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**Supplementary information**

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**Radiopharmaceutical therapy in cancer:  
clinical advances and challenges**

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In the format provided by the  
authors and unedited

## SUPPLEMENTARY DATA - SEARCH TERMS FOR FIGURE 2

### General search:

("radionuclide"[tiab] OR "radiopharmaceuticals"[mh] OR "radiopharmaceutical" OR "radiopharmaceuticals" OR "radioimmunotherapy"[mh] OR "radioimmunotherapy" OR "immunoradiotherapy" OR "radioiodine" OR "radioembolization" OR "radioconjugate" OR "radiopeptide" OR "Y-90" OR "90Y" OR "yttrium-90"[nm] OR "yttrium-90" OR "Yttrium Radioisotopes/therapeutic use"[mh] OR "131I" OR "I-131" OR "iodine-131" OR "Iodine radioisotopes/therapeutic use"[mh] OR "Ra-223" OR "223Ra" OR "radium-223" OR "radium-223"[nm] OR "Lu-177" OR "177Lu" OR "lutetium-177" OR "lutetium-177"[nm] OR "153Sm" OR "Sm-153" OR "samarium-153" OR "samarium Sm-153 lexidronam"[nm] OR "166Ho" OR "Ho-166" OR "holmium-166" OR "holmium-166"[nm] OR "211At" OR "At-211" OR "astatine-211" OR "astatine-211"[nm] OR AND ((clinical[Title/Abstract] AND trial[Title/Abstract]) OR clinical trials as topic[MeSH Terms] OR clinical trial[Publication Type] OR random\*[Title/Abstract] OR random allocation[MeSH Terms] OR therapeutic use[MeSH Subheading]) NOT ("brachytherapy" OR "external beam radiotherapy" OR "heavy ion radiotherapy" OR "radioisotope teletherapy" OR "proton therapy")

### Cancer Strategies:

#### Brain:

("radionuclide"[tiab] OR "radiopharmaceuticals"[mh] OR "radiopharmaceutical" OR "radiopharmaceuticals" OR "radioimmunotherapy"[mh] OR "radioimmunotherapy" OR "immunoradiotherapy" OR "radioiodine" OR "radioembolization" OR "radioconjugate" OR "radiopeptide" OR "Y-90" OR "90Y" OR "yttrium-90"[nm] OR "yttrium-90" OR "Yttrium Radioisotopes/therapeutic use"[mh] OR "131I" OR "I-131" OR "iodine-131" OR "Iodine radioisotopes/therapeutic use"[mh] OR "Ra-223" OR "223Ra" OR "radium-223" OR "radium-223"[nm] OR "Lu-177" OR "177Lu" OR "lutetium-177" OR "lutetium-177"[nm] OR "153Sm" OR "Sm-153" OR "samarium-153" OR "samarium Sm-153 lexidronam"[nm] OR "166Ho" OR "Ho-166" OR "holmium-166" OR "holmium-166"[nm] OR "211At" OR "At-211" OR "astatine-211" OR "astatine-211"[nm] OR AND ((clinical[Title/Abstract] AND trial[Title/Abstract]) OR clinical trials as topic[MeSH Terms] OR clinical trial[Publication Type] OR random\*[Title/Abstract] OR random allocation[MeSH Terms] OR therapeutic use[MeSH Subheading]) NOT ("brachytherapy" OR "external beam radiotherapy" OR "heavy ion radiotherapy" OR "radioisotope teletherapy" OR "proton therapy") AND ("brain neoplasms"[mh] OR (("brain" OR "cerebral" OR "cerebellar" OR "hypothalamic") AND ("neoplasm" OR "neoplasms" OR "cancer" OR "cancers" OR "malignant" OR "malignancy" OR "carcinoma" OR "papilloma" OR "tumor" OR "tumour" OR "tumors" OR "tumours"))))

