Chapter 6.2:
Legal and regulatory considerations for pharmaceutical biotechnology

Adapted from a lecture given by
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Senior Patent Attorney, Roche Basel

FDA NEWS RELEASE

For Immediate Release: **Dec. 11, 2013**

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Consumer Inquiries: 888-INFO-FDA

En Español (/NewsEvents/Newsroom/ComunicadosdePrensa/ucm378300.htm) FDA approves first generic versions of antidepressant drug Cymbalta

The U.S. Food and Drug Administration today approved the first generic versions of Cymbalta (duloxetine delayed-release capsules), a prescription medicine used to treat depression and other conditions.

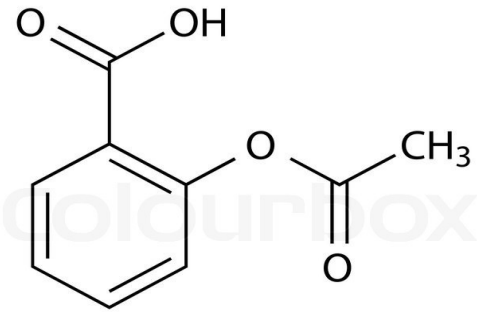
Aurobindo Pharma Ltd., Dr. Reddy's Laboratories Ltd., Lupin Ltd., Sun Pharma Global FZE, Teva Pharmaceuticals USA, and Torrent Pharmaceuticals Ltd. have received FDA approval to market duloxetine in various strengths.

"Health care professionals and consumers can be assured that these FDA-approved generic drugs have met our rigorous standards," said Kathleen Uhl, M.D., acting director of the Office of Generic Drugs in the FDA's Center for Drug Evaluation and Research. "Generic drugs offer greater access to health care for many people."

Patent expiry cliff

Generic drugs

- Aspirin



Acetylsalicylic acid

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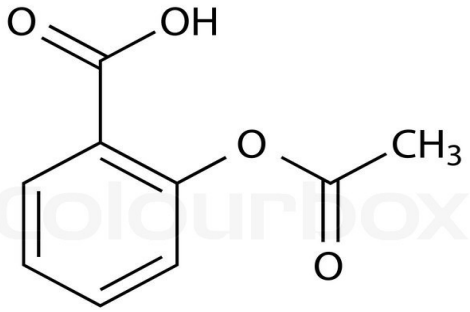


Acetylsalicylic acid

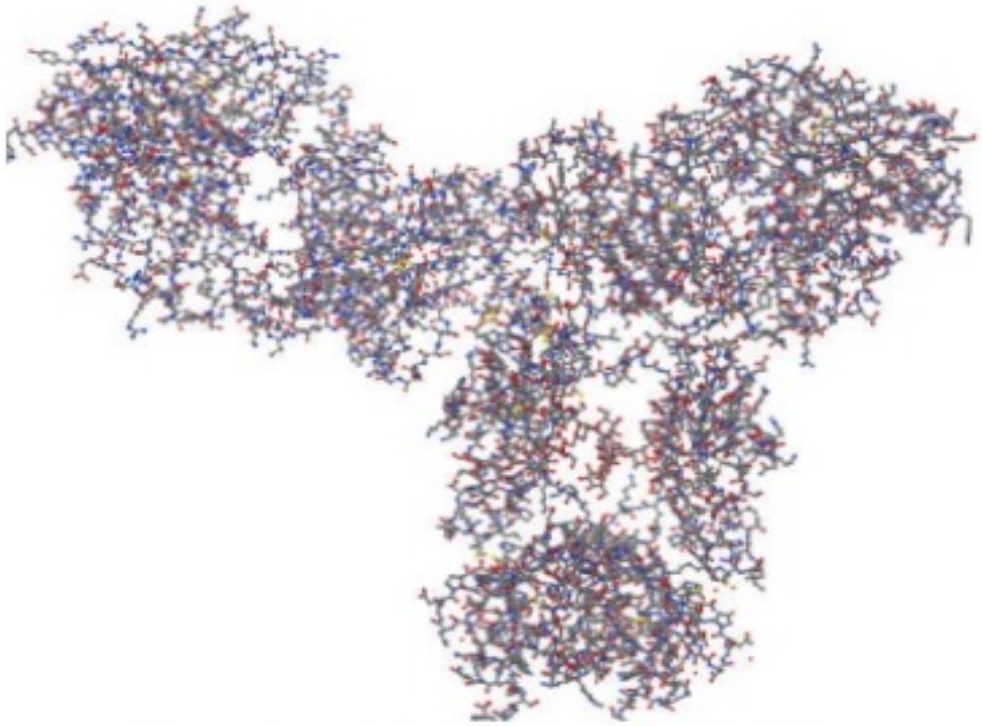
Generic medicines

- Generic medicines are identical in the active pharmaceutical substance, dose, strength, route of administration, safety, efficacy, they can be substituted for the originator product.

