

Job and career opportunities in the biomedical research sector: an overview

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Intro to set the scene

- **Scope: 'the biomedical research sector'**

- **Meaning: the inventors of biomedical interventions (mostly products, but also services & solutions) to prevent or treat diseases and to promote health**
Part of the wider 'biomedical health care sector'
- **Includes mainly pharma (medicines), red biotech (e.g. biologics, ATMPs) and medtech (e.g. medical devices, *in vitro* diagnostics, digital health and care)**
- **But also: special food and personal care products, etc...**

- **Offers a wealth of opportunities for jobs and careers** (over 1 M employees in Europe)

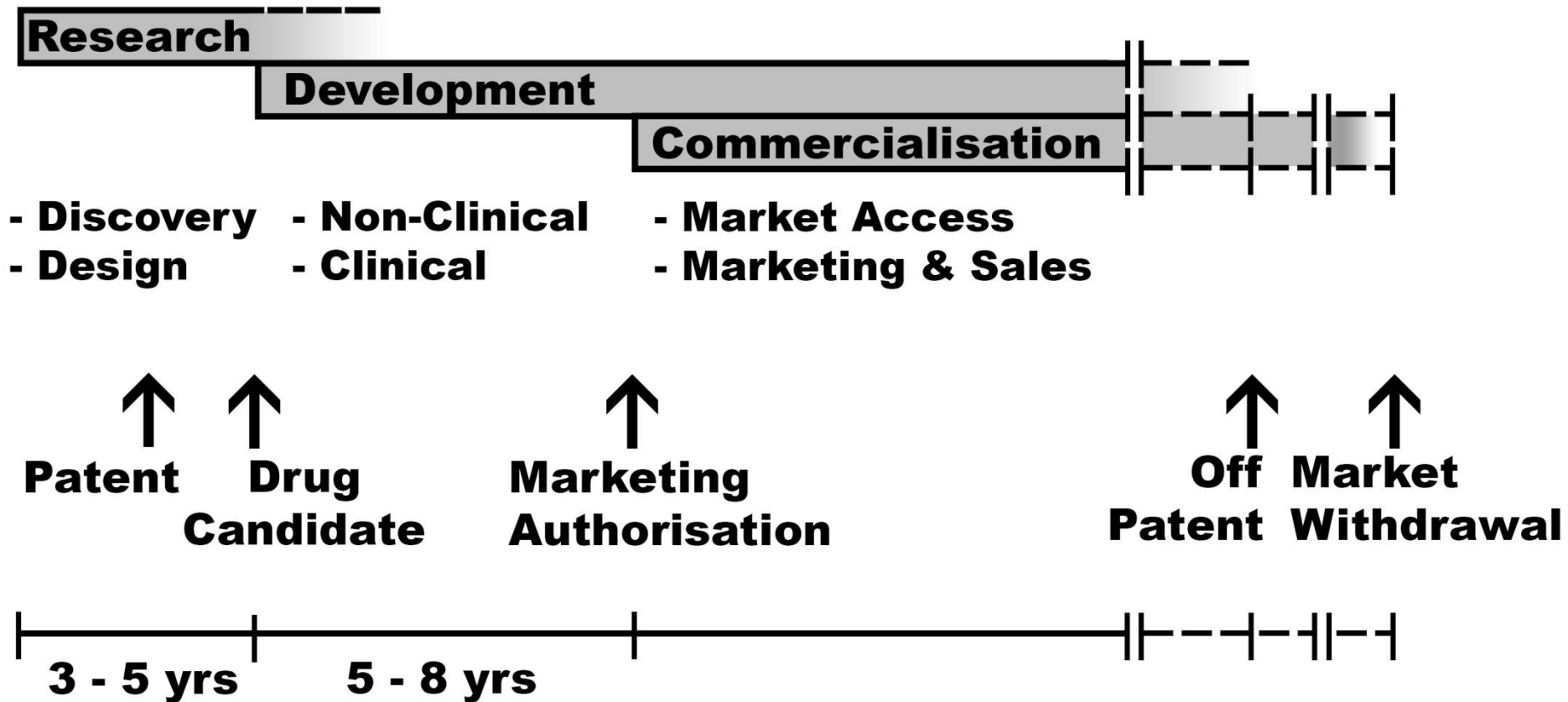
- **Along the entire drug/product life cycle**
- **In diverse organisations/companies**
- **For a wide spectrum of professionals**

