Key knowledge, skills and capabilities for biochemists

Any list of key knowledge, skills and capabilities is inevitably dynamic. Nonetheless, there are clearly identifiable core requirements for biochemists that are unlikely to change rapidly while other, new skill requirements will emerge as technology advances and knowledge grows, requiring any syllabus to be continuously reviewed and updated.

Biochemical basics

These should be central to all undergraduate courses in biochemistry. However, as the field grows new discoveries may tend to displace the traditional topics that were taught. This can leave newer generations of students struggling with some basic concepts. We must never lose sight of the fundamental topics that underpin understanding of more complex biological processes.

Analytical skills

Accurate identification and precise measurements of biochemical entities supports many aspects of the life sciences, none more so than in drug design. Understanding of key principles of analytical science allows new assays to be developed and refined, many of which make use of biochemical systems (e.g. ELISA and its newer homogenous formats) as well as hardware-centred techniques such as HPLC, LC-MS, and robotic systems for high-throughput screening or bioimaging assay formats.

The last of these, imaging and high-throughput microscopy, is an area of growth and rapid change that offers novel approaches to drug screening and creates high content assay formats that the industry is adopting so researchers with specific training in these areas will be needed. Elsewhere, the shifting emphasis towards the use of biomarkers to inform personalized healthcare and in translational science will provide more opportunities for biochemists in the future.

Assay design and statistics

Young scientists need to be able to design their own experimental protocols with a clear understanding of how to ensure they generate data that are fit-for-purpose. At different stages in drug research, the types of experimental design may change (e.g. high-throughput screening might be less rigid than pre-clinical studies). A good grounding in assay design