#### Breast:

("radionuclide"[tiab] OR "radiopharmaceuticals"[mh] OR "radiopharmaceutical" OR "radiopharmaceuticals" OR "radioimmunotherapy"[mh] OR "radioimmunotherapy" OR "immunoradiotherapy" OR "radioiodine" OR "radioembolization" OR "radioconjugate" OR "radiopeptide" OR "Y-90" OR "90Y" OR "yttrium-90"[nm] OR "yttrium-90" OR "Yttrium Radioisotopes/therapeutic use"[mh] OR "131I" OR "I-131" OR "iodine-131" OR "Iodine radioisotopes/therapeutic use"[mh] OR "Ra-223" OR "223Ra" OR "radium-223" OR "radium-223"[nm] OR "Lu-177" OR "177Lu" OR "lutetium-177" OR "lutetium-177"[nm] OR "153Sm" OR "Sm-153" OR "samarium-153" OR "samarium Sm-153 lexidronam"[nm] OR "166Ho" OR "Ho-166" OR "holmium-166" OR "holmium-166"[nm] OR "211At" OR "At-211" OR "astatine-211" OR "astatine-211"[nm] OR AND ((clinical[Title/Abstract] AND trial[Title/Abstract]) OR clinical trials as topic[MeSH Terms] OR clinical trial[Publication Type] OR random\*[Title/Abstract] OR random allocation[MeSH Terms] OR therapeutic use[MeSH Subheading]) NOT ("brachytherapy" OR "external beam radiotherapy" OR "heavy ion radiotherapy" OR "radioisotope teletherapy" OR "proton therapy") AND ("breast neoplasms"[mh] OR (("breast" OR "breasts" OR "mammary") AND ("neoplasm" OR "neoplasms" OR "cancer" OR "cancers" OR "malignant" OR "malignancy" OR "carcinoma" OR "tumor" OR "tumour" OR "tumors" OR "tumours"))))

#### Colorectal:

("radionuclide"[tiab] OR "radiopharmaceuticals"[mh] OR "radiopharmaceutical" OR "radiopharmaceuticals" OR "radioimmunotherapy"[mh] OR "radioimmunotherapy" OR "immunoradiotherapy" OR "radioiodine" OR "radioembolization" OR "radioconjugate" OR "radiopeptide" OR "Y-90" OR "90Y" OR "yttrium-90"[nm] OR "yttrium-90" OR "Yttrium Radioisotopes/therapeutic use"[mh] OR "131I" OR "I-131" OR "iodine-131" OR "Iodine radioisotopes/therapeutic use"[mh] OR "Ra-223" OR "223Ra" OR "radium-223" OR "radium-223"[nm] OR "Lu-177" OR "177Lu" OR "lutetium-177" OR "lutetium-177"[nm] OR "153Sm" OR "Sm-153" OR "samarium-153" OR "samarium Sm-153 lexidronam"[nm] OR "166Ho" OR "Ho-166" OR "holmium-166" OR "holmium-166"[nm] OR "211At" OR "At-211" OR "astatine-211" OR "astatine-211"[nm] OR AND ((clinical[Title/Abstract] AND trial[Title/Abstract]) OR clinical trials as topic[MeSH Terms] OR clinical trial[Publication Type] OR random\*[Title/Abstract] OR random allocation[MeSH Terms] OR therapeutic use[MeSH Subheading]) NOT ("brachytherapy" OR "external beam radiotherapy" OR "heavy ion radiotherapy" OR "radioisotope teletherapy" OR "proton therapy") AND ("colorectal neoplasms"[mh] OR (("colon" OR "colorectal" OR "rectal" OR "rectum") AND ("neoplasm" OR "neoplasms" OR "cancer" OR "cancers" OR "malignant" OR "malignancy" OR "tumor" OR "tumour" OR "tumors" OR "tumours"))))

#### **Hematologic:**

("radionuclide"[tiab] OR "radiopharmaceuticals"[mh] OR "radiopharmaceutical" OR "radiopharmaceuticals" OR "radioimmunotherapy"[mh] OR "radioimmunotherapy" OR "immunoradiotherapy" OR "radioiodine" OR "radioembolization" OR "radioconjugate" OR "radiopeptide" OR "Y-90" OR "90Y" OR "yttrium-90"[nm] OR "yttrium-90" OR "Yttrium Radioisotopes/therapeutic use"[mh] OR "131I" OR "I-131" OR "iodine-131" OR "Iodine radioisotopes/therapeutic use"[mh] OR "Ra-223" OR "223Ra" OR "radium-223" OR "radium-223"[nm] OR "Lu-177" OR "177Lu" OR "lutetium-177" OR "lutetium-177"[nm] OR "153Sm" OR "Sm-153" OR "samarium-153" OR "samarium Sm-153 lexidronam"[nm] OR "166Ho" OR "Ho-166" OR "holmium-166" OR "holmium-166"[nm] OR "211At" OR "At-211" OR "astatine-211" OR "astatine-211"[nm] OR AND ((clinical[Title/Abstract] AND trial[Title/Abstract]) OR clinical trials as topic[MeSH Terms] OR clinical trial[Publication Type] OR random\*[Title/Abstract] OR random allocation[MeSH Terms] OR therapeutic use[MeSH Subheading]) NOT ("brachytherapy" OR "external beam radiotherapy" OR "heavy ion radiotherapy" OR "radioisotope teletherapy" OR "proton therapy") AND ("hematologic neoplasms"[mh] OR "leukemia"[mh] OR "lymphoma"[mh] OR "leukemia" OR "lymphoma" OR (("hematologic" OR "hematological" OR "bone marrow" OR "blood") AND ("neoplasm" OR "neoplasms" OR "cancer" OR "cancers" OR "malignant" OR