Biologicals versus drugs

- Bigger, more complex

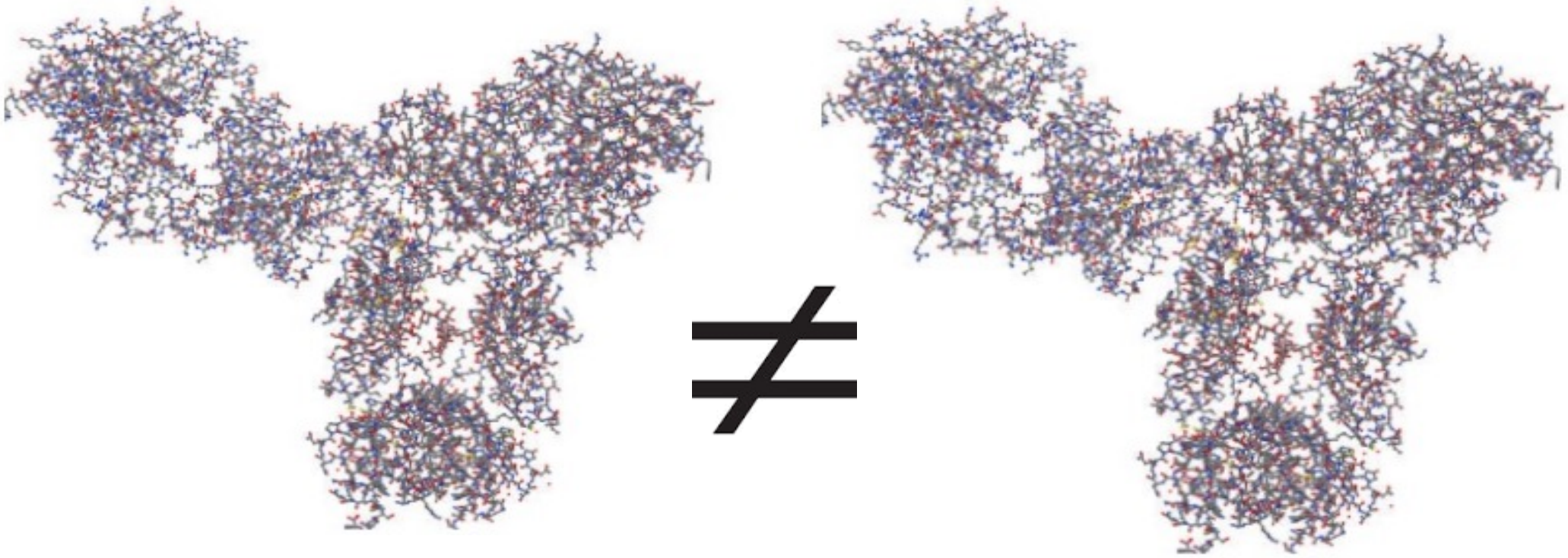
Aspirin 180 Da



Monoclonal Antibody ~150,000 Da

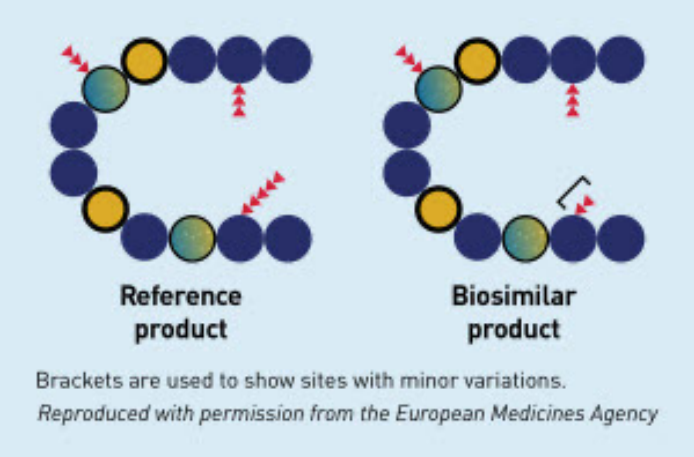
Biosimilars

- Similar but not identical



Biosimilars

- May have slight differences in post-translational modifications which can have immunogenic potential. Such reactions can be serious, causing hypersensitivity, infusion reactions, strong allergic reactions, and loss of efficacy.



Biosimilar

- A biotherapeutic product (Biological) which is similar in terms of quality, safety and efficacy to an already licensed reference biotherapeutic product.
- Biosimilars are officially approved versions of original "innovator" products and can be manufactured when the original product's patent expires.

