

**COMPETENCES REQUIRED FOR APPLICANTS  
TO ATTAIN STATE REGISTRATION AS CLINICAL SCIENTISTS**

**SPECIALTY :**

**CLINICAL CYTOGENETICS**



This document comprises a discipline-specific version of the general competence document and provides additional guidance as to how to complete the general document, Appendix 1 of the Guidelines, that you must submit with your application.

Remember that the aim of the process is for the candidate to satisfy the assessor that he or she has the appropriate basic qualifications and length of experience for issue of the Certificate of Attainment, and that the training programme/period of supervised practice has enabled the candidate to achieve the basic level of competence required for registration as a clinical scientist.

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<b>GENERIC COMPETENCES</b>		<b>SPECIFIC COMPETENCES</b>
<b>HPC Standards of Proficiency Code - Clinical Scientist</b>	<b>1-SCIENTIFIC</b>	Be able to demonstrate the rigorous application of scientific methods in his/her experience to date
3a.1	<ul style="list-style-type: none"> <li>understanding the science that underpins the specialty (modality) and the broader aspects of medicine and clinical practice</li> </ul>	<ul style="list-style-type: none"> <li>must understand the scientific principles of the techniques and methods employed in clinical cytogenetics</li> <li>must have a basic knowledge of related disciplines in order to be able to interpret diagnostic results</li> <li>must be familiar with sources of up to date information on cytogenetic abnormalities and related disorders</li> <li>must be familiar with information on the developments and needs in clinical cytogenetics</li> <li>must be able to search and critically appraise the relevant literature</li> <li>must be able to advise on choice and suitability of samples for specific diagnostic cytogenetic investigations</li> <li>must understand the effectiveness and limitations of the common diagnostic procedures relevant to clinical cytogenetics</li> <li>must be able to critically appraise , develop and refine technical procedures used in clinical cytogenetics, with respect to scientific and clinical outcomes</li> </ul>
3a.1	<ul style="list-style-type: none"> <li>demonstrating a strong base of knowledge appropriate to the specialty and to the investigations and therapeutic options available</li> </ul>	
2b.1	<ul style="list-style-type: none"> <li>experience of searching for knowledge, critical appraisal of information and integration into the knowledge base</li> </ul>	
2b.4	<ul style="list-style-type: none"> <li>ability to apply knowledge to problems associated with the routine provision, and development, of the service</li> </ul>	
2a.1	<ul style="list-style-type: none"> <li>ability to identify the clinical decision which the test/intervention will inform</li> </ul>	
2a.3, 2c.1	<ul style="list-style-type: none"> <li>ability to make judgements on the effectiveness of procedures</li> </ul>	
2a.2	<ul style="list-style-type: none"> <li>application of the knowledge base to the specialty (modality) and to the range of procedures/investigations available</li> </ul>	
<i>Achievement of:</i>	<ul style="list-style-type: none"> <li>an understanding of the principles of the diagnostic methods employed in the practice of clinical cytogenetics</li> <li>a critical understanding of the application of investigative protocols and diagnostic tests for establishing karyotypes and other diagnostic cytogenetic information</li> <li>a critical understanding of the integration and interpretation of cytogenetic data with other diagnostic parameters (molecular genetic, haematological etc)</li> <li>a critical understanding of scientific method and the information required to successfully evaluate, develop and/or modify both current and emerging technologies as diagnostic tools in clinical cytogenetics</li> </ul>	
<i>Achieved through:</i>	<ul style="list-style-type: none"> <li>participation in appropriate training programmes (including ACC-accredited Grade A training, MRCPATH Part 1 training and other professional education and training sessions) and in-post training in clinical cytogenetics</li> <li>attendance at relevant scientific conferences and other educational meetings</li> <li>presentation (oral and/or posters) and/or publication of outcomes and method evaluations, protocol development and clinical research initiatives</li> <li>self endeavour (eg literature awareness, personal study, use of the Internet)</li> </ul>	
<i>Assessed by:</i>	<ul style="list-style-type: none"> <li>the locally nominated supervisor, ACC-appointed assessor for A Grade training, head of department and CPSM/ACS-appointed external assessor/s</li> </ul>	

