

**MEDICINAL CHEMISTRY**  
**SUPPLEMENTAL EDUCATIONAL OUTCOMES**  
**BASED on CAPE 2004**

**PHARMACEUTICAL CARE** Provide pharmaceutical care in cooperation with patients, prescribers, and other members of an interprofessional health care team based upon sound therapeutic principles and evidence-based data, taking into account relevant legal, ethical, social, economic, and professional issues, emerging technologies, and evolving biomedical, sociobehavioral, and clinical sciences that may impact therapeutic outcomes.

I. Acquire, comprehend, apply, analyze, synthesize, and evaluate information about the chemical structure of drugs and drug classes in order to design, implement, monitor, evaluate, and adjust pharmaceutical care plans that are patient-specific and evidence based.

- A. Identify the chemical and/or pharmacological classification to which a drug belongs.
- B. Predict therapeutic applications for individual drugs based on knowledge of chemical and/or pharmacologic classification.
- C. Given patient-specific information, select optimal drug within a pharmacologic class based on structure-activity relationships (SAR) and those structural features responsible for binding to biological targets that account for relative drug potencies and receptor affinities.
- D. Select optimal drug therapy within a chemical and/or pharmacologic class based on structural features that affect absorption, distribution, metabolism and excretion.
- E. Determine the appropriate route(s) of drug administration based on the contribution of specific chemical features to drug solubility in biological fluids and delivery vehicles.
- F. Predict and prevent drug-drug interactions, drug-food interactions, drug-herbal interactions, and drug side effects and toxicities by applying knowledge of structural features and other chemical principles.
- G. Select appropriate drug therapy based on mechanism of drug action via integration of knowledge gained from the drug structure with concepts of organic chemistry, anatomy, physiology, pharmaceuticals and pharmacology.

II. Recommend changes in pharmacotherapeutic regimens based on chemical differences among drugs that relate to solving patient problems, providing patient-centered care, and providing population-based care.

- A. Based on individual patient characteristics and medical conditions, evaluate pharmacotherapeutic options by analyzing chemical features that determine solubility, routes of metabolism, duration of action, and acid-base characteristics.
- B. Modify drug therapy regimens based on the evaluation of structural features and chemical properties of drugs that are related to adverse drug reactions, drug-drug interactions, nutritional effects, and lack of efficacy.

III. Resolve drug therapy problems of individual patients by applying knowledge of drug chemistry across pharmacological classes.

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- A. Prevent drug-drug interactions by consideration of the pharmacodynamics and pharmacokinetic differences of drugs.
  - B. Utilizing chemical principles, predict the potential adverse effects that contribute to patient morbidity and nonadherence.
  - C. Anticipate and prevent problems with drug delivery systems and routes of administration associated with the chemical properties of drugs.
  - D. Select an appropriate multi-source drug product based on knowledge of the chemical, physical and biochemical properties of a generic drug.
- IV. Use appropriate chemical terminology to explain chemical, pharmacological and basic therapeutic concepts.
- A. Effectively communicate the chemical rationale for therapeutic decisions at an appropriate level of understanding for patients, caregivers, and other health professionals.
  - B. Respond accurately and appropriately to questions related, either directly or indirectly, to drug structure or chemistry that are posed by patients and other health care professionals.
- V. Maintain professional competence by employing knowledge of structural features to predict mechanisms, adverse effects, metabolism, solubility, acid/base characteristics, potential drug interactions, and therapeutic effects of future drug products.

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The supplemental outcomes were developed by Educational Outcomes and Objectives Supplements Task Force Members: Marc W. Harrold, Duquesne University (chair); Naser Alsharif, Creighton University; Jeff Christoff, Ohio Northern University; Elmer Gentry, Midwestern University; Matt Lu, University of Illinois-Chicago; Robert Riggs, Samford University; Terry Schwinghammer, West Virginia University; and Robin Zavod, Midwestern University.