with <u>no</u> patient contact)
3. Relevant Registrations	Training employment pass application with Ministry of Manpower, Singapore (MOM)
4. Overview 4.1 Background information	<p>A three-month' observation and hands-on experience under laboratory supervision in the Cytogenetics Laboratory, Department of Molecular Pathology.</p> <p>During the three months, the Research Fellow will be trained in Conventional Cytogenetics, Fluorescence in situ Hybridisation (FISH) and Chromosomal Microarray Analysis (CMA) assays. The Research Fellow will be taught various bench work processes; understand the test principles; learn to handle the specimen processing, analysis, and interpret the test results.</p>
4.2 Goal/ aim(s)	To train the Research Fellow to achieve a level of competency so as to able to have oversight of a clinical laboratory specialising in Cytogenetic Oncology.
4.3 Duration	3 months
4.4 Hyperlinks/URL Sites	https://www.sgh.com.sg/Clinical-Departments-Centers/Pathology/Pages/overview.aspx
5. Target Audience	Medical doctors with a keen interest to develop expertise in Cytogenetics and/or to head a Cytogenetics laboratory.
5.1 Pre-requisite /eligibility requirement(s)	<p>General requirements for all Research Fellows:</p> <ul style="list-style-type: none"> • A basic medical degree from an accredited medical university or medical school • Passed the relevant national licensing examination in the country of conferment of basic degree, where applicable • Evidence of at least 12 months' houseman-ship / internship with a certificate of satisfactory completion of houseman-ship or equivalent • Been registered as a medical practitioner in the country where he is currently practising • Been certified to be of good standing by the Medical Council or the relevant national authority <p>In addition to the above criteria, Research Fellows must:</p> <ol style="list-style-type: none"> a) Have a minimum of 3 years of relevant working experience as a medical officer (or equivalent) b) Preferably have obtained a postgraduate diploma or degree in his country or overseas c) Pass a pre-attachment medical examination, including Hepatitis B (antigen) test, conducted by an SGH-PGMI appointed clinic. d) Not to be involved in any form of patient contact. <p>Department's requirement, if any (only for Research Fellows in this subspecialty): Not applicable.</p>

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<p>6. Learning Objectives</p>	<p>This fellowship would allow the Research Fellow to:</p> <ul style="list-style-type: none"> • Be able to interpret results of Conventional Cytogenetics, FISH and CMA. • Be able to perform pre-analytic, analytic and post-analytic processes for Conventional Cytogenetics, FISH and CMA. • Appreciate and understand the pre-analytic, analytic and post-analytic control measures of these processes to ensure the quality of test results.
<p>7. Course/Training Syllabus</p>	<p>Type of Cases:</p> <ul style="list-style-type: none"> • MDS and leukaemia (AML, CML, ALL). • Lymphoproliferative disorder (CLL, BL FL). • Multiple myeloma. • FISH assays – haematological / solid tissue (HER2 FISH, NSCLC FISH, etc.). • CMA assays (haematological and solid tissue). <p>Type of Procedures:</p> <ul style="list-style-type: none"> • Tissue culture set-up. • Bone marrow harvest. • Slide-making and G-banding. • Karyotyping and analysis. • FISH slide processing. • FISH analysis. • CMA bench procedures. • CMA analysis and interpretation. <p>Type of Skills:</p> <ul style="list-style-type: none"> • Setting up technique. • Cell harvesting technique. • Slide-making technique. • Karyotyping and analysis skill. • FISH slide processing (e.g. pipetting, washing technique). • FISH analysis skill. • CMA analysis and interpretation skill.
<p>8. Training Method</p>	<p>Method of Supervision: Direct observation and supervised hands-on practice. Research Fellow will be supervised by an assigned supervisor at all times.</p> <p>Hands-On Experience: Research Fellow will perform or assist in the following procedures under supervision:</p> <ol style="list-style-type: none"> 1. Bone marrow culture set up. 2. Bone marrow harvest. 3. Slide making and G-banding. Operate the Thermotron Slide Drying Chamber. 4. Operate the MetaSystems automated metaphase capture platform. 5. Karyotype analysis on MetaSystems IKAROS platform. 6. Fluorescence in situ hybridisation (FISH) slides processing (on blood and bone marrow). 7. Manual processing of FFPE tissue sections for FISH. 8. Use of VP2000 equipment slide preparation.

