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PHARMACEUTICAL INDUSTRY

	1999	2000	2001	2002	2003	2004	2005	2006
R&D Spending (\$ billion)	22	26	30	32	33	39	39.9	43
R&D as % of Revenues	17	18	18	18	18	19	19.2	19.4
New Drugs Approved	35	27	32	26	24	25	19	29
Mean Approval Times (mo)	12.6	17.6	16.4	22.1	23	24.7	23	24

Number of diseases under R&D Programs: ~500

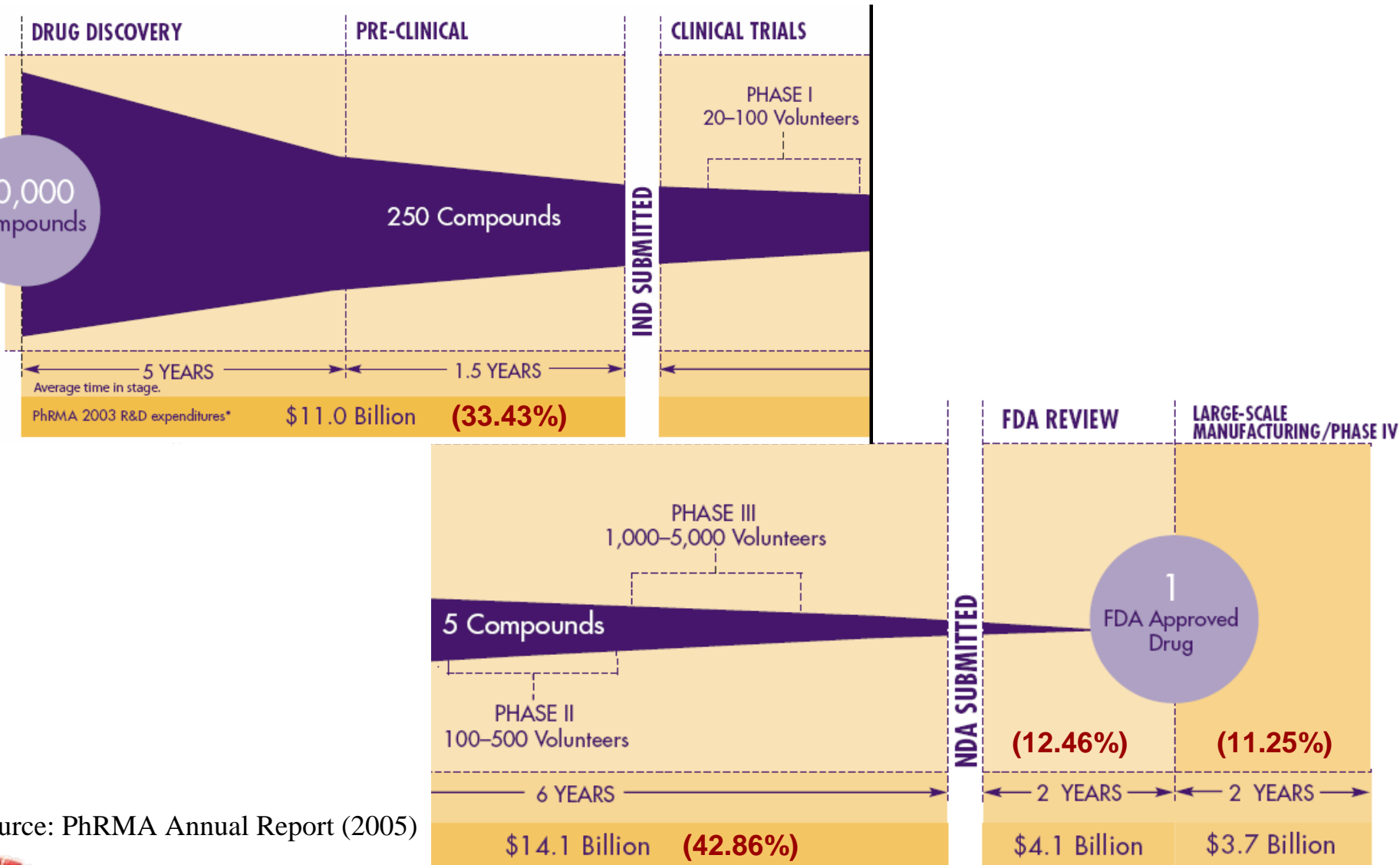
Number of diseases that Humans suffer: ~10,000

