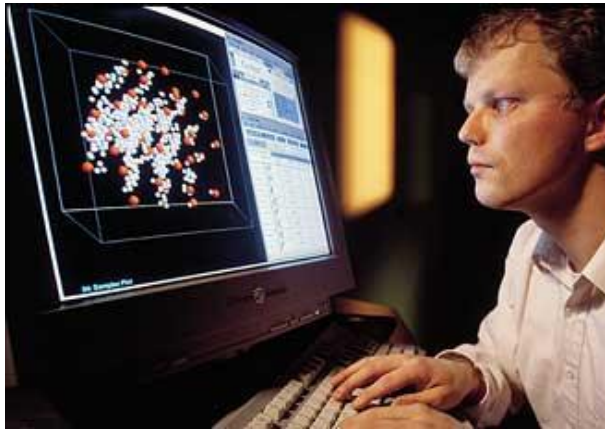
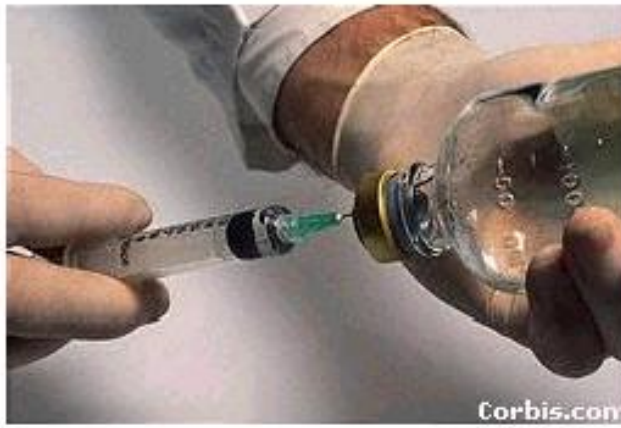
# DRUG RESEARCH AND DEVELOPMENT METHODS

**Prof. Dr. Esin AKI-YALÇIN**

**Department of Pharmaceutical Chemistry**







# KANTİTATİF YAPI-ETKİ İLİŞKİLERİ ANALİZLERİ (QSAR)

**Prof. Dr. Esin Akı Şener**

Ankara Üniversitesi Eczacılık Fakültesi
Farmasötik Kimya Anabilim Dalı

**Prof. Dr. İsmail Yalçın**

Ankara Üniversitesi Eczacılık Fakültesi
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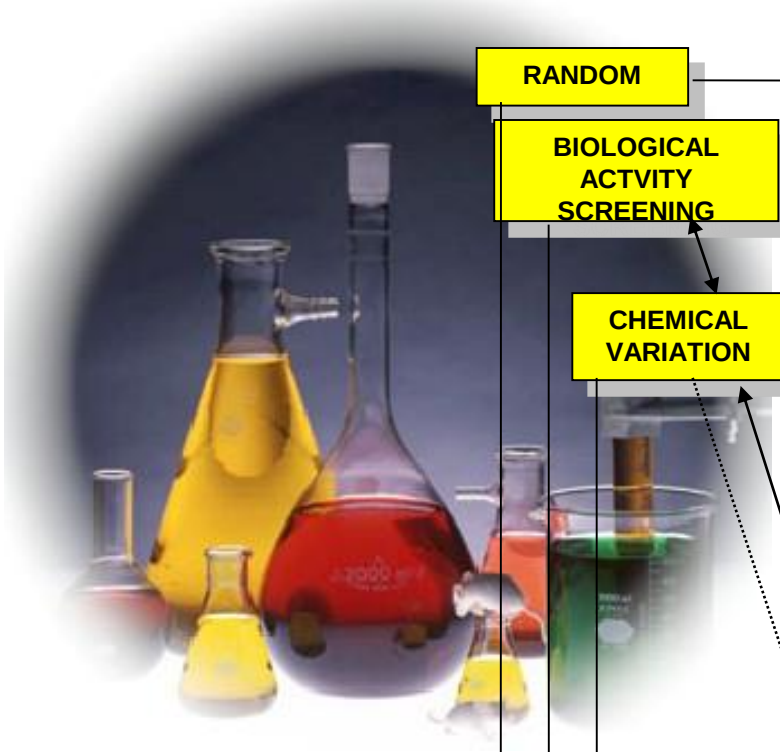