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<b>GENERIC COMPETENCES</b>		<b>SPECIFIC COMPETENCES</b>
HPC Standards of Proficiency Code - Clinical Scientist	<b>2-CLINICAL</b>	Be able to demonstrate the following relevant to the contribution of his/her specialty to patient care:
2a.4, 2b.2, 2c.1	<ul style="list-style-type: none"> <li>ability to provide interpretation of data and a diagnostic (therapeutic) opinion, including any further action to be taken by the individual directly responsible for the care of the patient</li> </ul>	<ul style="list-style-type: none"> <li>must be able to analyse critically and interpret the results of diagnostic investigations for cytogenetic abnormalities and related clinical disorders commonly encountered in the training programme</li> <li>must be able to devise and/or develop investigative strategies taking into account the relevant clinical parameters</li> <li>must understand the clinical basis and relevance of the cytogenetic and related disorders commonly encountered in the training programme</li> <li>must understand the contribution of cytogenetic results to clinical management of patients</li> <li>must have sufficient clinical knowledge to communicate effectively with clinical and other professional colleagues</li> <li>must undertake and understand the basis of clinical audit of patient outcomes</li> </ul>
2b.3, 3a.1	<ul style="list-style-type: none"> <li>understanding of the wider clinical situation relevant to the patients presenting to his/her specialty</li> </ul>	
2b.3	<ul style="list-style-type: none"> <li>ability to develop/devise an investigation strategy taking into account the complete clinical picture</li> </ul>	
1a.5, 3a.2	<ul style="list-style-type: none"> <li>understanding of the clinical applications of his/her specialty and the consequences of decisions made upon his/her actions/advice</li> </ul>	
3a.2	<ul style="list-style-type: none"> <li>awareness of the evidence base that underpins the use of the procedures employed by the service</li> </ul>	
<i>Achievement of:</i>	<ul style="list-style-type: none"> <li>an understanding of the clinical relevance of constitutional or acquired cytogenetic abnormalities and normal results</li> <li>an understanding of the pathology of genetic disease, with special emphasis on cytogenetic disorders</li> <li>an ability to implement appropriate and evidence-based diagnostic strategies</li> </ul>	
<i>Achieved through:</i>	<ul style="list-style-type: none"> <li>participation in appropriate training programmes (including ACC-accredited Grade A training, MRCPATH Part 1 training and other professional education and training sessions) and in-post training in clinical cytogenetics</li> <li>participation in clinical audit discussions and evidence of supervised and collaborative clinical audit initiatives</li> <li>participation in case discussions</li> <li>presentation (oral and/or posters) and/or publication of case studies</li> <li>direct clinical liaison at meetings and by telephone</li> <li>self endeavour (eg literature awareness, personal study, use of the Internet)</li> </ul>	
<i>Assessed by:</i>	<ul style="list-style-type: none"> <li>the locally nominated supervisor, ACC-appointed assessor for A Grade training, head of department and CPSM/ACS-appointed external assessor/s</li> </ul>	

