Roles of Basic Sciences in Clinical Reasoning Education

W. Cary Mobley, R.Ph., Ph.D
University of Florida College of Pharmacy
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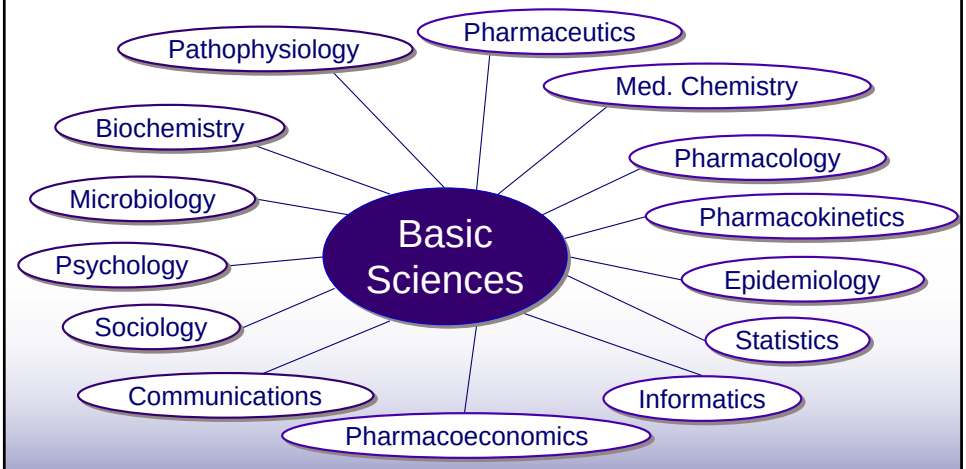
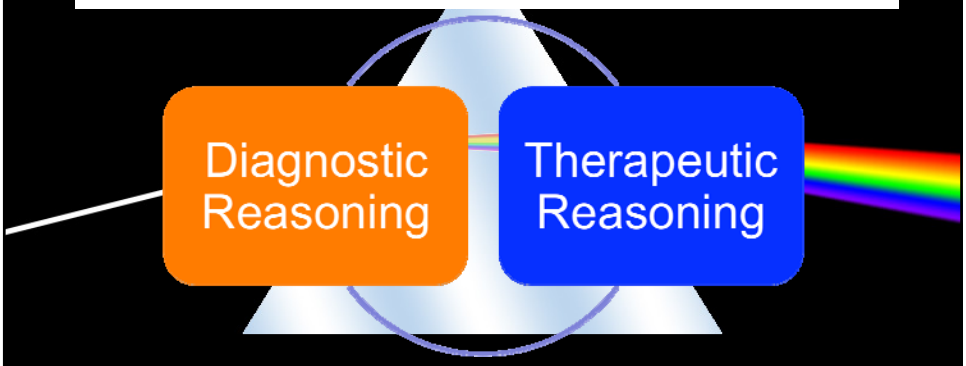
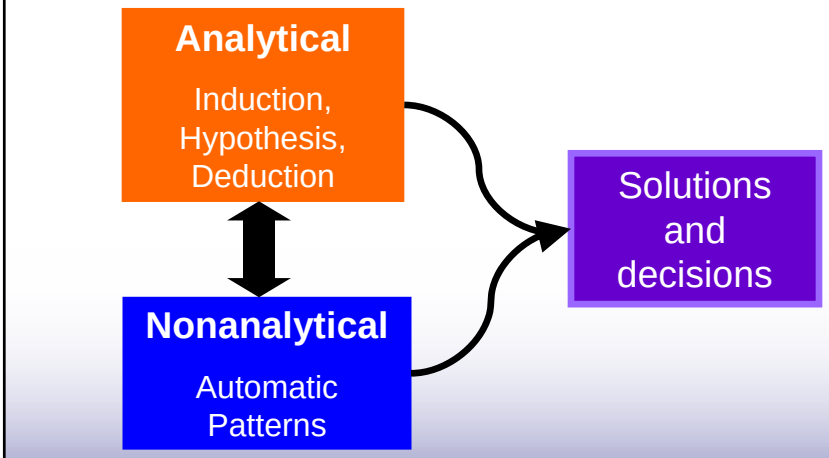
The Basic Sciences - A Broad Perspective



The Clinical Reasoning Spectrum



General Reasoning Processes



General Values of Basic Sciences for the Health Care Practitioner

- For understanding
- For communication
- For furthering knowledge
- For translating knowledge
- For debunking
- For demystifying
- For valuing the whole patient