RANDOM

BIOLOGICAL ACTVITY SCREENING

CHEMICAL VARIATION

MECHANICAL DESIGN

Identification of Disease Factor

Effector

Target

Identification

Identification

Computer-Aided Drug Design

Theoretical Drug Active Ingredient Design

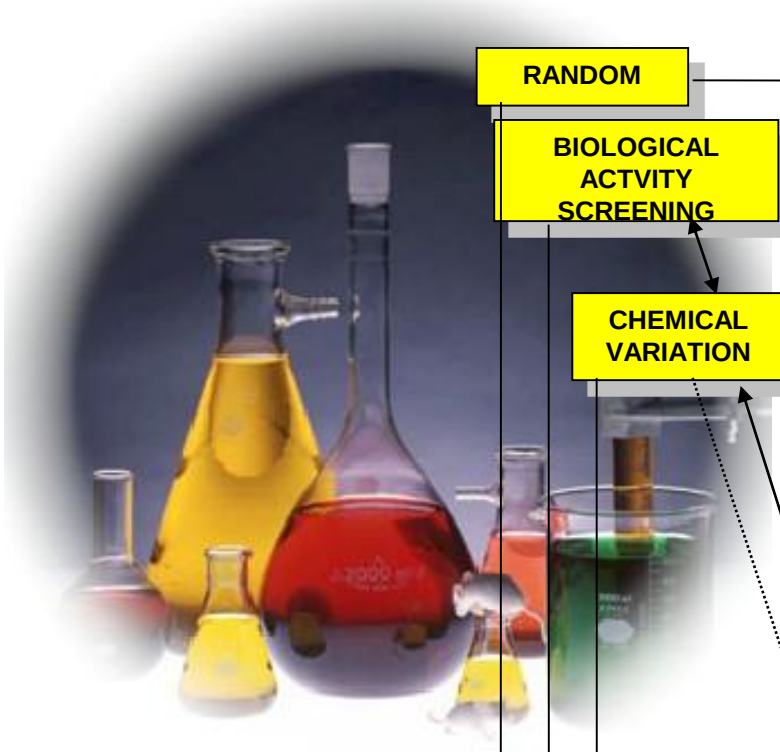
Synthesis

Determination of the Biological Activity

NEW DRUG ACTIVE INGREDIENT

# RANDOM DRUG DISCOVERY

- Drugs sometimes can be discovered by chance or intuition.
- Drugs are more often discovered as a result of organized research.
- As computer technology develops, drug design methods develop in parallel.



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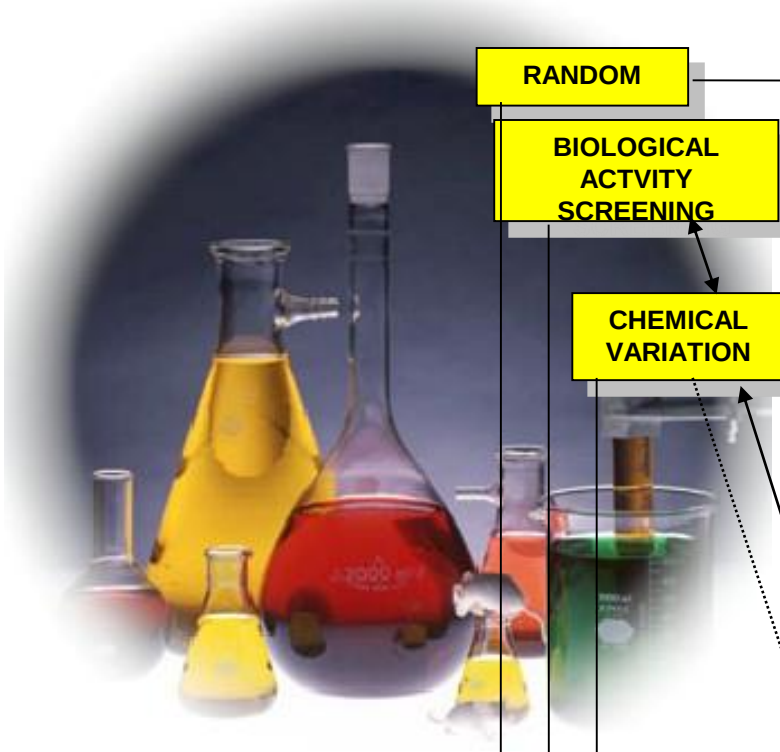
# BIOLOGICAL ACTIVITY SCREENING METHOD FOR NEW DRUGS

- In this method, which has been applied mostly in the past, many compounds are screened for the desired activity.
- The known screening method is to test a large number of compounds for the desired activity.
- Today, it is not seen as the ideal drug design method.