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<b>GENERIC COMPETENCES</b>		<b>SPECIFIC COMPETENCES</b>
<b>HPC Standards of Proficiency Code - Clinical Scientist</b>	<b>3-TECHNICAL</b>	Be able to demonstrate the following, relevant to the modality or area of specialisation in which he/she wishes to be recognised
3a.2	<ul style="list-style-type: none"> <li>understanding of the principles associated with a range of techniques employed in the modality</li> </ul>	<ul style="list-style-type: none"> <li>must understand the principles associated with the commonly used techniques and diagnostic procedures in clinical cytogenetics</li> <li>must understand the required standards of practice for these techniques</li> <li>must have experience of performing these techniques</li> <li>must understand the problems associated with these techniques sufficiently to be able to troubleshoot when necessary</li> <li>must understand the principles of quality control and quality assurance for procedures in clinical cytogenetics</li> <li>must have experience of interpretation and monitoring of quality control and quality assurance data including restorative action when performance deteriorates</li> <li>must understand and comply with principles and practice underlying health and safety aspects of clinical cytogenetics</li> </ul>
2b.4	<ul style="list-style-type: none"> <li>knowledge of the standards of practice expected from these techniques</li> </ul>	
2b.4	<ul style="list-style-type: none"> <li>experience of performing these techniques</li> </ul>	
2b.4	<ul style="list-style-type: none"> <li>the ability to solve problems that might arise during the routine application of these techniques (troubleshooting)</li> </ul>	
2c.1, 2c.2	<ul style="list-style-type: none"> <li>understanding of the principles of quality control and quality assurance</li> </ul>	
2c.1, 2c.2	<ul style="list-style-type: none"> <li>experience of the use of quality control and quality assurance techniques including restorative action when performance deteriorates</li> </ul>	
<i>Achievement of:</i>	<ul style="list-style-type: none"> <li>an ability to perform the commonly used techniques and diagnostic procedures employed in the practice of clinical cytogenetics</li> <li>an ability to critically review the results and to understand and implement the required quality control and quality assurance procedures for these techniques</li> <li>a critical understanding of cytogenetic techniques to facilitate method troubleshooting</li> <li>an understanding of the hazards and risk management associated with these techniques</li> </ul>	
<i>Achieved through:</i>	<ul style="list-style-type: none"> <li>participation in appropriate training programmes (including ACC-accredited Grade A training, MRCPATH Part 1 training and other professional education and training sessions) and in-post training in clinical cytogenetics</li> <li>attendance at relevant training courses and meetings</li> <li>supervised practical instruction in the laboratory</li> <li>self endeavour (eg literature awareness, personal study, use of the Internet)</li> </ul>	
<i>Assessed by:</i>	<ul style="list-style-type: none"> <li>the locally nominated supervisor, ACC-appointed assessor for A Grade training, head of department and CPSM/ACS-appointed external assessor/s</li> </ul>	

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<b>HPC Standards of Proficiency Code - Clinical Scientist</b>	<b>4-RESEARCH AND DEVELOPMENT</b>	Be able to demonstrate a training in research which should include:
2b.1	<ul style="list-style-type: none"> <li>ability to read and critically appraise the literature</li> </ul>	<ul style="list-style-type: none"> <li>• must be able to search and critically appraise the relevant literature</li> <li>• must be able to utilise this knowledge base in relation to developments in clinical cytogenetics</li> <li>• must be able to develop the aims and objectives of a project in clinical cytogenetics</li> <li>• must have basis research skills to be able to identify technical and scientific problems in clinical cytogenetics, formulate hypotheses and design experimental plans to resolve problems</li> <li>• must be able to develop new techniques or experimental protocol in clinical cytogenetics</li> <li>• must be able to perform a new technique or experimental protocol and generate results</li> <li>• must be able to critically appraise the results in the light of existing knowledge</li> </ul>
2b.1	<ul style="list-style-type: none"> <li>ability to develop the aims and objectives associated with a project</li> </ul>	
2b.1	<ul style="list-style-type: none"> <li>ability to develop an experimental protocol to meet the aims and objectives in a way that provides reliable and robust data (i.e. free of bias)</li> </ul>	
2b.1	<ul style="list-style-type: none"> <li>ability to perform the required experimental work ability to produce and present the results (including statistical analysis)</li> </ul>	
2b.1	<ul style="list-style-type: none"> <li>ability to critically appraise results in the light of existing knowledge and the hypothesis developed and to formulate further research questions</li> </ul>	
1b.4, 2b.1	<ul style="list-style-type: none"> <li>ability to present data and provide a critical appraisal to an audience of peers – both spoken and written</li> </ul>	
<i>Achievement of:</i>	<ul style="list-style-type: none"> <li>• an understanding of the current state of research in the specialty of clinical cytogenetics</li> <li>• a basic ability to design and introduce new diagnostic cytogenetic techniques into the laboratory</li> <li>• a basic ability to perform research and development relevant to the work of a clinical cytogeneticist</li> <li>• a development of research skills and expertise sufficient to support supervised and collaborative research initiatives in clinical cytogenetics and related disciplines</li> </ul>	
<i>Achieved through:</i>	<ul style="list-style-type: none"> <li>• participation in appropriate training programmes (including ACC-accredited Grade A training, MRCPATH Part 1 training and other professional education and training sessions) and in-post training in clinical cytogenetics</li> <li>• attendance at relevant training courses and meetings</li> <li>• participation in local seminars, journal clubs etc</li> <li>• participation in R&amp;D/project work discussions</li> <li>• evidence of supervised and collaborative R&amp;D/project work initiatives</li> <li>• presentation (oral and/or posters) and/or publication of outcomes of R&amp;D/project work initiatives</li> <li>• self endeavour (eg literature awareness, personal study, use of the Internet)</li> </ul>	
<i>Assessed by:</i>	<ul style="list-style-type: none"> <li>• the locally nominated supervisor, ACC-appointed assessor for A Grade training, head of department and CPSM/ACS-appointed external assessor/s</li> </ul>	