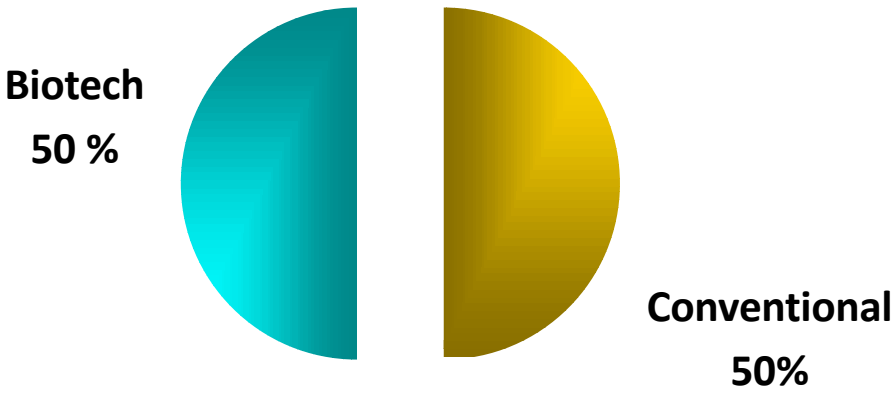
- **Patents and Market Exclusivity**

  (what is a patent and what are the consequences)

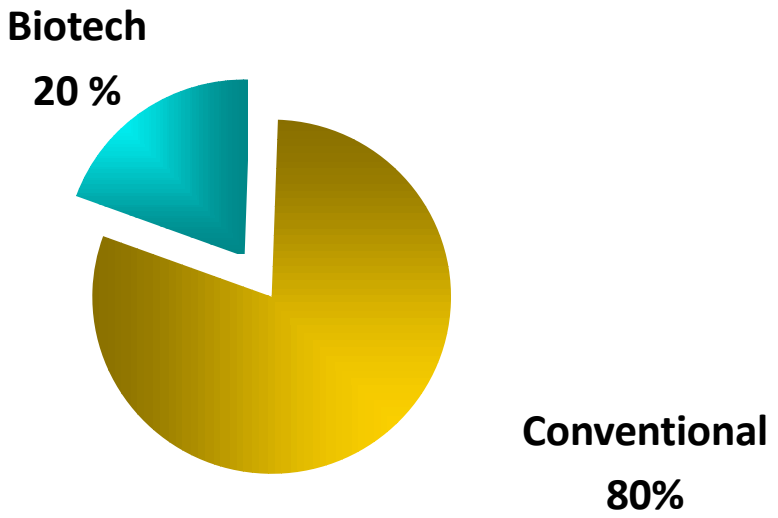
- **Patents and Pharmaceutical Industry**

The Healthcare Biotech Industry

New medicines in development



Medicines currently on the market



First Patent Law

- **Venice (1474)**

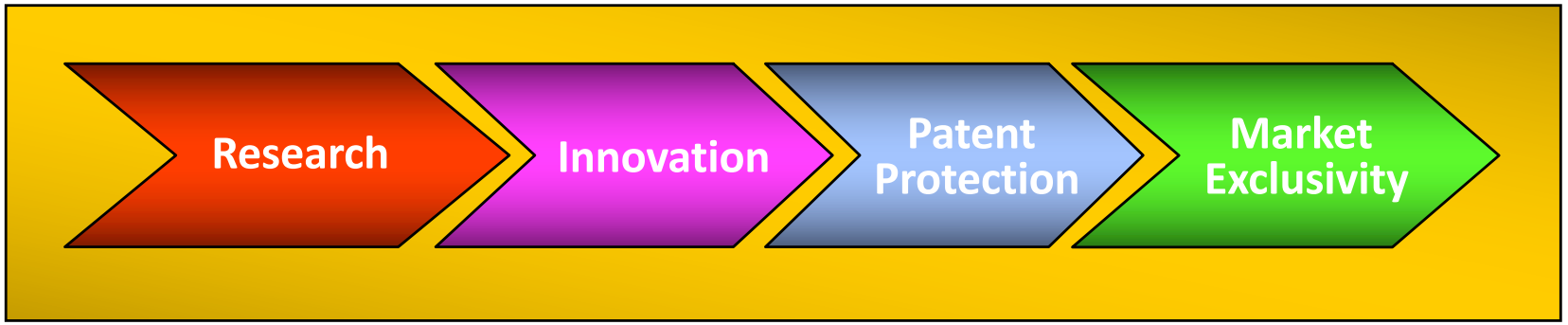
We have among us men of great genius, apt to invent and discover ingenuous devices...

Now, if provision were made for the words and devices discovered by such persons, so that others, who may see them, **could not build them and take the inventors' honor away**, more men would then apply their genius, would discover, and would build devices of great utility and benefit to our commonwealth.

- **Incentive to invent = drives innovation**

Innovative Pharmaceutical Industry
(not the "me-too" companies)

- Mission: to create, produce and market **innovative solutions** of high quality for **unmet medical** needs
- Innovation is converted into **intellectual property rights** that can **lawfully provide protection** against third party interlopers (market exclusivity).