HTS
High Throughput Screening

# Result:

- While the compound may be active, it can be eliminated before its activity is detected.
- The structure of the target and mechanism of the disease cannot be elucidated in this method.
- Costs a lot of time, effort and expense.



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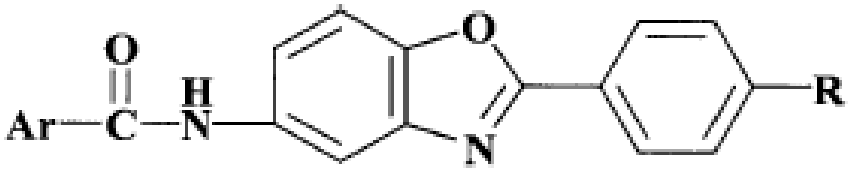
# CHEMICAL VARIATION (MODIFICATION)

**Making modifications on groups or atoms in order to observe changes in the activity of active drug ingredients.**

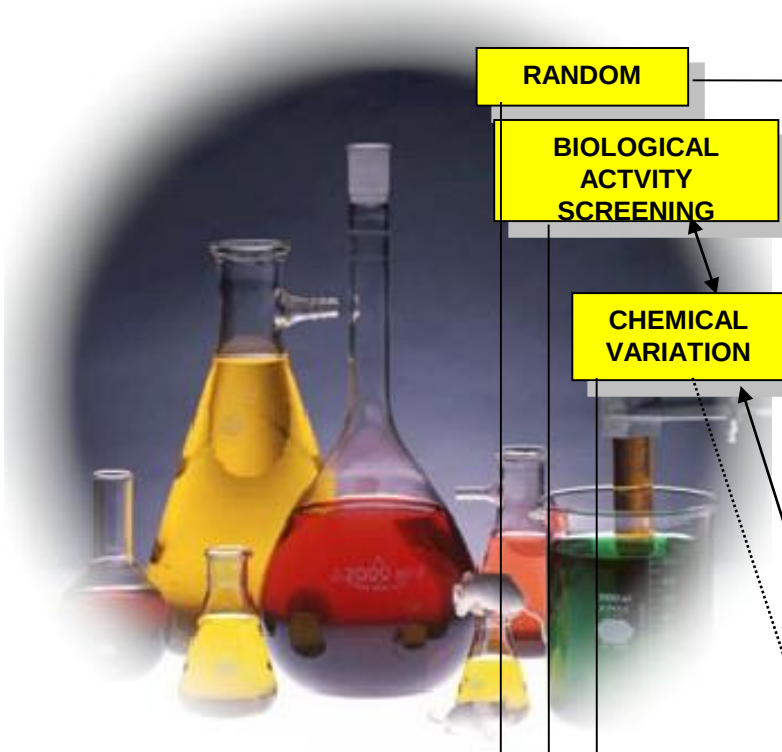
# CHEMICAL VARIATION (MODIFICATION)




R = H, $C_2H_5$, F, $N(CH_3)_2$
Ar = 2-furyl, 2-thienyl, substituted phenyl

# CHEMICAL MODIFICATION

- A trial and error method
- Not much information is required about the structure of the target.
- Some data that can describe the relationships between structure and activity can be revealed.



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# DRUG DESIGN BASED ON MECHANISM

- Biological pathway must be known
- All studies are carried out at the molecular level
- It is the ideal drug design method today.