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HPC Standards of Proficiency Code - Clinical Scientist	<b>5-COMMUNICATION</b>	Be able to communicate in both the written and spoken media to colleagues, peers and patients:
1a.6	<ul style="list-style-type: none"> <li>ability to assess a situation and act accordingly when representing the specialty</li> </ul>	<ul style="list-style-type: none"> <li>must have an ability to assess a situation and act accordingly when representing the specialty of clinical cytogenetics</li> <li>must be able to respond to enquiries regarding the cytogenetics service</li> <li>must be able to communicate effectively with colleagues within the cytogenetics profession and with other health care professionals</li> <li>must be able to communicate effectively with members of the public as appropriate to clinical cytogenetics</li> <li>must be able to communicate effectively with colleagues in the outcome of problem solving and research and development activities</li> <li>must be able to present relevant information and research findings-both written and spoken – to an audience of peers</li> <li>must be capable of using modern communication media</li> </ul>
1a.6	<ul style="list-style-type: none"> <li>ability to respond to enquiries regarding the service provided when dealing with clinical colleagues</li> </ul>	
1a.2, 1b.1, 1b.3	<ul style="list-style-type: none"> <li>ability to communicate with patients, carers and relatives, the public and other healthcare professionals as appropriate</li> </ul>	
1b.3, 1b.4	<ul style="list-style-type: none"> <li>ability to communicate the outcome of problem solving and research and development activities</li> </ul>	
2b.1	<ul style="list-style-type: none"> <li>evidence of presentation of scientific material at meetings and in the literature</li> </ul>	
<i>Achievement of:</i>	<ul style="list-style-type: none"> <li>an ability to communicate clearly and with confidence to clinical and other professional colleagues both within and outside the profession of clinical cytogenetics</li> <li>an ability to educate and train others both within and outside the profession of clinical cytogenetics</li> <li>an understanding of all aspects of information technology pertinent to provision of the clinical cytogenetics service</li> </ul>	
<i>Achieved through:</i>	<ul style="list-style-type: none"> <li>participation in appropriate training programmes (including ACC-accredited Grade A training, MRCPATH Part 1 training and other professional education and training sessions) and in-post training in clinical cytogenetics</li> <li>attendance at relevant training courses and meetings</li> <li>direct clinical liaison at meetings and by telephone</li> <li>active participation in local seminars, tutorials, journal clubs, case presentations etc</li> <li>participation in R&amp;D/project work discussions</li> <li>presentations - oral and/or posters – at scientific conferences</li> <li>presentation and/or publication of outcomes of R&amp;D/project work initiatives</li> <li>self endeavour (eg literature awareness, personal study, use of the Internet)</li> </ul>	
<i>Assessed by:</i>	<ul style="list-style-type: none"> <li>the locally nominated supervisor, ACC-appointed assessor for A Grade training, head of department and CPSM/ACS-appointed external assessor/s</li> </ul>	