Roles of the Basic Sciences in Clinical Reasoning Processes

Preventing and resolving DRPs

- Obtaining patient information
- Organizing patient information
- Establishing cause and effect
- Developing a care plan
- Preventing premature closure
- Reflecting & integrating

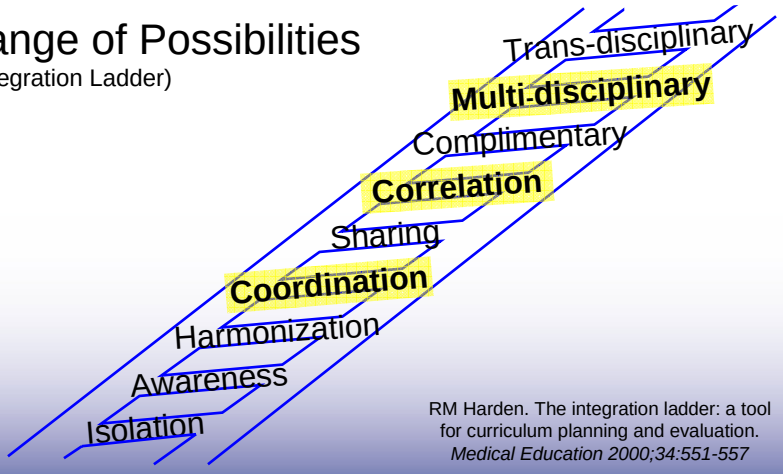
Important Concept Attributes for the Education of the Clinician

- Integration
- Hierarchy
- Automatization

Integrating the Curriculum to Support Conceptual Integration

A Range of Possibilities

(The Integration Ladder)



RM Harden. The integration ladder: a tool for curriculum planning and evaluation. *Medical Education 2000;34:551-557*

An Approach to Curricular Integration:

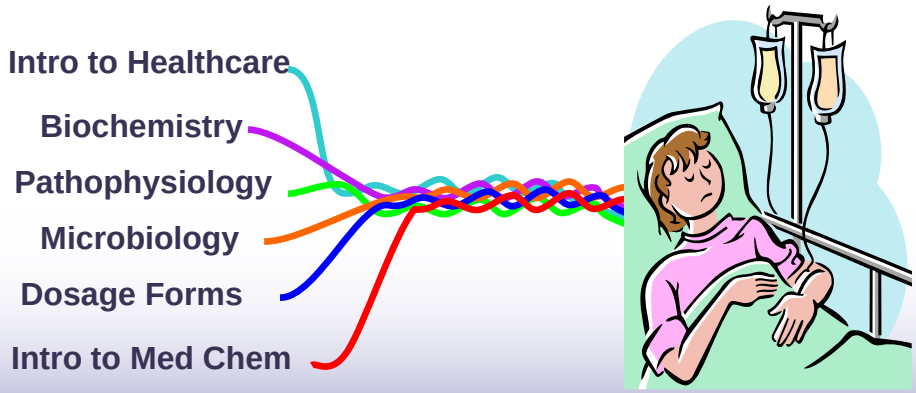
Weaving the Training Around the Curriculum

Integrated Case Studies (ICS)

Year 1	Year 2	Years 3 and 4
Biochemistry, Physiology, Pharmaceutics, Microbiology, Intro Courses: to Pharmacy, to Medicinal Chemistry, to Pharmacology, to Pharmacotherapy	Medicinal Chemistry, Pharmacology, Pharmacokinetics, Communications, Statistics Pharmacotherapy…	Evidence-Based Med., Law, Pharmacoeconomics, Drug Therapy Mon., Skills Labs, Pharmacotherapy, APPEs …

An Approach to Conceptual Integration:

ICS - Weaving the Curriculum Around the Patient



General Description of the Integrated Case Studies Courses

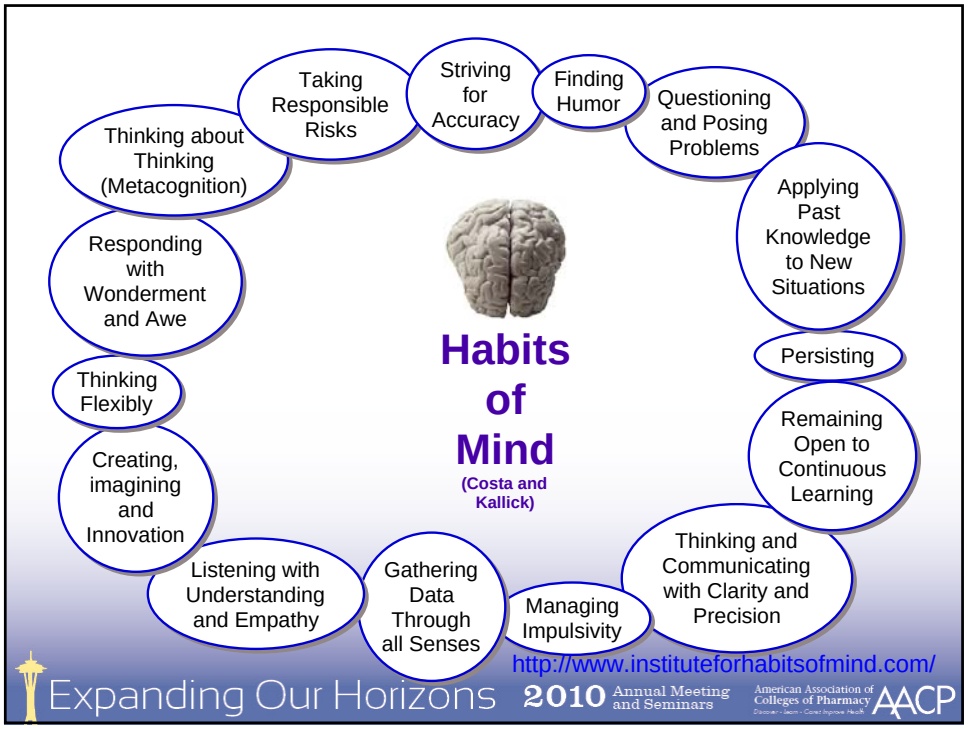
- Using **patient cases** to integrate and apply curricular knowledge
- Facilitated, small-group sessions
- 3 to 4-week sequence: Case overview > Learning issue presentations > Practical applications and integrations
- Learning issue order: Pt/disease background > diagnosis and monitoring > patient care

Next Stage: Developing Clinical Reasoning Skills

- Integration alone is not enough
- Cognitive aids are multiplying
- For the “future of the profession”

Developing Clinical Reasoning Skills: Some General Considerations

- For the generalist
- Hierarchy and integration
- Basic sciences from beginning to end
- Analytical & non-analytical reasoning skills
- Independent rational thought
- Personal responsibility
- Habits of mind



Developing Clinical Reasoning Skills: Some Important Themes

- The integrated patient
- Common illnesses, common DRPs
- Patient assessment
- Important basic science concepts

Developing Clinical Reasoning Skills: General Course Sequence

- Semester 1 - Understanding the patient and clinical reasoning processes
- Semester 2 - Differential assessment of patients' medical needs
- Semester 3 - Differential assessment and therapeutic reasoning of the prototypical patient
- Semester 4 - Differential assessment and therapeutic reasoning of prototypical and complex patients

Developing Clinical Reasoning Skills: Understanding Reasoning Processes

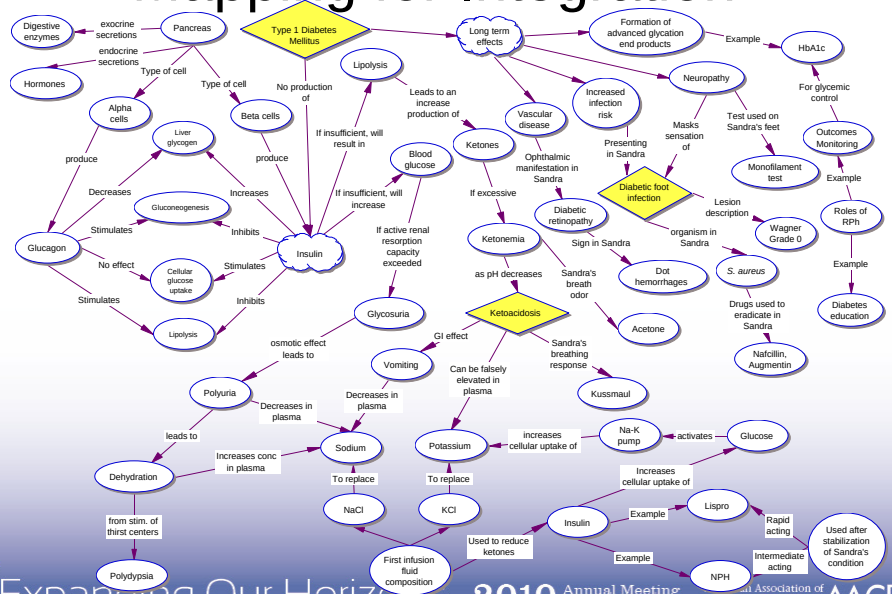
- Induction, hypothesis, deduction, and patterns
- Example: Include logical fallacies as causes of clinical error
  e.g.,"post hoc, ergo propter hoc"