**TARGET:**

**RECEPTORS**

**ENZYMES**

**NUCLEIC ACIDS**

**HORMONES**

Prof. Dr. Esin AKI-YALÇIN

# TARGET STRUCTURE ELUCIDATION

- **Elucidation of the structure of targets:**
- **With X-ray crystallography studies, receptors**
- **With NMR data, enzyme-substrate interactions**
- **With recombinant DNA technology and cloning studies, elucidation of primary structures of receptors and enzymes**

# EFFECTOR:

NATURAL ENDOGENIC SUBSTANCES OR DRUGS THAT OCCUPY THE ACTIVE SURFACE OF THE TARGET AND AFFECT THE TARGET POSITIVELY OR NEGATIVELY

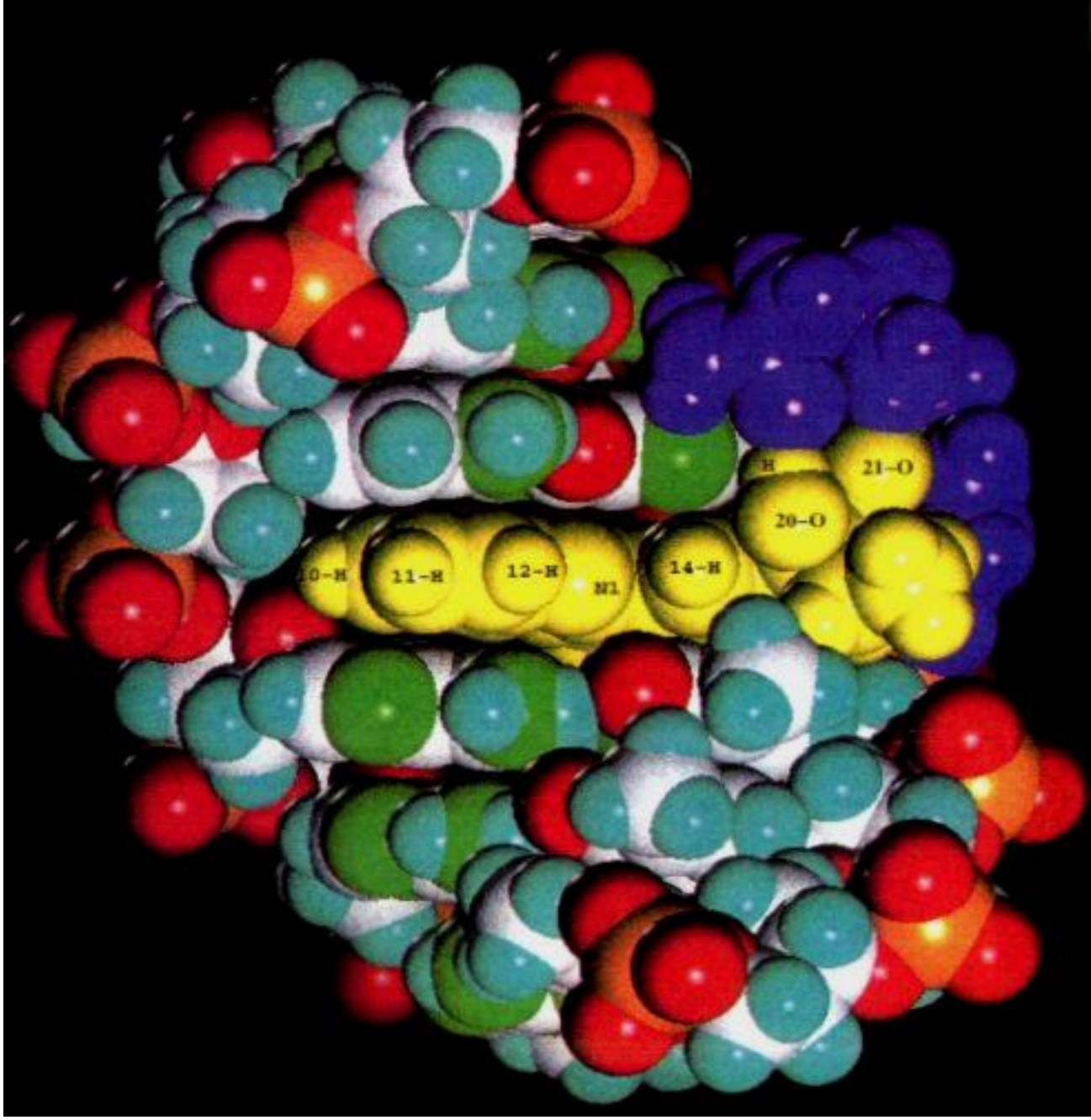
