PHARM.D • YEAR 3

Medicinal Chemistry

CHAPTER 11

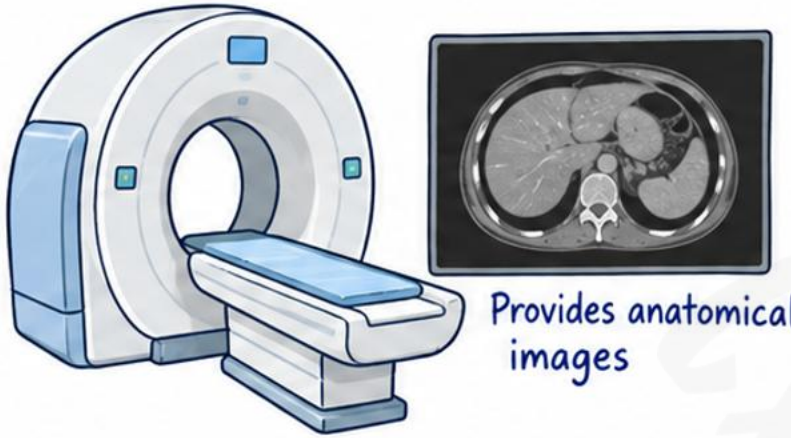
Diagnostic Agents



PPT CHAPTER COVER

Diagnostic Agents: Purpose

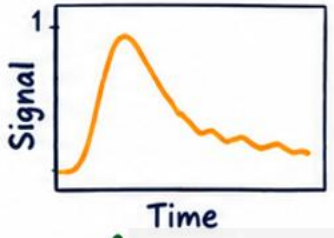
Imaging



Provides anatomical images

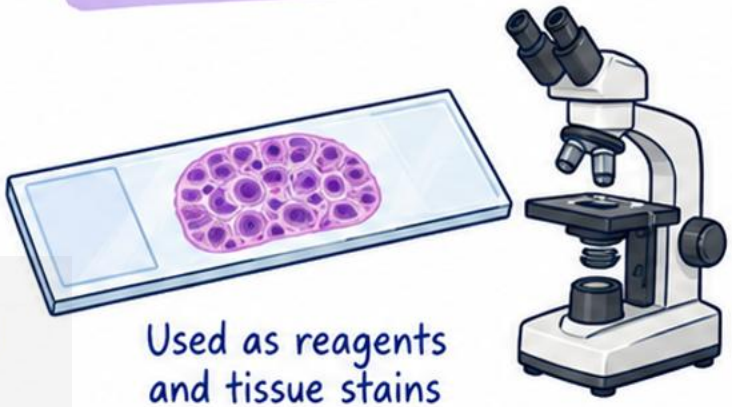
Functional Testing





Assesses organ function or biochemical activity

Laboratory Specimen



Used as reagents and tissue stains

Diagnostic Agents

What do they do?

Provide information about anatomy, organ function or biochemical activity. They support diagnosis, staging, monitoring and treatment planning.

Where are they used?

Inside the body as contrast media, tracers or challenge agents. Outside the body as laboratory reagents and tissue stains.

Desirable properties

Useful target selectivity, detectable signal, chemical stability and compatibility with the test.

Safety & clearance

An appropriate safety margin and predictable elimination are important. Required persistence depends on the procedure; a short half-life is not always ideal.

Distinguish

A diagnostic use is different from a therapeutic use, but one substance can have both.

DIAGNOSTIC AGENT CLASSES

DIAGNOSTIC AGENTS

IMAGING

Radiopaque agents absorb X-rays: iodinated contrast and barium sulfate.

Radiopharmaceuticals emit detectable radiation: organ-directed radionuclide tracers.





FUNCTIONAL TESTS

Inulin and PAH assess renal handling.

Radioiodine uptake assesses thyroid activity.



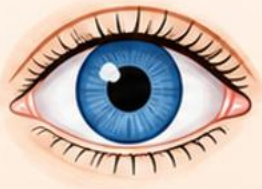


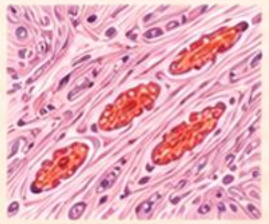
SURFACE & TISSUE DYES

Fluorescein for ocular examination.

Congo red for amyloid.

Erythrosine for dental plaque.