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9. FISH probe hybridisation and post hybridisation washes.
10. FISH analysis and images capture of MetaSystems ISIS platform.
11. Plasma cell enrichment process of multiple myeloma samples on CD138+ve cells.
12. Media preparation.
13. Chromosome Microarray Analysis (CMA) bench work.
14. CMA analysis.

The Research Fellow will go through Competency Assessment for the activities after each bench activity training is completed.

**No job rotation to other Departments within SGH is required.
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TRAINING ACTIVITIES & METHODOLOGY

Name of activity	Frequency / No. of sessions / Length of session	Teaching methodology
1. Bone marrow culture set up	10 hours	Observation and hands-on practice with supervision
2. Bone marrow harvest	10 hours	Observation and hands-on practice with supervision
3. Slide Making	10 hours	Observation and hands-on practice with supervision
4. Operating the MetaSystems instrument for scanning of slides for automated metaphase acquisition	2 hours	Observation and hands-on practice with supervision
5. Chromosome analysis, karyotyping and imaging capture	22 hours	Observation and hands-on practice with supervision
6. Fluorescence in situ hybridisation (FISH) slide processing (for blood, bone marrow)	10 hours	Observation and hands-on practice with supervision
7. Manual processing of FFPE tissue sections for solid tumour FISH assay	10 hours	Observation and hands-on practice with supervision

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	8. Operation of VP2000 instrument	5 hours	Observation and hands-on practice with supervision
	9. Apply and hybridise FISH probes to target DNA	4 hours	Observation and hands-on practice with supervision
	10. Washing of post hybridisation FISH slides	4 hours	Observation and hands-on practice with supervision
	11. FISH slide analysis and image acquisition	10 hours	Observation and hands-on practice with supervision
	12. CD138+ Plasma cell sorting enrichment procedure	5 hours	Observation and hands-on practice with supervision
	13. Media preparation	8 hours	Observation and hands-on practice with supervision
	14. Chromosome Microarray Analysis (CMA) bench work	15 hours	Observation and hands-on practice with supervision
	15. CMA analysis interpretation and reporting	15 hours	Observation and hands-on practice with supervision
	16. Quality assurance and quality control processes	10 hours	Observation and hands-on practice with supervision