Agenda

- **Job opportunities throughout the entire drug/product life cycle**
 - As operational expert in a part of the cycle (research, development, commercialisation)
 - Or in support or management functions (in one of the parts of the cycle, or overall)
- **A wealth of possibilities**
 - In a wide variety of functions and jobs
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- **Wanted qualifications and profiles**
- **Career opportunities**

Along the entire drug/product life cycle

Drug Life Cycle



Along the entire drug/product life cycle

- **Discovery research**
- **Development**
 - Non-clinical development
 - Clinical development
- **Marketing Authorisation (MA)**
- **Commercialisation**
 - Market Access
 - Marketing & Sales
 - Production & distribution
 - Continued development (post-MA)

Drug Discovery Research

- Drug discovery and design
- Phenotypic-based vs target-based
- Target-based process:
 - (Druggable) target selection and validation
 - Assay development and validation
 - (High-throughput) screening
 - Hit-to-lead finding (CADD, QSAR)
 - Lead optimisation
- Goal: patented drug candidate(s)

Research: disciplines involved

- (Molecular) biologists
- Biochemists
- Biotechnologists
- Bioinformaticians
- Biomedical scientists
- Medicinal chemists
- CombiChem specialists
- Protein chemists
- Analytical chemists
- Computational chemists
- Pharmacologists
- Pharmacokineticists
- Pharmacometricians
- (Bio-)engineers
- Automation specialists
- Data analysts
- IP specialists
- Patent lawyers
- Patent reviewers

Non-clinical Drug Development

- **Pharmaceutical dev. (ChemPharm, CMC)**
 - **Non-clinical Pharmacology (incl. Safety)**
 - **Non-clinical Toxicology**
 - **Non-clinical Pharmacokinetics**
 - **Drug analysis in bio-specimens**
- ▶ **Goal: prerequisites for clinical dev. (pre-clinical part) + all non-clinical data for the MA dossier (pre-approval phase) + continued dev. (post-approval phase)**

NC Development: disciplines involved

Pharmaceutical dev.

- Chemists
- Chemical or bio-engineers
- Pharmaceutical technologists
- (Industrial) pharmacists
- ...

Toxicology (NC safety)

- Toxicologists
- Veterinary surgeons
- Pathologists
- Pharmacists, BMS
- ...

NC (Safety) Pharmacology

- Experimental pharmacologists
- Pharmacists
- Biomedical scientists (BMS)
- Biologists, biotechnologists
- ...

Pharmacokinetics

- NC Pharmacokineticists
- Bio-analytical chemists
- Pharmacometricians
- Pharmacists, BMS
- ...

Clinical Drug Development: phases

- **Early Clinical Dev. = exploratory**
 - Phase 1: Safety & PK in healthy volunteers
 - Phase 2a: Does it work in patients?
- **Late Clinical Dev. = confirmatory**
 - Phase 2b: Dose (regimen) finding
 - Phase 3: Benefit/risk vs. existing therapy
- Marketing Authorisation (MA)**
 - Phase 4: Use in clinical practice
 - New clinical developments: new indications, new formulations, new combinations

Clinical Drug Development: teams

- **Clinical Research** (strategy, planning, methodology, and management of clinical trials)
 - **Clinical Operations** (implementation, monitoring)
 - **Medical Review & Pharmacovigilance (PV)**
 - **Clinical Services**
- ▶ **Goal: All clinical data for the MA dossier (pre-approval phase) + continued development (post-approval phase)**

Clinical Dev.: disciplines involved

Clinical Research

Early Development

- Human/Clin. Pharmacologists
- Clinical Pharmacokineticists
- Clinical Pharmacometricians
- Clinicians, Medical Specialists
- ...

Clinical Research

Late Development

- Clinicians, Medical Specialists
- Clinical Pharmacologists
- Pharmaceutical Physicians
- (Clinical/hospital) Pharmacists
- Pharmaco-epidemiologists
- ...

Clinical Operations

- (International) Project Managers
- Clinical Research Associates
(CRAs or Monitors)
- Research nurses, study coordinators
- Pharmacists, Biomedical Scientists
- ...

