

# Radiochemistry

PROFESSOR  
**IGOR N. BECKMAN**

RADIATION AND  
NUCLEAR MEDICINE:  
physical and chemical aspects



**I.N.Beckman**

**RADIATION AND NUCLEAR MEDICINE:  
PHYSICAL AND CHEMICAL ASPECTS**

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A text-book series in Postgraduate Education

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## Abstract

*“Radiation and nuclear medicine: physical and chemical aspects”* is the 7th volume in popular *“Radiochemistry”* text-book series, authored by prof. I. Beckman. This volume is dedicated to clinical applications of ionizing radiation and radionuclides. The author describes their usage in modern diagnostics, surgery and therapy and provides numerous practical examples to the reader. **Part I** describes the phenomenon of radioactivity, nuclear reactions, interactions of ionizing radiation with matter and biological effects of radiation. Current national and international radiation safety guidelines and sanitary standards are provided. **Part II** of the text-book is dedicated to methods of radiation diagnostics (planar X-ray imaging and CT scans) and therapy (X-ray-,  $\gamma$ -, and hadron therapy; radiosurgery, brachytherapy). **Part III** contains essential information on radionuclide diagnostics and therapy. The author describes the theoretical foundations, equipment and applications of scintigraphy, radioimmunoassays, single-photon emission computed tomography, positron emission tomography and kinetic methods. Methods and equipment for production of short-lived radioisotopes, as well as synthesis of radiopharmaceuticals are all outlined in the concluding chapters of present volume. The author reviews techniques which are currently employed in radiation and nuclear medicine as well as their applications in diagnostics and therapy of malignant tumors.

The volume has been written as an accompanying text-book for post-graduate students, taking advanced courses in chemistry and physics. However, it can be used a reference book by researchers working with radiation and by everyone who is interested in ionizing radiation, radioisotopes and their medical applications.

# Brief Table of Contents

Foreword

Introduction

1. History of nuclear medicine.
2. Atomic nucleus and nuclear processes.
3. Ionizing radiation.
4. Measurement of ionizing radiation.
5. Radiation safety and radiation dose.
6. Biological effects of ionizing radiation.
7. X-ray diagnostics.
8. X-ray computed tomography(CT scan).
9. Radiotherapy.
10. Radiosurgery.
11. Sealed-source radiotherapy(brachytherapy).
12. Particle radiotherapy.
13. Scintigraphy.
14. Radioimmunoassays(RIA).
15. Single-photon emission computed tomography(SPECT).
16. Positron emission tomography(PET).

17. Therapeutic applications of radionuclides.

18. Production of radionuclides.

19. Synthesis of radiopharmaceuticals.

Conclusions

Further Reading



# Table of Contents

Foreword

Introduction

**1. History of nuclear medicine:**

1.1. Ionizing radiation

1.2. Biological effects of ionizing radiation

1.3. X-ray diagnostics

1.4. Radiation therapy

1.5. Radionuclide diagnostics and therapy

**2. Atomic nucleus and nuclear processes:**

2.1. Atom and atomic nucleus

2.2. Radioactivity

2.3. Various modes of radioactive decay

2.4. Nuclear reactions

**3. Ionizing radiation:**

3.1. Types of ionizing radiation

3.2. Interaction of ionizing radiation with matter

3.3. Interaction of ionizing radiation with living organisms

**4. Measurement of ionizing radiation:**

4.1. Detectors of ionizing radiation

4.2. Gamma spectroscopy

4.3. Detectors and equipment for imaging of radiation fields:

- 4.3.1. Fluorescent screens for fluoroscopic viewing (fluoroscopy)
  - 4.3.2. Photofilms for X-ray imaging
  - 4.3.3. Fiber and nanocrystalline detectors
  - 4.3.4. Detectors for digital projection X-ray imaging
  - 4.3.5. Scintillation xenon-filled detectors with peak-sensing
  - 4.3.6. Gamma-detectors
5. **Radiation safety and radiation dose:**
- 5.1. Physical and biological dose of ionizing radiation
  - 5.2. External dose
  - 5.3. Equivalent internal dose
  - 5.4. Radiation safety standards and sanitary rules
6. **Biological effects of ionizing radiation:**
- 6.1. Radiation and biomacromolecules
  - 6.2. Impact of radiation on cells and tissues. Radiosensitivity.
  - 6.3. Ionizing radiation and living organisms
  - 6.4. Managing the radiobiological effect
7. **X-ray diagnostics:**
- 7.1. Modern methods of X-ray diagnostics
  - 7.2. Projectional radiography
  - 7.3. Equipment for X-ray diagnostics
  - 7.4. Radiographic images
  - 7.5. Mathematical foundations of transmission radiography
  - 7.6. How to interpret an X-ray image
  - 7.7. Irradiation dose during X-ray diagnostics
  - 7.8. Applications of X-ray diagnostics