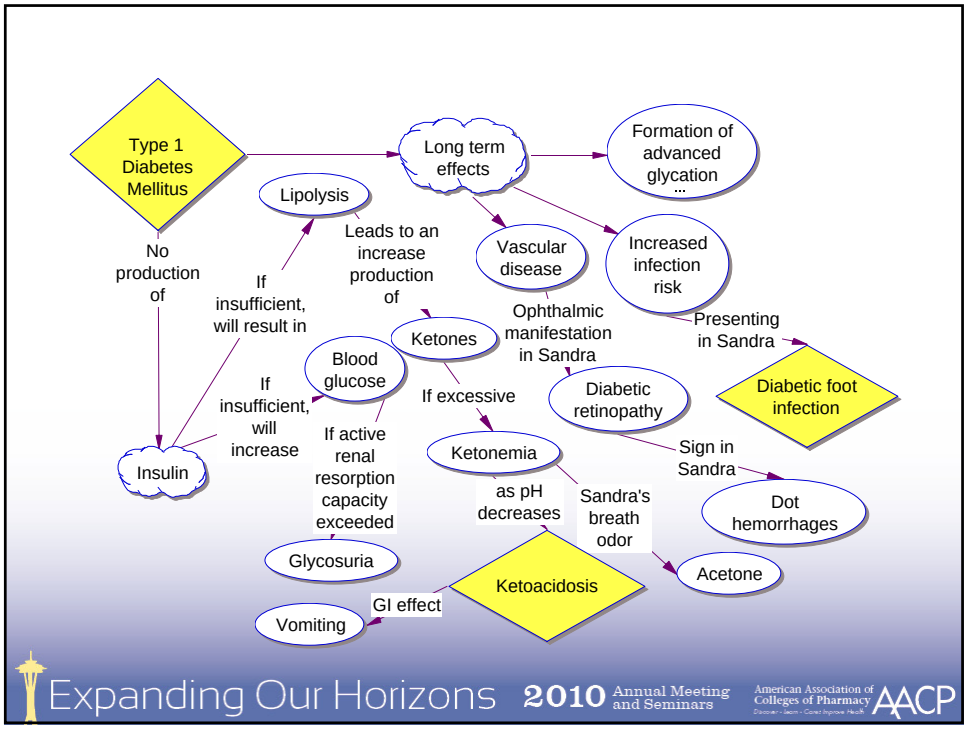
Developing Clinical Reasoning Skills: Exercises for Analytical Reasoning Processes

Mapping Examples:

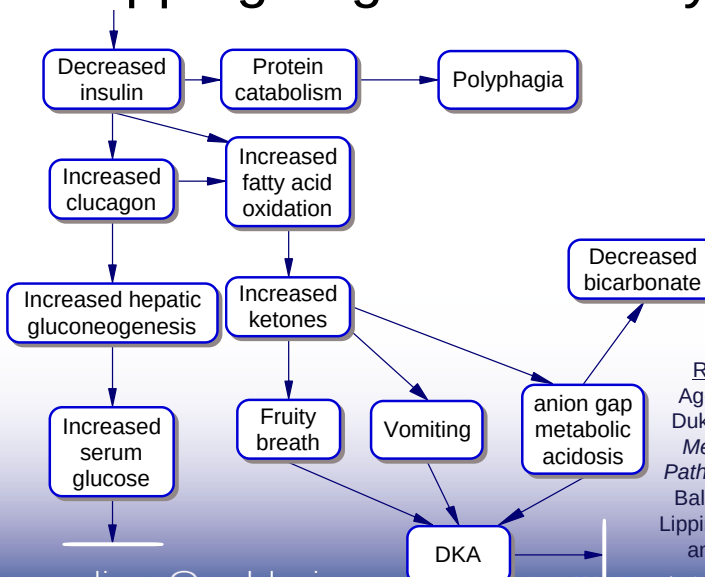
- Integration
- Logical Pathways
- Patient Care Planning
- Pharmacotherapy Consults