CHALLENGE & LABORATORY TESTS

Glucose, labelled urea, lactose and methacholine probe a physiological response.

Biochemical reagents detect analytes in collected specimens.





EXAM LINK

Match each agent to its signal, route, target and major precaution.

IODINATED CONTRAST MEDIA

CHEMISTRY & SIGNAL

Iodine-rich compounds attenuate X-rays and increase contrast in CT or radiographic imaging.

EXAMPLES

Iothalamate sodium and diatrizoate salts: ionic contrast agents.

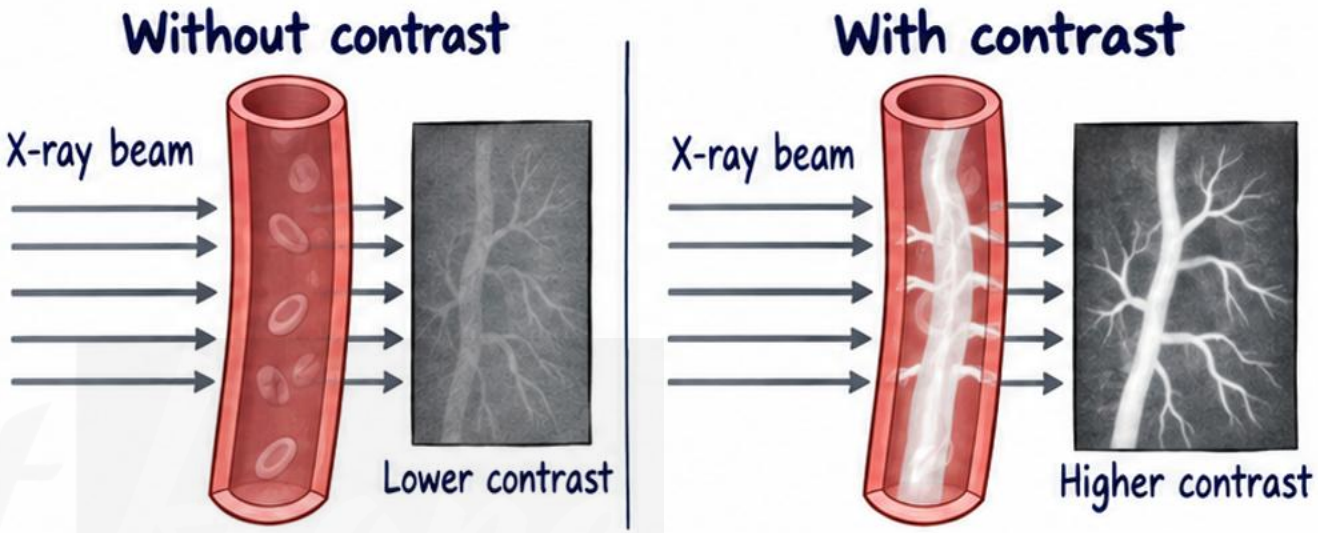
Iohexol: nonionic, low-osmolar contrast.

USES

Selected vascular, urinary-tract, CT and reproductive-tract examinations. Route and formulation depend on the procedure.

SAFETY

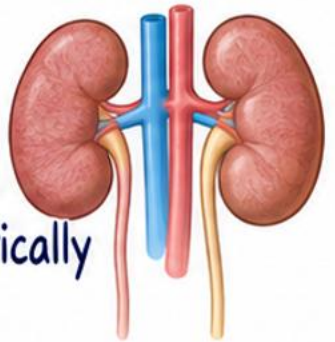
Allergic-like reactions and physiological reactions can occur. Nonionic does not mean risk-free.





RENAL CHECK

Assess renal function and acute kidney injury risk. Hydration is individualised; contrast is not automatically nephrotoxic in every patient.