Source: PhRMA Annual Report (2005)

Year	Cost (million \$/drug)
1999	645
2000	962
2001	931
2002	1,192
2003	1,438
2004	1,480
2005	2,074
2006	1,480



DRUG DISCOVERY PIPELINE



*Source: PhRMA Annual Report (2005)



PROSTATE CANCER

➤ **FACTS**

- Most common malignancy.
- Most common age-related cause of cancer death among males.
- Family history is a risk factor.
- High levels of androgens is common.

➤ **TREATMENT**

- Anti-androgens for androgen receptors
- GnRH analogs and antagonists
- Orchiectomy or prostatectomy

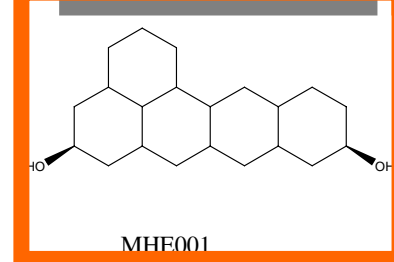
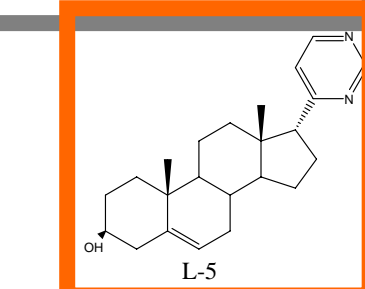
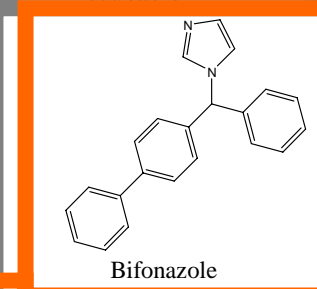
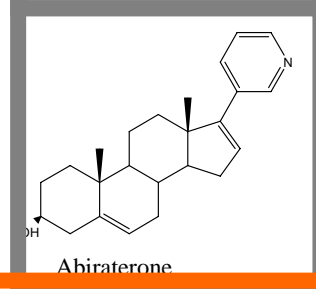
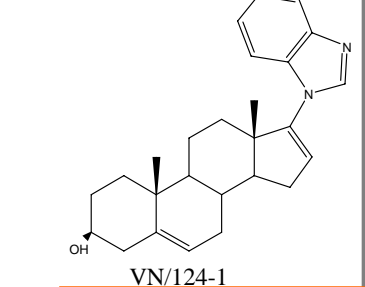
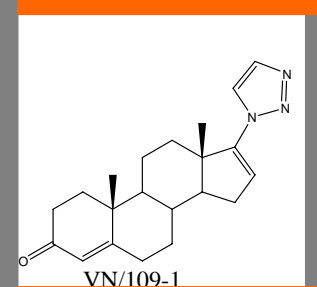
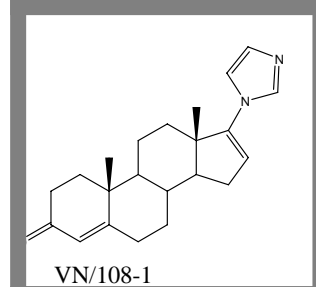
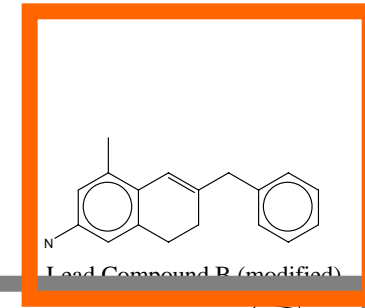
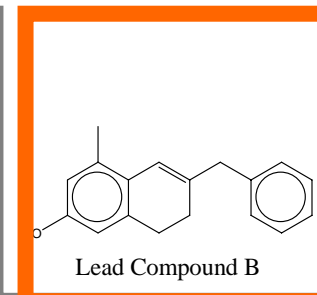
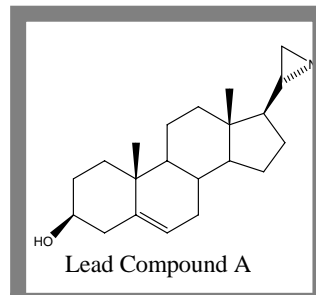
➤ **DRUGS**