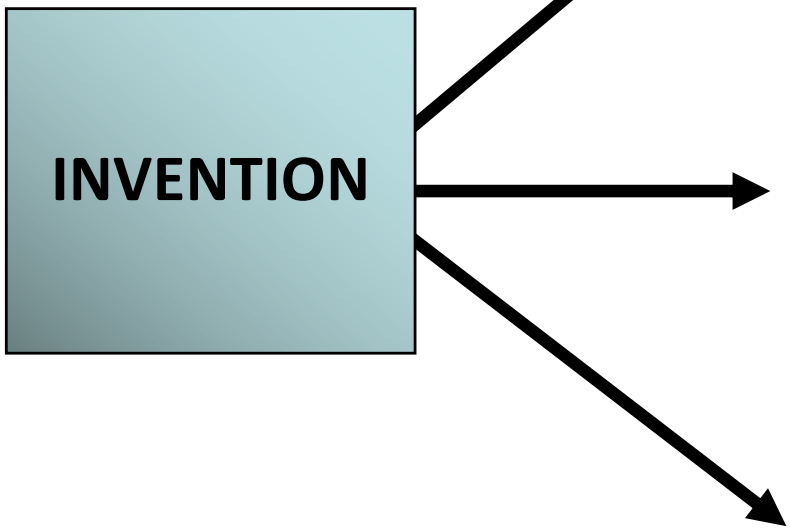
Patents Provide Incentives for Innovation

"Bargain" or "deal" with the state:

- In return for **publication** of your invention you receive **the right to exclude others** from making, using, offering for sale, or selling your invention (= commercial aspects)
- **But:** limited in time and territory

Patents and Market Exclusivity

How to Treat Proprietary Information and Knowledge?



PUBLISH

- No protection
- Creates free accessible information
- Invention can be copied without compensation

PATENT YOUR INVENTION

KEEP SECRET

- Secrecy vanishes by leaking of know-how
- Emerging third party patents prevent exploitation of own invention
- Prior use rights offer weak protection

Patents and Market Exclusivity

A Patent Provides …

- **market exclusivity** on competitive advantage products
- the possibility to obtain financing/ **recoup investment**
- Freedom to operation (FTO) as a defensive measure - **market access**

Intellectual Property – three legal approaches for protection

Copyrights: **protects creator from others copying original works**

Trademarks: **the unique source of goods/services**

Patents: **gives the right to patent owner to exclude others**

All can be used concurrently, and SHOULD BE. Valuable intellectual property tends to be in a "thicket" of protection.

Patent Standards

- **A patentable invention has to satisfy:**
  - **Novelty**
  - **Non-obviousness**
  - **Industrial applicability; utility**
- **The patent description must:**
  - **Sufficiently disclose the invention (utility)**
- **The patent claims have to be:**
  - **Clear and be supported by the description**

Sufficient Disclosure / Utility Requirement

Limitations

A patent is not a hunting license**. It is not a reward for the search, but** compensation for its successful completion**.**

A patent is therefore not a license to experiment.

Brenner v. Manson, 383 U.S. 519 (1966)

(you can not patent an idea without the proof that it works!)

What Cannot be Patented?

- Works of authorship (copyrights)
- Tradename, logo, method of doing business?
- Laws of nature & physical phenomena
- Inventions that will not work
- Abstract ideas

What Cannot be Patented?

Directive 98/44/EC

Article 6

1. **Inventions shall be considered unpatentable where their commercial exploitation would be contrary to order public or morality; however, exploitation shall not be deemed to be so contrary merely because it is prohibited by law or regulation.**

2. **On the basis of paragraph 1, the following, in particular, shall be considered unpatentable:**

   a) **cloning human beings**;
   b) **modifying the germ line genetic identity of human beings**;
   c) **uses of human embryos**

   d) **Modifying the genetic identity of animals which causes suffering without medical benefit for man or animal**

Structure of a Patent

- **Description:** The invention has to be sufficiently disclosed
- **Examples**
- **Patent claims**: Define the scope of protection

Further Patent Features

- Term of patents

20 years **from date of application**

Most countries have similar terms (harmonization)

