Session 2.1 Overview of Nuclear Applications in Human Health and Nutrition

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Nuclear Applications in Human Health



Precise and Safe Treatment



Treatment of Cancer



Disease prevention

Accurate diagnosis

Division of Human Health enhances the capabilities of MS to address the needs related to the **prevention**, **diagnosis and treatment** of health problems through the application of nuclear and related techniques



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Stable Isotope Techniques in Nutrition

- Monitor programmes that:
 - Promote breastfeeding & appropriate healthy foods for infants
 - Increase vitamins & mineral through food fortification and supplements
 - Prevent and treat moderate and severe malnutrition
 - Prevent and treat childhood obesity



Exclusive breastfeeding



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Nuclear Medicine and Radiology

Renal Scintigraphy-Tc-99m-MAG3



PET/CT in Use in Neurology



PET/CT in Thyroid Cancer



Courtesy Diana Paez and Essen- University

Use in Cardiology



Most Common NM tests: Bone scans Thyroid scintigraphy Lung perfusion and ventilation Nuclear cardiology Renal scans Oncology Neurology and Psychiatry





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Radiation Therapy







- 50% of cancer patients need radiotherapy for treatment
- Radiotherapy can be curative or palliative, alone or combined with chemotherapy or surgery.







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Quality and Dosimetry in Radiation Medicine

Application of radiation in medicine Safe & effective

 Development and harmonization of guidance on physical & technical aspects of Quality Assurance

Consistent and accurate

 Development and provision of accurate dosimetry through calibration and audit services





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Added value of the Nuclear Applications

	Radiotherapy utilisation rate (%)	Mean radiotherapy fractions per course	5-year local control benefit	5-year overall survival benefit (%)
Breast	87	16	15	2
Cervix	71	21	35	20
Colorectal	19	23	5	2
Haematological	48	8	7	4
Head and neck	74	22	31	20
Liver	0	0	0	0
Lung	77	16	9	6
Oesophagus	71	15		2
Prostate	58	28	25*	1
Stomach	27	19	2	1
Total	50	18	10	4

Radiotherapy utilisation rate is the number of patients for whom radiotherapy is the treatment of choice according to guidelines and evidence, divided by the number of new cases in one year. Haematological cancers include leukaemia, Hodgkin's lymphoma, non-Hodgkin lymphoma, and multiple myeloma. *5-year biochemical disease-free survival for curative cases only.

Table 1: Radiotherapy utilisation rate, mean fractions, and outcome benefits (absolute proportional) for top ten cancers globally by incidence

Atun etal LancetOncol2015;16:1153-86

Figure 11: Cost and benefits (in US\$) of investments to scale up radiother apy services in low and middle income countries (2015-2035) ¶



Cost-and-benefits: (in-US\$)-of-investments-to-scale-up-radiotherapy-services-in-low-and-middleincome-countries: (2015-2035). The-costing-models-are-described-in-the-text-and-include-bothoperational-and-capital-costs. A wan eail ancedrone/2015.18:1153-66



Childhood Obesity And Related Health Risks In Asia And The Pacific

Countries: China, Lebanon, Malaysia, Philippines and Thailand

Participants: 1039 children age 8-10 years

Technique: Body composition using stable isotope deuterium

Conclusion: Necessity to consider ethnic differences in body composition when developing body mass index (BMI) cut-off points and other obesity criteria in Asian children

Source: LIU A et al, Br J Nutr 106 (2011) 1390-7



RMI (ka/m²)

Scatter plot of percentage body fat (%BF) against BM









Steps in the implementation and use of Nuclear Techniques



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30 May–1 June 2017 Vienna, Austria #Atoms4Dev2017