- Drugs for the treatment of prostate cancer are analyzed.
- Steroid based drugs are commonly used for this purpose.
- Steroidomimetic compounds are rewarding alternatives.
- Steroids and Steroidomimetics are characterized on the basis of interaction energies.



DRUG CANDIDATES

- Candidate molecules modulate function of target.
- Candidates can be grouped into two classes:
 - Steroids
 - Steroidomimetics



DOCKING RESULTS

<i>Inhibitors</i>	<i>Energies (kcal/mol)</i>		<i>Chemistry</i>
	<i>Docking</i>	<i>Binding</i>	
Lead Compound B^[29]	-10,37	-9,7	Steroidomimetic
Lead Compound B (modified)	-9,98	-9,32	Steroidomimetic
Bifonazole^[27]	-8,59	-8,89	Steroidomimetic
10^[3]	-8,08	-7,56	Steroidomimetic
MHE001	-7,3	-7,26	Steroidomimetic
Abiraterone ^[27]	-5,23	-4,74	Steroidal
Lead Compound A ^[29]	-4,73	-4,44	Steroidal
VN/108-1 ^[27]	-3,67	-3,17	Steroidal
VN/109-1 ^[27]	-3,35	-2,77	Steroidal
VN/124-1 ^[27]	-1,46	-1,05	Steroidal
L-5 ^[27]	-0,92	-1,25	Steroidal



EXPERIMENTAL STUDIES

- The separation of substrates and the products of CYP17 is optimized for TLC and HPLC.
- Enzyme assay is completed.
- In-vitro inhibition studies are conducted to verify theoretical results
- Optimization of current candidates is done through modification of side groups using QSAR Analysis
- Toxicity analysis of drug candidates
- Design of new novel drug candidates
- Virtual Screening of new compounds

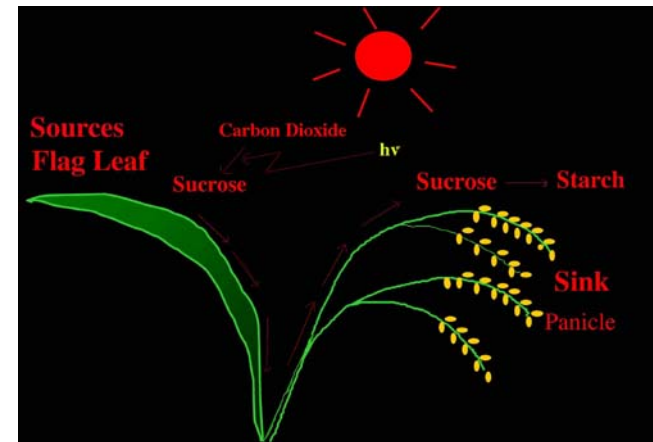


OTHER PROJECTS

1. Understanding molecular mechanism of human Biological Clock



2. Improvement of plant yield increasing starch biosynthesis by enhancing ADP-glucose pyrophosphorylase activity



3. Development of biosensor to detect narcotic in blood



RECOMMENDATIONS

➤ Biotechnology Strategy for Turkey

- decide on application domain(s)
 - Food, Energy, Environment, Health, Basic Materials
- developing and retaining human resources
 - BS programs are not sufficient to develop a strong foundation
 - Need for MS and PhD programs and students
 - Collaboration with other universities
- legal framework and ethical issues
 - IP rights
 - Code of ethics
 - Public image
- funding mechanisms for research and innovation
 - Government, EU Framework programs, VC