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<b>Standards of Proficiency Codes for Clinical Scientist</b>	<b>6-PROBLEM SOLVING</b>	Be able to deal with the unexpected and thus be able:
2a.2	<ul style="list-style-type: none"> <li>to assess a situation</li> </ul>	<ul style="list-style-type: none"> <li>must have an ability to assess a situation and determine the nature and severity of a problem in clinical cytogenetics</li> <li>must have the knowledge and experience to act accordingly to initiate resolution of a problem in clinical cytogenetics</li> <li>must have the ability to demonstrate personal initiative to resolve a problem in clinical cytogenetics</li> </ul>
1a.6, 2b.1	<ul style="list-style-type: none"> <li>determine the nature and severity of the problem</li> </ul>	
1a.6, 2b.1	<ul style="list-style-type: none"> <li>call upon the required knowledge and experience to deal with the problem</li> </ul>	
1a.6, 2b.1	<ul style="list-style-type: none"> <li>initiate resolution of the problem</li> </ul>	
1a.6	<ul style="list-style-type: none"> <li>demonstrate personal initiative</li> </ul>	
<i>Achievement of:</i>	<ul style="list-style-type: none"> <li>an ability to critically appraise a situation and implement the required action to resolve problems in the laboratory aspects of clinical cytogenetics</li> <li>an ability to critically appraise clinical information and implement the required action to resolve problems in the clinical aspects of a clinical cytogenetics service</li> </ul>	
<i>Achieved through:</i>	<ul style="list-style-type: none"> <li>participation in appropriate training programmes (including ACC-accredited Grade A training, MRCPATH Part 1 training and other professional education and training sessions) and in-post training in clinical cytogenetics</li> <li>attendance at relevant training courses and meetings</li> <li>supervised experience of problem-solving in the laboratory</li> <li>supervised experience of problem-solving in relevant aspects of clinical liaison (oral and written)</li> <li>self endeavour (eg literature awareness, personal study, use of the Internet)</li> </ul>	
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HPC Standards of Proficiency Code – Clinical Scientist	<b>7-PROFESSIONAL ACCOUNTABILITY</b>	Be able to demonstrate an understanding of management principles and techniques, including the following:
1a.1	<ul style="list-style-type: none"> <li>Understanding of the legal and ethical boundaries of the modality, and the ethical aspects of scientific research.</li> </ul>	<ul style="list-style-type: none"> <li>must be able to recognise legal and ethical boundaries of the modality and practice and conduct research within these boundaries</li> <li>must be able to recognise the limits of his/her knowledge and skills</li> <li>must understand the principles of clinical governance and be able to audit, reflect on and review practice</li> <li>must understand the need for and basic requirements of accreditation schemes appropriate to the modality</li> <li>must understand the importance of effective communication with colleagues and be able to function as an effective member of a multidisciplinary team</li> <li>must understand the principles of appraisal and be able to supervise staff in his/her area of responsibility</li> <li>must participate in an appropriate CPD scheme (after completion of training)</li> <li>must have acquired a basic knowledge of health and safety requirements appropriate to the discipline</li> <li>must have acquired a basic understanding of the structure and organization of the department, and relevant financial aspects.</li> </ul>
1a.6	<ul style="list-style-type: none"> <li>Ability to recognise the limits of personal practice and when to seek advice.</li> </ul>	
1a.7	<ul style="list-style-type: none"> <li>Ability to manage personal workload and prioritize tasks appropriately.</li> </ul>	
1a.3, 1a.4, 2b.5, 2c.2	<ul style="list-style-type: none"> <li>Understanding of the principles of clinical governance including clinical audit, accreditation requirements relevant to the modality. The importance of confidentiality, informed consent and data security</li> </ul>	
1b.2	<ul style="list-style-type: none"> <li>Ability to contribute effectively to work undertaken as part of a multi-disciplinary team</li> </ul>	
1b.4	<ul style="list-style-type: none"> <li>Ability to supervise others as appropriate to area of practice. Understanding of the role of appraisal in staff management and development.</li> </ul>	
1a.8, 2c.2	<ul style="list-style-type: none"> <li>Understanding of the need for career-long self-directed learning and the importance of continuing professional development.</li> </ul>	
1a.5, 1a.8, 2b.4, 3a.3	<ul style="list-style-type: none"> <li>Understanding of the need for, and ability to establish and maintain, a safe practice environment.</li> </ul>	
	<ul style="list-style-type: none"> <li>Understanding of the structure and organization of the department and how it fits into the local clinical setting, General understanding of the way the modality is structured and practised in other locations within the UK. Basic understanding of the importance of financial accountability, budgetary control and resource management.</li> </ul>	
<i>Achievement of:</i>	<ul style="list-style-type: none"> <li>an understanding of the management principles and tools used in the service</li> <li>the ability to act as a professional and work effectively as part of a team</li> <li>understanding of the importance and principles of accreditation, audit, confidentiality, data security and safe working practice</li> </ul>	

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<i>Assessed by:</i>	<ul style="list-style-type: none"><li>• the nominated local supervisor and appropriate professional body external advisor/tutors</li></ul>