Mapping for Integration





Mapping Logical Pathways



Reference:
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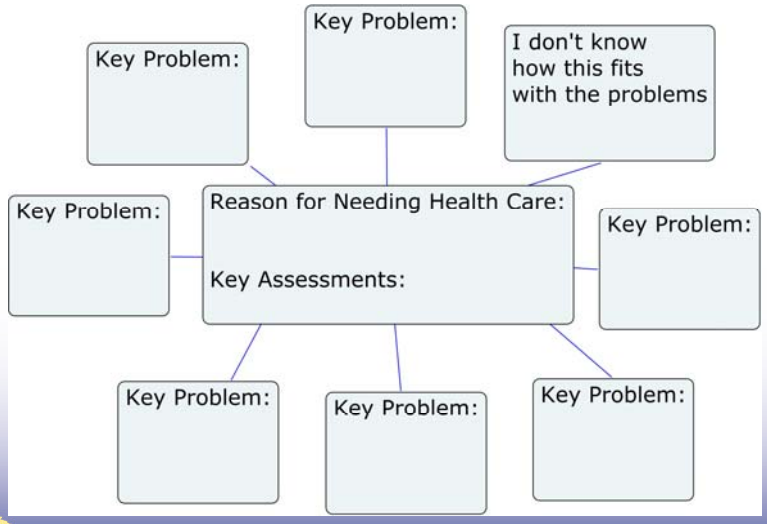
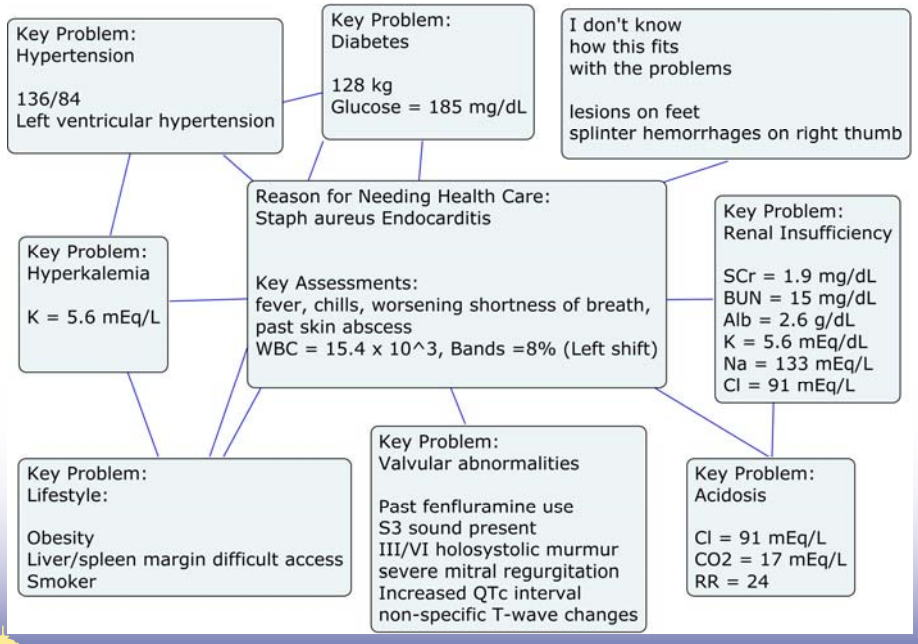
Mapping for Patient Care Planning