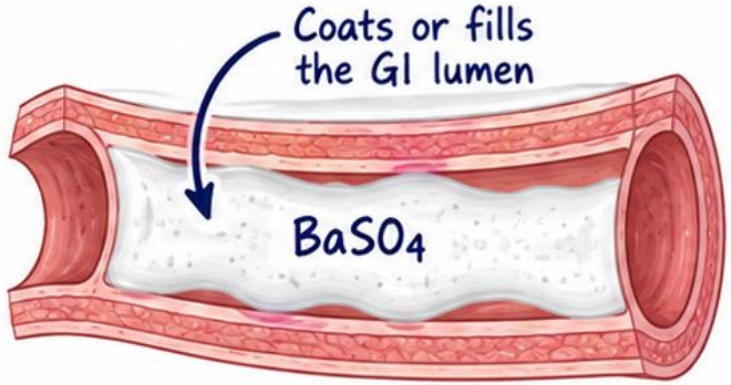
BARIUM SULFATE

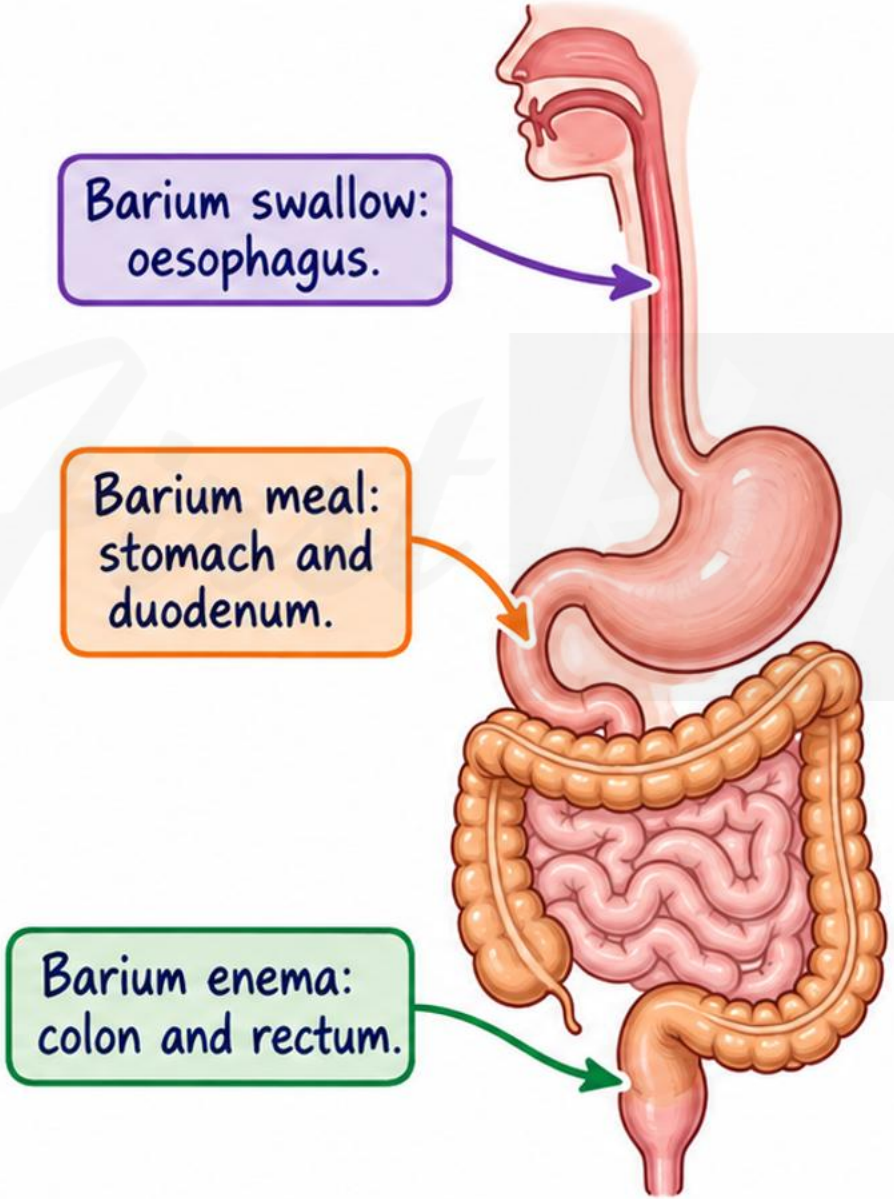
CHEMISTRY

$BaSO_4$ is an insoluble, radiopaque inorganic salt, administered as a gastrointestinal suspension.

LOCAL ACTION

It coats or fills the GI lumen and is minimally absorbed through an intact tract.





EXAMINATIONS

Barium swallow: oesophagus.

Barium meal: stomach and duodenum.

Barium enema: colon and rectum.

IMPORTANT PRECAUTIONS

Suspected perforation can permit leakage and severe inflammation.

Aspiration and obstruction risks also require assessment.

DISTINGUISH

An insoluble barium suspension is not an intravenous iodinated contrast medium.

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