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<p>9. Assessment and Evaluation</p>	<p>Research Fellow will need to demonstrate their proficiency level based on the following competencies:</p> <p>1) Patient Care</p> <ul style="list-style-type: none"> • Test results must be attended to on the same day with set up of the correct tissue cultures. • Care must be exercised that the correct patient samples are labelled as such and there are no patient sample mix up. • Results are produced accurate and within the expected turnaround times. <p>2) Medical Knowledge</p> <ul style="list-style-type: none"> • Demonstrates understanding of the various cytogenetic and gene involvement associated with specific disease types. • Demonstrates knowledge of risk prognostication associated with specific cytogenetic lesions and gene rearrangements. <p>3) Practice-Based Learning and Improvement</p> <ul style="list-style-type: none"> • The Research Fellow will need to demonstrate the knowledge, attitude and skills acquired during the course of training and initiate self-directed & independent learning. • The Research Fellow is expected to exhibit progressive improvement in the level of skills and knowledge throughout the training. • Through appraisal and feedback from trainers, the Research Fellow will need to reflect and learn from the training experience, in order to achieve a level of competency. <p>4) Interpersonal and Communication Skills</p> <ul style="list-style-type: none"> • Demonstrates collegiality and respect toward colleagues and superiors. • Is inclusive and a good team player. <p>5) Professionalism</p> <ul style="list-style-type: none"> • Upholds the institution's code of conduct. • Dresses appropriately in accordance to institution dress code. • Is accountable for own actions. <p>6) Systems-Based Practice</p> <ul style="list-style-type: none"> • Demonstrates an understanding of the safety culture system in a clinical laboratory. The Research Fellow is expected to adhere strictly to all safe laboratory practices. • Demonstrates an understanding of the laboratory work system and the entire work process so as to deliver quality patient care.
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<p>9.1 Assessment approaches</p>	<p>Formative assessment:</p> <ul style="list-style-type: none"> Regular evaluation between Research Fellow and Supervisor / Head of Department Competency assessment Reflective journal- logbook recordings of training activities <p>Summative assessment:</p> <ul style="list-style-type: none"> Periodical assessment reports <p>Feedback:</p> <ul style="list-style-type: none"> End-of-training feedback form End-of-training feedback session with SGH-PGMI 															
<p>9.2 Evaluation Process 9.2.1 General overall grading system</p>	<p>The general overall grading system evaluates the Research Fellow's performance upon completion of the fellowship programme. All Research Fellows will be given a general overall grading status at the end of the fellowship programme based on the grading criteria requirements incorporating the six competencies based knowledge, skills and performance that Research Fellows must demonstrate throughout the programme.</p> <table border="1"> <thead> <tr> <th>Grading Status</th> <th>Description</th> <th>Grading Criteria Requirements</th> </tr> </thead> <tbody> <tr> <td>CMP</td> <td>Completes the programme</td> <td> <ul style="list-style-type: none"> Completes the total training hours and pass the competency assessment for assigned activities. </td> </tr> <tr> <td>USP</td> <td>Unsatisfactory performance</td> <td> <ul style="list-style-type: none"> Fails competency assessments. </td> </tr> <tr> <td>DCP</td> <td>Did not complete the programme</td> <td> <ul style="list-style-type: none"> Fail to complete the total training hours. </td> </tr> <tr> <td>WDN</td> <td>Withdrawn from the programme</td> <td> <ul style="list-style-type: none"> Withdrawal from training programme within the 3-month designated period. </td> </tr> </tbody> </table>	Grading Status	Description	Grading Criteria Requirements	CMP	Completes the programme	<ul style="list-style-type: none"> Completes the total training hours and pass the competency assessment for assigned activities. 	USP	Unsatisfactory performance	<ul style="list-style-type: none"> Fails competency assessments. 	DCP	Did not complete the programme	<ul style="list-style-type: none"> Fail to complete the total training hours. 	WDN	Withdrawn from the programme	<ul style="list-style-type: none"> Withdrawal from training programme within the 3-month designated period.
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<p>9.2.2 Options for Clinical Fellow who was graded with a (USP) for unsatisfactory performance</p>	<p>To re-learn the failed activity and re-sit the competency assessment, and pass it.</p>															

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<p>9.3 Criteria for Early Termination</p>	<p>The attachment programme will be terminated early on the ground of the Research Fellow's poor performance, misdemeanour, misconduct, negligence or breach of any terms stipulated or referred to in the Fellowship Letter of Offer and Institution Terms and Conditions.</p> <p>The Research Fellow may also request to terminate the attachment programme for reasons such as serious illness or other personal obligations. The institution will review all requests for early termination with the Research Fellow and the Supervisor / Head of Department.</p>
<p>10. Course Administration</p>	<p>Type of Certification: Certificate of Training</p> <p>Training Fee: S\$3,210 per month</p> <p>Programme Funding source: Self-funded</p>
<p>11. Past and Present Clinical Fellow</p>	<p>We previously hosted two fellows from Myanmar and The Philippines in 2006 and 2012 respectively:</p> <ol style="list-style-type: none"> 1. Dr. Thiri Tun, Myanmar, 15 Aug-10 Nov 2006 2. Dr. Gregory Cortez III, The Philippines, 6 Jul-15 Aug 2012 <p>Dr Cortez is now an Anatomic and Clinical Pathologist sub-specialising in Molecular Pathology and Cytogenetics at the Medical City Hospital, Clark, and the National Capital Region, The Philippines.</p>
<p>12. Number of Research Fellow to be accepted at any one time</p>	<p>One</p>