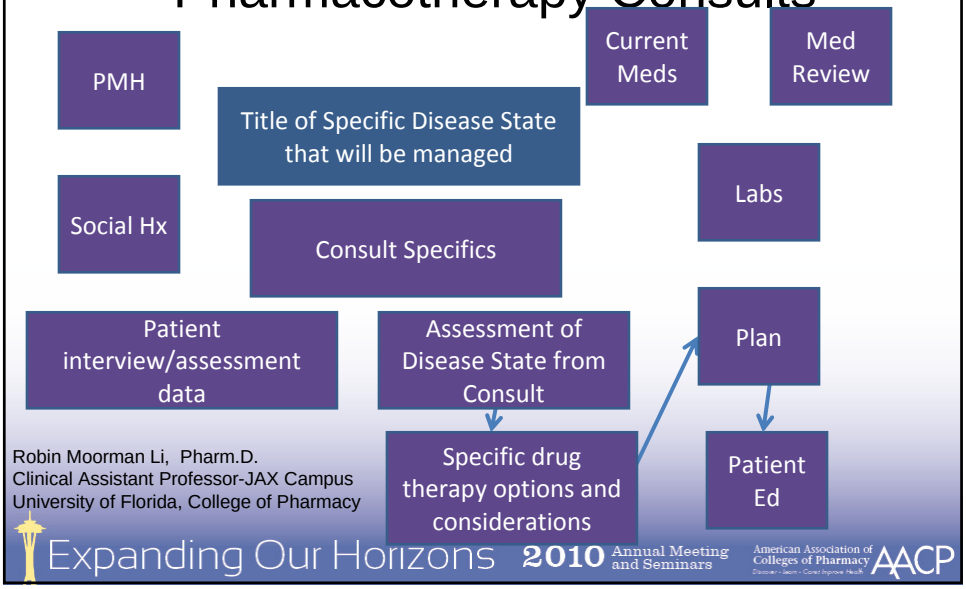


Schuster, P.M. 2008 *Concept Mapping: A Critical-Thinking Approach.* Philadelphia, PA: F.A. Davis.



Created by 2PD Integrated Case Studies Session Group 1 Students. Spring 2010

Mapping for Pharmacotherapy Consults



Robin Moorman Li, Pharm.D.
Clinical Assistant Professor-JAX Campus
University of Florida, College of Pharmacy

1. DM Type II
2. DPN
3. HTN

1. Lisinopril 10mg daily
2. Amitriptyline 75mg qhs
3. Glargine 20 units qhs
4. Novolog 5 units tid

Amitriptyline improper due to pt age; anticholinergic SE can cause confusion

Negative for Tobacco, ETOH, Substance Abuse

Diabetic Peripheral Neuropathy

Labs: WNL except CrCL calc: 23.3ml/min
AIC: 6.8%

78 y/o f with severe DPN; possible drug induced confusion

1. Pain 7/10
2. Heat and rest improves pain
3. Only has been prescribed amitriptyline for DPN
4. C/O excessive daytime sedation/ dry mouth, confusion

1. DPN uncontrolled; improper drug selection

1. Pregabalin: renal dosage possible effective agent
2. Gabapentin: as above but possible tid dosing vs bid

1. D/C Amitriptyline
2. Lyrica 25mg qhs may increase to max 150mg daily if tolerated

Robin Moorman Li, Pharm.D.
Clinical Assistant Professor-JAX Campus
University of Florida, College of Pharmacy

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Developing Clinical Reasoning Skills: Exercises for Non-analytical Reasoning Processes

- Patterns
  - e.g., of signs and symptoms
- Scripts
  - Goal-directed [automatized] knowledge structures

Illness Scripts

Problem list generation and processing

↓

Illness script

Predisposing (Enabling) Conditions	• Age >40 yr • Male sex • Alcohol use • Diuretics use
Pathohysiological Insult (Fault)	• Abnormal uric acid metabolism • Crystals in joint • Joint inflammation
Clinical Consequence	• Acute pain • Single joint (usually the first metatarsophalangeal) • Recurrent

JL Bowen. Educational strategies to promote clinical diagnostic reasoning. *N Engl J Med* 2006;355:2217-25.

Assessment of Clinical Reasoning Skills

- Need for Cognition Scale
- Diagnostic Thinking Inventory
- Rational-Experiential Inventory
- Health Sciences Reasoning Test
- Script Concordance Test

Script Concordance Test: Example

Clinical Vignette: "A 50-year-old pre-menopausal woman shows up for a routine visit in the Department of Occupational Medicine. Her body mass index is 28; she is sedentary. Glycosuria is found at screening urine analysis."*

If the hypothesis is	And you know that	The hypothesis becomes
Her glycosuria results from early-stage type 2 diabetes	Her FBG is126 mg⁄dL, plasma insulin level was high	-2 Much less likely -1 Less likely 0 Not affected +1 More likely +2 Much more likely

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Carrying Basic Science Education Forward

Curricular Coordination

Basic Science Education
- Find the right depth
- Clinical correlations
- Critical concepts / automatizations / working knowledge

Clinical Science Education
- Integrate basic science
- Feedback to basic science educators

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