- Cost of a patent

Moderate to apply - legal costs and fees

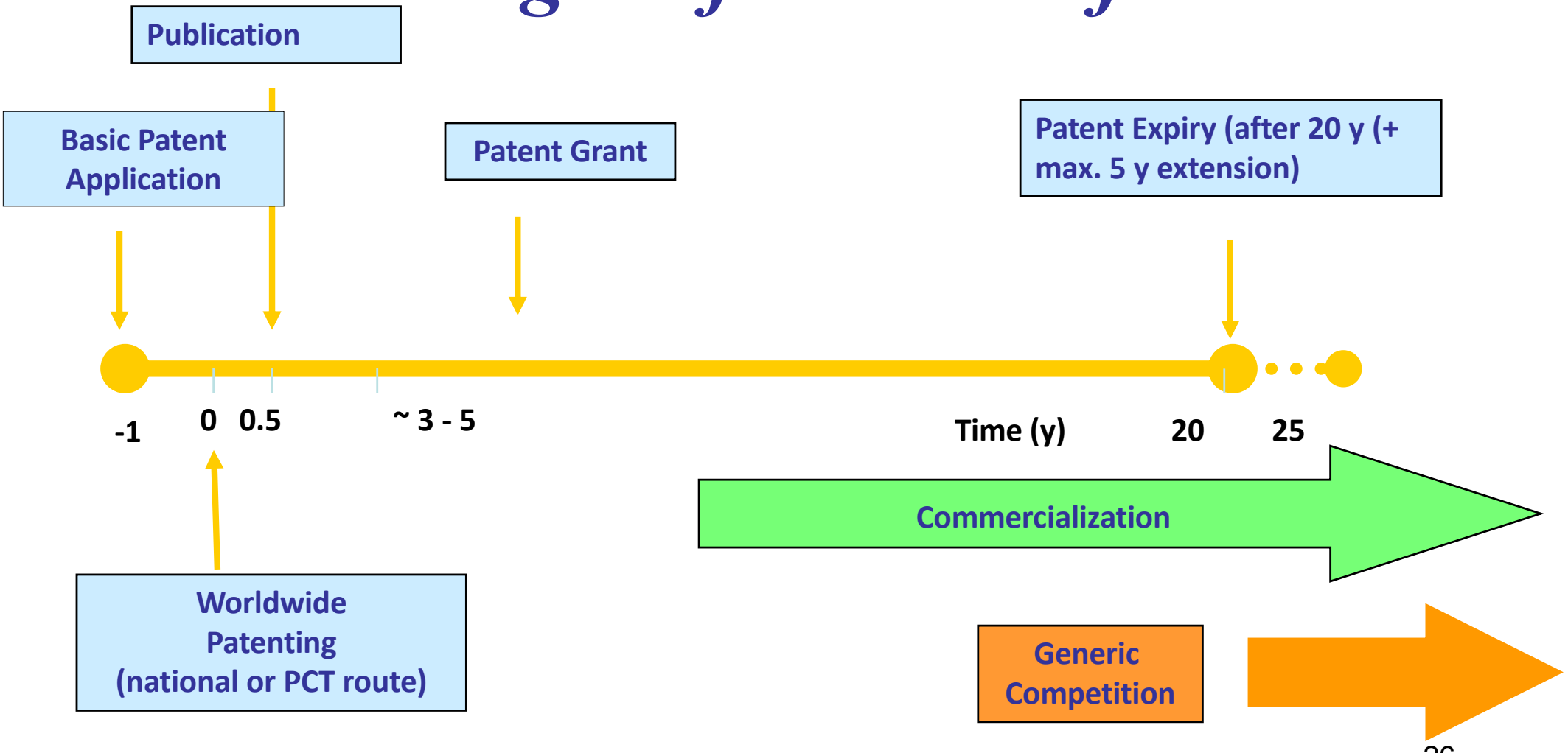
Expensive to maintain - maintenance fees

Further Patent Features

- "First-to-File" vs. "First-to-Invent"
  - U.S. is the only major "first -to-invent" country
  - May mean an invention in the U.S. will not get a European patent
- Every country has a different system
  - Patents are granted by national offices
  - One invention may differ in coverage from country to country
  - Patent Cooperation Treaty and the European Patent Office

Patent Overview

Stages of Patent Life



Patent Milestones

From Patent Application to Patent Expiry

1. **Research project: new compound**
2. **Drafting patent application**
3. **Basic filing ("priority filing") with a patent office**
4. **Foreign patent applications within one year after basic filing**
5. **Publication of patent applications 18 months after basic filing**
6. **Examination procedure in the individual countries (checking material and formal patentability requirements)**
7. **Grant (after successful prosecution)**
8. **Opposition (third parties may oppose)**
9. **Enforcement - infringement/nullity proceedings (patent can become involved in a law suit)**
10. **Maximum lifetime as a rule is 20 years from filing (maintenance fees (annuities) must be paid)**
11. **Patent term extensions possible for patented drugs providing up to 5 additional years of protection**
12. **Patent expiry**

Patent Application – Front Page

WO-Publication

Publication Date

Classification

Application No.