## **8. X-ray computed tomography (CT scan):**

8.1. Principles of computed tomography

8.2. CT scan machines

8.3. Image processing

8.4. How to interpret results of X-ray tomography

8.5. Contrast agents in X-ray tomography

8.6. Medical applications of X-ray computed tomography

## **9. Radiotherapy:**

9.1. Basics of radiotherapy

9.2. X-ray and gamma therapy

9.3. Photon capture therapy

9.4. Clinical applications of radiotherapy

9.5. Irradiation dosimetry for X-ray and gamma therapy

## **10. Radiosurgery.**

## **11. Sealed-source radiotherapy (brachytherapy):**

11.1. Principles of brachytherapy

11.2. Intracavitary radiotherapy

11.3. Interstitial radiotherapy

11.4. Surface brachytherapy

## **12. Particle radiotherapy:**

12.1. Electron therapy

12.2. Proton therapy

12.3. Meson therapy

12.4. Heavy-ion therapy



## 12.5. Neutron therapy

### 12.5.1. Fast-neutron radiotherapy

### 12.5.2. Neutron capture therapy

## 13. Scintigraphy:

### 13.1. Key features of radionuclide diagnostic tests

### 13.2. Scanning

### 13.3. Static scintigraphy

### 13.4. Dynamic scintigraphy

### 13.5. Pharmacokinetics

### 13.6. Isotopes and radiopharmaceuticals for radionuclide diagnostics

### 13.7. Clinical applications of radiopharmaceuticals

## 14. Radioimmunoassays (RIA).

## 15. Single-photon emission computed tomography(SPECT):

### 15.1. Emission tomography

### 15.2. Principles of SPECT

### 15.3. Radionuclides and radiopharmaceuticals for SPECT

### 15.4. Equipment and methods

### 15.5. Processing and interpreting of SPECT data

### 15.6. SPECT in clinical practice

## 16. Positron emission tomography(PET):

### 16.1. Principles of two-photon emission tomography

### 16.2. PET scanners

### 16.3. Radionuclides and radiopharmaceuticals

### 16.4. Processing and interpreting PET data

16.5. Kinetic studies

16.6. Clinical applications of positron emission tomography

**17. Therapeutic applications of radionuclides:**

17.1. Methods of radionuclide therapy

17.2. Radionuclides and radiopharmaceuticals

17.3.  $\alpha$ -emitting radionuclides

17.4.  $\beta$ -emitting radionuclides

17.5. Radionuclides that emit Auger electrons

17.6. Nanoparticle-immobilized radionuclides

17.7. Radioimmune therapy

17.8. Clinical applications of radiotherapy

17.9. Dosimetry and radiation safety

**18. Production of radionuclides:**

18.1. Production of isotopes in nuclear reactors

18.2. Laboratory-scale generators

18.3. Production of  $\alpha$ -emitting radionuclides

18.4. Production of  $\beta$ - and  $\gamma$ -emitting radionuclides

**19. Synthesis of radiopharmaceuticals:**

19.1. Radiopharmaceuticals for scintigraphy, SPECT and radioimmunoassay

19.2. Radiopharmaceuticals for positron emission tomography

19.3. Radiopharmaceuticals for radionuclide therapy

**Conclusions.**

**Further reading.**



Nuclear medicine is a medical specialty involving the application of radioactive substances in the diagnosis and treatment of disease. Nuclear medicine imaging, in a sense, is "radiology done inside out" or "endoradiology" because it records radiation emitting from within the body rather than radiation that is generated by external sources like X-rays. In addition, nuclear medicine scans differ from radiology, as the emphasis is not on imaging anatomy, but on the function. For such reason, it is Radiation is particularly associated with nuclear medicine and the use of nuclear energy, along with X-rays, is ionising radiation. Another valuable report, titled Low-level Radiation and its Implications for Fukushima Recovery, was published in June 2012 by the American Nuclear Society. In 2012 UNSCEAR reported to the UN General Assembly on radiation effects. The health effects of exposure both to radiation and to chemical cancer-inducing agents or toxins must be considered in relation to time. There is cause for concern not only about the effects on people presently living, but also about the cumulative effects that actions today might have over many generations. Radioprotection and Radiation Safety of the Employers in Nuclear Medicine Department. January 2010. Kyriatzis GA. Leivaditaki E. Aphroditis Strataki. Athanasios Zissimopoulos. Read more. Join ResearchGate to discover and stay up-to-date with the latest research from leading experts in Nuclear Medicine and many other scientific topics. Join for free. ResearchGate iOS App. Get it from the App Store now. Install. Keep up with your stats and more. Access scientific knowledge from anywhere.