Skills needs for Biomedical research
creating the pools of talent to win the innovation race

Presentation for HUBS
5 May 2009
Traditional pharmaceutical business model ....

- Takes about 12 years to develop a new medicine
- **Costs $1.1 billion USD** to bring one drug from concept to market
- **80% drugs fail** leaving **20%** to fund R&D
- **Society expects** access to safe and effective medicines with no side-effects
In future …

In R&D we need to be faster, reduce attrition and contain costs

We need to work with healthcare providers to ensure that the patient gets the right drug at the right dose at the right time

This vision is dependent on our ability to innovate in a vibrant scientific community with a strong skills pipeline
Methodology

- Surveyed ABPI and BIA member companies
- Responses from 30 companies
  - Pharma, CROs and SMEs

Questions around:
- Core disciplines
  - Quality
  - Number
  - Future
  - Skill level
- Core skills
Core Practical Skills

The main skills gap in candidates is their lack of basic lab skills

“The major concern which is voiced by many recruiting managers within our organisation is the lack of lab skills which candidates now have, when previously they learned these skills as part of their course”

“Practical experience is a real concern – a 3 year course does not provide enough practical experience. When we recruit students we only look at those who have at the very least a summer placement”

“School leavers lack practical skills”

“New graduates need significant training in lab and scientific skills”

“Need for increased practical component in current degrees as well as more MSc courses”

“Lab skills, lab maths - some candidates do know these but some don't - if you can't make up a solution you can't do the job”
Specific comments relating to biological sciences

“The practical component of pharmacology courses is no preparation for work”

“We need to find ways to give bioscience and molecular biology students more hands-on experience”

“It would help if biochemistry graduates had more opportunities to work with high level analytical Equipment”

“Some graduates are lacking grounding in quantitative analytical techniques”
Core Mathematical Skills

General lack of maths skills

“Anything to do with maths seems to be a general problem”

Too few students study maths beyond school level (or even post-16)

“The lack of maths skills is worrying, as is the inability to estimate if a result is correct or to have an idea of the answer before the computer generates one”

Understanding of statistical concepts lacking in a wide range of disciplines

“Graduates lack grounding in quantitative analytical techniques”

Demand for statistics skills will increase

“Lack of numerate graduates”

“Mathematical skills are weak”

Graduates lack grounding in quantitative analytical techniques
Major issues – core capabilities

Concerns over recruiting 1st degree graduates

Particularly around:

- Basic mathematical capability
- Paucity of practical skills training
- Ability to apply scientific and mathematical knowledge
- Variability in subject discipline rigour
Substantial issues around recruitment in some core disciplines

- Supporting disciplines for biomedical translational science and the subsequent transformation of ideas into products:
  - Clinical pharmacology / experimental medicine
  - Drug metabolism science
  - Pharmacokinetics, pharmacodynamics and modelling
  - *In vivo* sciences and supporting animal technicians
  - Mathematical aspects of biology, statistics
  - Computational chemistry
  - High-level engineering & Biopharm. Production
  - Biotechnology and biopharmaceuticals
In vivo sciences

• Physiology
• Pharmacology
• Toxicology
• Pathology

• All high priority disciplines, quality and number of applicants is low
• Minimal exposure to in vivo work throughout the education system – reduces interest and experience
Drug metabolism and ADME

- Candidates often lack appropriate experience and core skills as well as knowledge of basic pharmacology, physical chemistry and maths
- Increasing need for an understanding of biologics
- There is a need for more good quality postgraduate courses
Pharmacokinetics, pharmacodynamics and modelling

- Lack of numerate biological sciences graduates
- Very few specialist courses available
- Shortage of high quality candidates
Biotechnology and biopharmaceuticals

- Growing importance, rapidly changing discipline with many new advances
- Hard to find graduates with up to date skills and experience
- Need more people with expertise in engineering and maths together with an understanding of biology
Clinical pharmacology/translational medicine

- Medical and biomedical curricula are not focussing on the skills required for translational or experimental medical research
Concerns in growth areas:

• Molecular and translational toxicology
  – Technical needs are high – recruit at PhD and post-doc level
  – Candidates need multidisciplinary skills and knowledge (toxicology, PK, ADME, immunology, genomics, toxicokinetics) – this is rare

• Biomedical imaging
  – Interdisciplinary skills needed including *in vivo* physiology
  – Strong competition from NHS and academia - hope Research Council initiatives will improve supply
• ‘Omics’ including proteomics and metabonomics
  – Small but specific need, preferably PhD level and above
  – Some candidates have insufficient maths skills
  – Awareness of roles in industry is low
• Computational science and bioinformatics
  – Skills need is multidisciplinary, few candidates have skills across computational science, mathematics and biological sciences
  – If graduates are recruited life science graduates who can be trained in IT skills are preferred; most recruiting is at PhD level and above
Other areas

• **Biochemistry**
  – Basic skills often lacking – enzyme kinetics, physiology, maths
  – Practical skills, quantitative analytical techniques and knowledge of regulation often lacking

• **Bioscience and molecular biology**
  – Issue is quality not quantity

• **In vitro pharmacology**
  – Practical laboratory skills are a particular concern
  – Increasing recruitment from France and Germany
Taking this forward

• Issues identified resonate with many other surveys and reports, notably:
  – Semta Bioscience Sector Skills Agreement (January 2008)
  – Bioscience Innovation and Growth Team (BigT) refresh report (January 2009)
• ABPI is taking forward the identified skills needs through an Innovation-focussed Board and taskforce
• ABPI and BIA (with BIVDA and ABHI) are working with Lord Drayson’s Office of Life Sciences (OLS) to seek Government action on issues identified as vital to the sector
Skills needs for Biomedical Research

- Information on careers in the pharmaceutical industry
- www.abpicareers.org.uk