Language

Priority Date

Applicant

Inventors

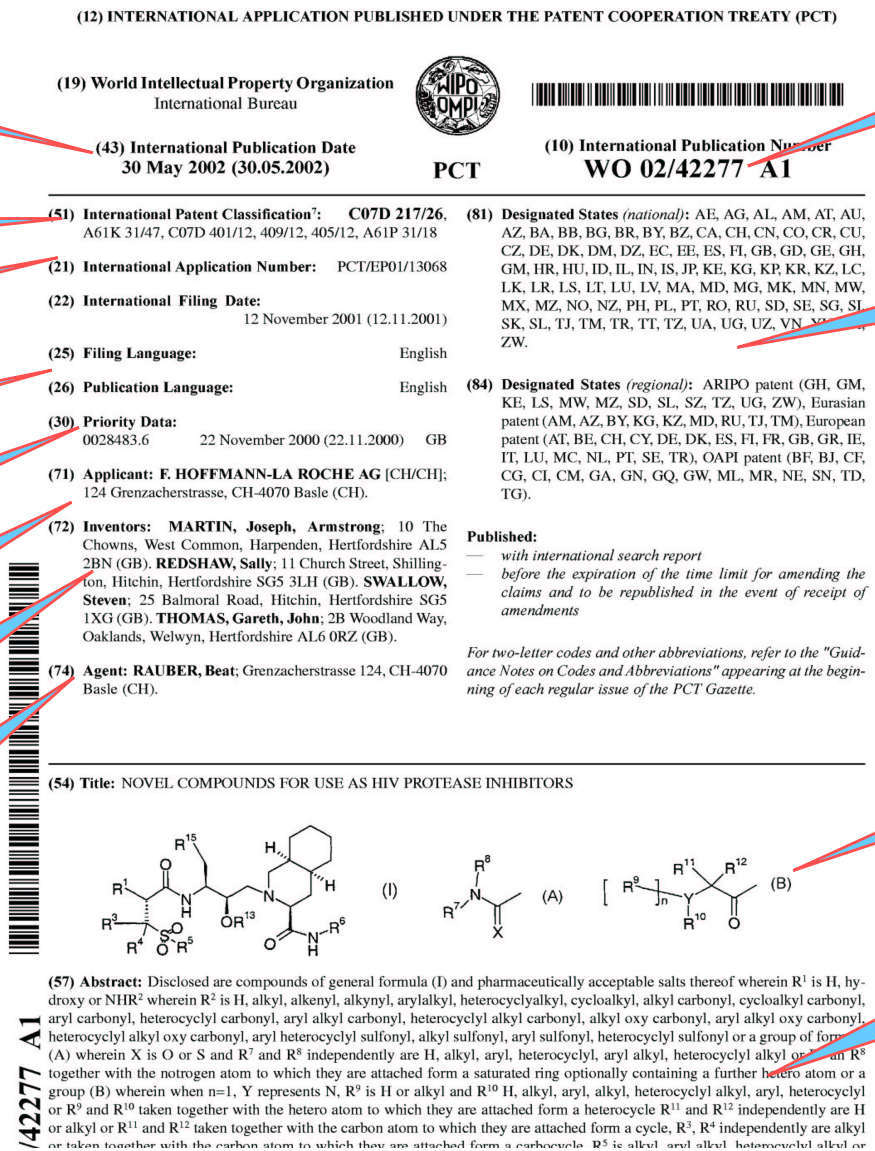
Patent Attorney

Patent number

Designated Countries

Representative drawing or figures

Abstracts gives the main feature of the invention



(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

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PCT

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0028483.6 22 November 2000 (22.11.2000) GB

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(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*
— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: NOVEL COMPOUNDS FOR USE AS HIV PROTEASE INHIBITORS

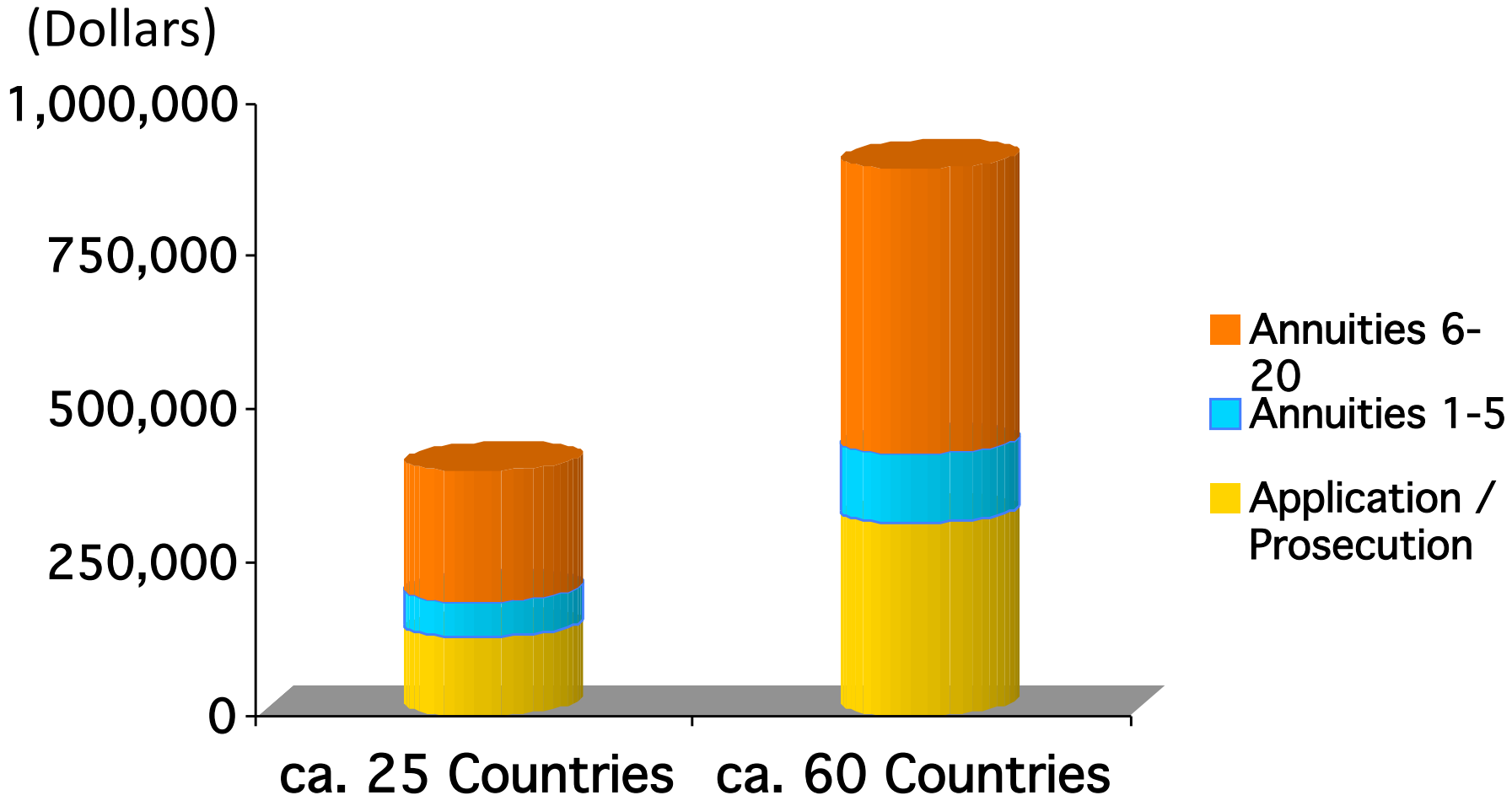
(I) (A) (B)