Clinical Dev.: disciplines involved

MR & PV

- Medical Reviewers, PV specialists
- (Pharmaceutical) Physicians
- (Clinical/Hospital) Pharmacists
- Clinical Toxicologists

Clinical Services

- Clinical Supplies
- Central Laboratories
- Study material logistics

Drug Commercialisation

- **Market Access**
 - Price setting and Reimbursement
- **Medical Affairs**
- **Pharmaceutical Marketing**
- **Sales**
- **Production and Distribution**
- ▶ **Goal: return on investment (ROI)**

Commercialisation: disciplines involved

Market access

- Pharma policy experts
- Drug pricing specialists
- Reimbursement experts
- Pharmaco-economists
- Marketing specialists
- Core Value Dossier writers

Medical Affairs

- Medical Advisors
- Medical Science Liaisons (MSL)
- Medical Information Mgrs
- Pharmacovigilance experts
- Pharmaceutical Physicians

Commercialisation: disciplines involved

Marketing & Sales

- Marketing specialists
- Product Managers
- Training Mgrs
- Sales force (Medical, Hospital, Pharmacy reps, Sales managers)

Manufacturing

- Production specialists
(for CTs, for the market)
- Industrial pharmacists
- Engineers, Quality experts
- Experts in Logistics

Support and management functions

– Support

- Regulatory Sciences/Affairs (CT & MA appl.)
- Quality management (QC, QA, QbD)
- Data management, biostatistics
- In general: training, HR, finance, IT, legal, ...

– Management

- Project team management
- Life cycle management
- In general: country/regional management, senior/top management

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Positions, functions, jobs, titles

- **At entry: Junior or Assistant**
With experience: dropped, and later Senior
- **Mostly active in multidisciplinary teams**
- **(Project) teams are usually lead by a Leader, Supervisor, Pilot, Manager or Director**
- **Units, Sites and Departments are lead by (Middle or Top) Managers or Directors**
- **Organisations/companies are lead by a Corporate Manager or Chief Executive Officer (CEO)**
- **Responsibility can be national, regional or worldwide**

Drug project team



Companies, organisations, institutions

- **The biomedical research industry** (cfr next slide)
- **Regulators: health authorities, agencies, HTA bodies, certified bodies, patent offices**
- **Academia, research centres, not-for-profit organisations, spin-offs**
- **Clinical investigator sites: phase 1 units, hospitals, site management organisations (SMOs)**
- **Consultants, lobbyists, law firms**
- **Venture capitalists, investment banks**

The biomedical research industry

- **Big companies: (bio-)pharma, biotech, medtech, nutraceuticals, ...**
- **Small & Medium Enterprises (SME)**
- **Spin-offs, start-ups, freelancers, ...**
- **Innovators & Copycats (generics/biosimilars)**
- **Contract Research Organisations (CRO), Service Providers, Central Labs/Services**
- **Umbrella organisations (e.g. EFPIA, EGA, MedTech Europe, EUCROF)**

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For a wide spectrum of professionals

- **Mainly Masters in Life Sciences**

e.g. pharmacy, medicine, biomedical sciences, (bio-)chemistry, biotechnology, (bio-)engineering, (bio-)informatics, etc.

- **With further specialisation**

e.g. hospital/industrial pharmacy, pharmaceutical medicine, drug regulatory affairs, ...

- **With a PhD (& post-doc experience)**

- **Or with a second degree**

e.g. marketing, MBA, (health) economics, (patent) law

- **But also bachelors, technicians & nurses**

- **And many other profiles**

e.g. proper marketers, (health) economists, lawyers, statisticians, IT & AI specialists, finance specialists, MBAs, etc.

Appreciated qualifications

- For Research and Non-Clinical Dev. (lab):
PhDs (+ post-doc experience)
- For Clinical Dev. and Commerce (office):
Masters + specialisation or 2nd degree
- Support and management functions:
Idem + previous experience in operations
- Manufacturing (factory):
Industrial pharmacists, engineers

New trends

Growing importance of:

- Pharmacometrics (quantitative pharmacology, modelling & simulations)
- (Big) data analysis
- Digital technology
- Artificial intelligence, virtual experiments
- Organs/human-on-a-chip
 - ▶ **Need for more STEM (super-)specialists**
- Combined products (drug/medical device, drug/companion diagnostic, drug/medical app)
- Networks, alliances, consortia, PPPs, etc.
 - ▶ **Need for more intense collaboration**

Sought-after personality profile

- Interest in the BM research sector
 - Capacity to work in a team
 - Creative and innovative mindset
 - Talent for organisation
 - Good sense of communication
 - High level of linguistic skills
 - Willing to learn lifelong
- + prepared for fierce competition**

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Career opportunities

- **Stay Expert or become a Leader**
- **Move along the drug life cycle**
- **Move lateral or move up**
- **Move to another company**
- **Start an international career**
- **Switch between industry, academia, agencies, CRO, ...**
- **Start your own company**

Conclusion

– **Assets of the sector**

- Wide array of jobs
- Good career opportunities
- Nice remuneration package
- Future proof

– **‘Side effects’: importance of**

- Personal skills
- Life-long learning
- Flexibility
- International mobility