# Effectors

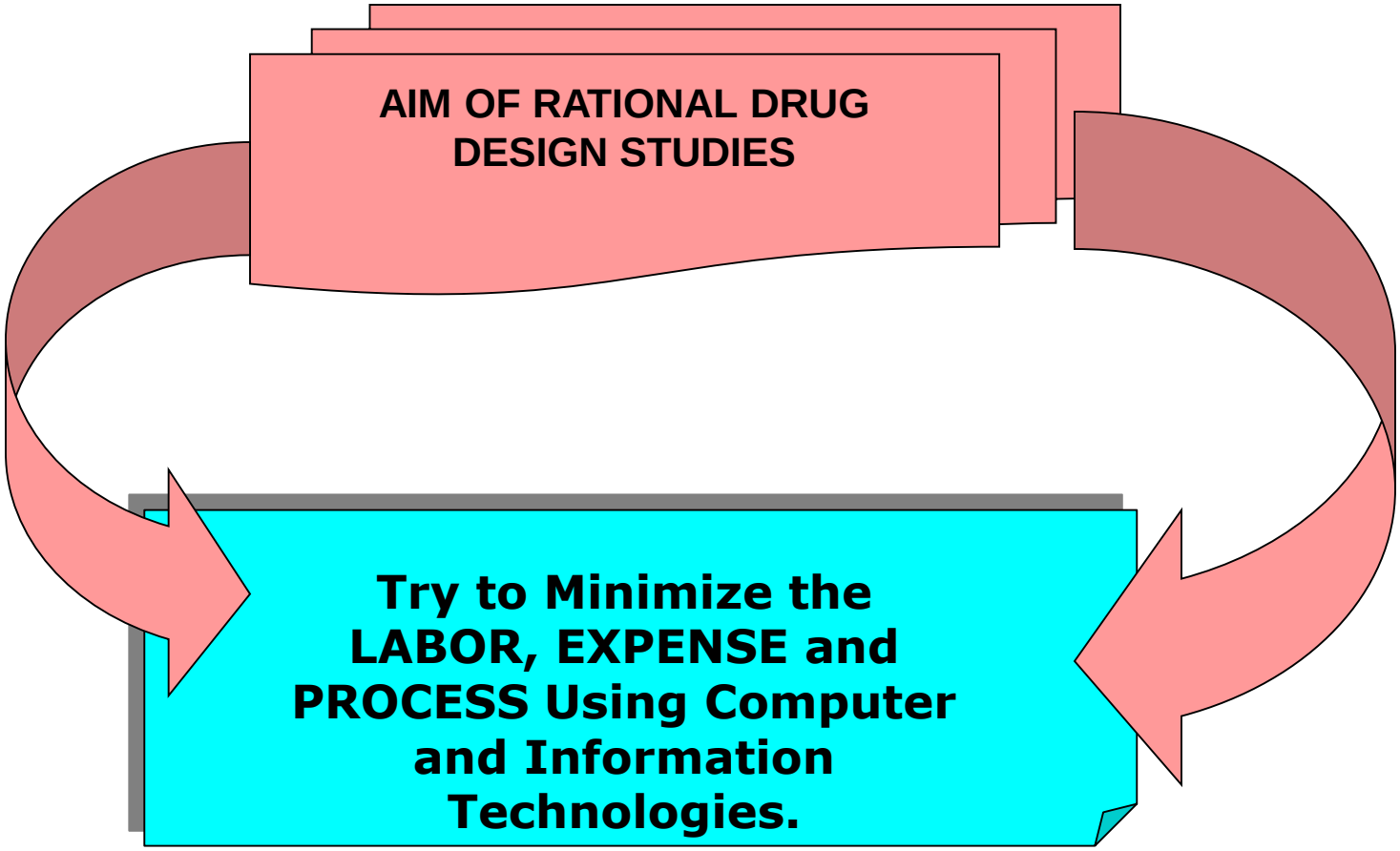
- Substrates
- Ligands
- Endogen subtances that affect the target positively or negatively
- Drugs

# Effector-Target Interactions

- Effector will interact with the active surface of the target as a key-lock model
- Groups that carry charges between the effector and target will fit each other
- Favorable chemical bonds will be formed between the effector and target

# Key-Lock Model




AIM OF RATIONAL DRUG DESIGN STUDIES
Try to Minimize the LABOR, EXPENSE and PROCESS Using Computer and Information Technologies.