(57) Abstract: Disclosed are compounds of general formula (I) and pharmaceutically acceptable salts thereof wherein R^1 is H, hydroxy or NHR^2 wherein R^2 is H, alkyl, alkenyl, alkynyl, arylalkyl, heterocyclyalkyl, cycloalkyl, alkyl carbonyl, cycloalkyl carbonyl, aryl carbonyl, heterocyclyl carbonyl, aryl alkyl carbonyl, heterocyclyl alkyl carbonyl, alkyl oxy carbonyl, aryl alkyl oxy carbonyl, heterocyclyl alkyl oxy carbonyl, aryl heterocyclyl sulfonyl, alkyl sulfonyl, aryl sulfonyl, heterocyclyl sulfonyl or a group of formula (A) wherein X is O or S and R^7 and R^8 independently are H, alkyl, aryl, heterocyclyl, aryl alkyl, heterocyclyl alkyl or ... an R^8 together with the notrogen atom to which they are attached form a saturated ring optionally containing a further hetero atom or a group (B) wherein when n=1, Y represents N, R^9 is H or alkyl and R^{10} H, alkyl, aryl, alkyl, heterocyclyl alkyl, aryl, heterocyclyl or R^9 and R^{10} taken together with the hetero atom to which they are attached form a heterocycle R^{11} and R^{12} independently are H or alkyl or R^{11} and R^{12} taken together with the carbon atom to which they are attached form a cycle, R^3, R^4 independently are alkyl or taken together with the carbon atom to which they are attached form a carbocycle, R^5 is alkyl, aryl alkyl, heterocyclyl alkyl or

Overview Patent Costs

- **Initial Costs:** LOW!
- **Clear cost increase:** Initiation of regional/national filings and patent prosecution
- Maintenance fees **(annuities)**

Patent Costs



Patents and Pharmaceutical Industry

Types of Patents

Patent Categories and Market Exclusivity for Pharmaceutical Products

- Patents directed to compounds
  - Protection for the **pharmaceutically active ingredient**
  - Provides **MARKET EXCLUSIVITY** for pharmaceutical products

- Patents directed to other aspects
  - Formulation, process for manufacturing, use (new therapy, indication), product combinations, related product, administration scheme, research tool, machine, …
  - **Cannot** guarantee market exclusivity
  - Provide protection for specific aspects only

Effective Term of Patent/Exclusivity

Patent Categories and Market Exclusivity

- **Patent/Exclusivity expiry after** 20 years.
- Reduced time **taken to qualify for market approval**

  - Patent term restoration**: Patent term extensions and "supplementary protection certificates" (SPCs)**
  - Regulatory exclusivity **available by state statue or market approval authority decision**

Extensions and Modifications of the Patent Regime - USA

- **Expanded by "evergreening": For patent filings pre-1995**
- **Extensions and modifications of the patent regime**
  - **The Hatch-Waxman Act (1984):** Allows recovery of part of time spent for FDA approval – **Up to 5 years extension** subject to **14 year cap** post approval
  - **Pediatric Exclusivity (1997):** Exclusivity can be extended **by 6 months** for pediatric indication

Extensions and Modifications of the Patent Regime – Europe (EU)

- Supplementary Protection Certificates (SPCs) **– product specific**
- **Allows recovery of part of time spent for European approval –** Up to 5 years extension
  - = period elapsed between the date of patent application and the date of the first marketing in any EU country minus 5 years but not exceeding 5 years
  - New: Pediatric exclusivity: 6 month extension of SPC time

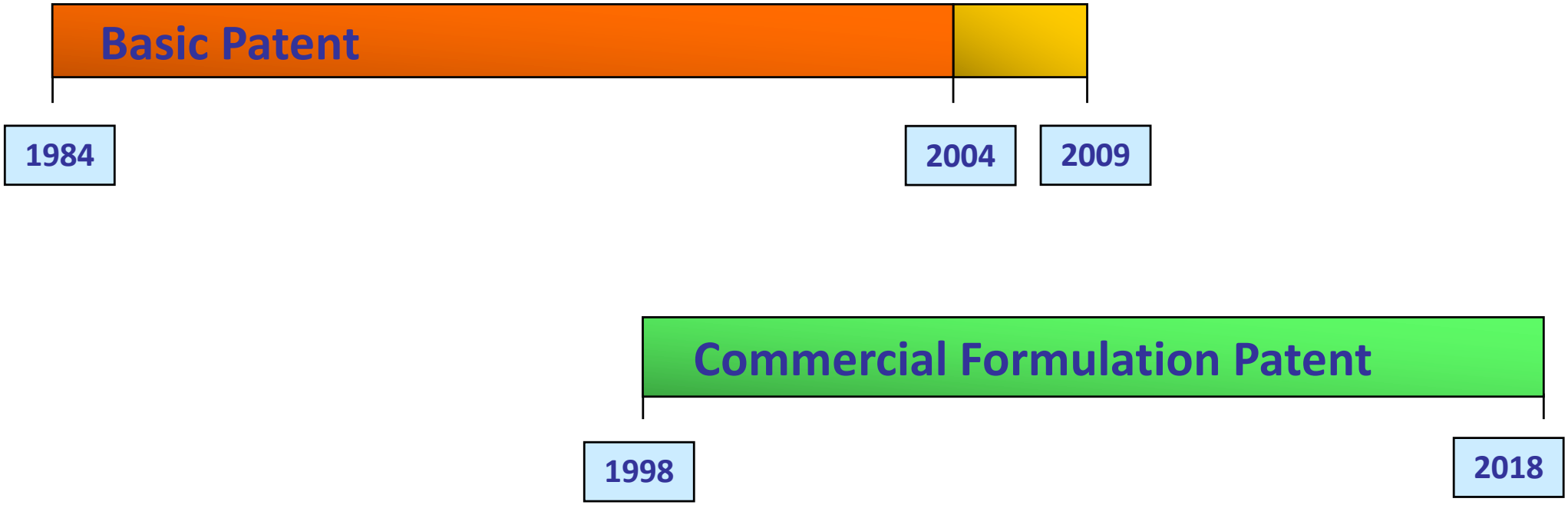
The Drug Patent is expired, and now?

Options

- **The basic patent covering the drug compound expirers, but…..**
- Life cycle patents **for formulations, processes, specific therapeutic uses may become relevant for protecting other features of the product**

Example: Pharmaceutical Compound

Patent Expiry Additional Patents – Life Cycle Patents



Copyrights

- **The exclusive right granted by a government to the owner of an original work of authorship to reproduce, distribute, perform, prepare derivative works, and/or display the copyright work.**
- **Term for individual is life plus 50 years; for organizations, publication plus 75 years (or creation plus 100 years).**
- **Covers the expression of an idea in tangible form but not the idea itself.**
- **Traditionally the vehicle for mass market software protection, print material, and recorded materials (tapes, records, film).**
- **Acquisition upon creation; registration relatively easy (in the US).**
- **Automatically protected in many foreign countries (Berne Convention, WIPO treaties for software and recordings).**

Trademarks

- **A name or logo which is affixed to goods or services placed in commerce and indicates the source and quality of the goods or services.**
- **Term is indefinite (while still in use).**
- **Easily protected via registration, and easily obtained indefinitely.**
- **May be worth more than the invention or creation (e.g, Gatorade).**
- **Trademarks can be registered within a state (USA), or nationally. Must be registered nation by nation.**

Written Exam

- **Thursday 15.01.2026 from 09h15 to 12h15 (CE 1 6)**

What will NOT be subject of the exam

- Skip : Introduction lecture
- Skip : Transgenic plants/transgenic animals
- Skip: Company presentations

ChE-433 Biotechnology lab (for CGC)

- February, 2026
- Tuesday: 12h-15h
- Friday: 9h-12h