#### **Hepatic:**

("radionuclide"[tiab] OR "radiopharmaceuticals"[mh] OR "radiopharmaceutical" OR "radiopharmaceuticals" OR "radioimmunotherapy"[mh] OR "radioimmunotherapy" OR "immunoradiotherapy" OR "radioiodine" OR "radioembolization" OR "radioconjugate" OR "radiopeptide" OR "Y-90" OR "90Y" OR "yttrium-90"[nm] OR "yttrium-90" OR "Yttrium Radioisotopes/therapeutic use"[mh] OR "131I" OR "I-131" OR "iodine-131" OR "Iodine radioisotopes/therapeutic use"[mh] OR "Ra-223" OR "223Ra" OR "radium-223" OR "radium-223"[nm] OR "Lu-177" OR "177Lu" OR "lutetium-177" OR "lutetium-177"[nm] OR "153Sm" OR "Sm-153" OR "samarium-153" OR "samarium Sm-153 lexidronam"[nm] OR "166Ho" OR "Ho-166" OR "holmium-166" OR "holmium-166"[nm] OR "211At" OR "At-211" OR "astatine-211" OR "astatine-211"[nm] OR AND ((clinical[Title/Abstract] AND trial[Title/Abstract]) OR clinical trials as topic[MeSH Terms] OR clinical trial[Publication Type] OR random\*[Title/Abstract] OR random allocation[MeSH Terms] OR therapeutic use[MeSH Subheading]) NOT ("brachytherapy" OR "external beam radiotherapy" OR "heavy ion radiotherapy" OR "radioisotope teletherapy" OR "proton therapy") AND ("liver neoplasms"[mh] OR (("liver" OR "hepatic" OR "hepatocellular") AND ("neoplasm" OR "neoplasms" OR "cancer" OR "cancers" OR "malignant" OR "malignancy" OR "adenoma" OR "carcinoma" OR "tumor" OR "tumour" OR "tumors" OR "tumours"))))

#### **Neuroendocrine:**

("radionuclide"[tiab] OR "radiopharmaceuticals"[mh] OR "radiopharmaceutical" OR "radiopharmaceuticals" OR "radioimmunotherapy"[mh] OR "radioimmunotherapy" OR "immunoradiotherapy" OR "radioiodine" OR "radioembolization" OR "radioconjugate" OR "radiopeptide" OR "Y-90" OR "90Y" OR "yttrium-90"[nm] OR "yttrium-90" OR "Yttrium Radioisotopes/therapeutic use"[mh] OR "131I" OR "I-131" OR "iodine-131" OR "Iodine radioisotopes/therapeutic use"[mh] OR "Ra-223" OR "223Ra" OR "radium-223" OR "radium-223"[nm] OR "Lu-177" OR "177Lu" OR "lutetium-177" OR "lutetium-177"[nm] OR "153Sm" OR "Sm-153" OR "samarium-153" OR "samarium Sm-153 lexidronam"[nm] OR "166Ho" OR "Ho-166" OR "holmium-166" OR "holmium-166"[nm] OR "211At" OR "At-211" OR "astatine-211" OR "astatine-211"[nm] OR AND ((clinical[Title/Abstract] AND trial[Title/Abstract]) OR clinical trials as topic[MeSH Terms] OR clinical trial[Publication Type] OR random\*[Title/Abstract] OR random allocation[MeSH Terms] OR therapeutic use[MeSH Subheading]) NOT ("brachytherapy" OR "external beam radiotherapy" OR "heavy ion radiotherapy" OR "radioisotope teletherapy" OR "proton therapy") AND ("neuroendocrine tumors"[mh] OR "somatostatin receptor positive" OR "SSR+" OR (("neuroendocrine" OR "somatostatin receptor") AND ("neoplasm" OR "neoplasms" OR "cancer" OR "cancers" OR "malignant" OR "malignancy" OR "carcinoma" OR "adenoma" OR "melanoma" OR

#### **Prostate:**

("radionuclide"[tiab] OR "radiopharmaceuticals"[mh] OR "radiopharmaceutical" OR "radiopharmaceuticals" OR "radioimmunotherapy"[mh] OR "radioimmunotherapy" OR "immunoradiotherapy" OR "radioiodine" OR "radioembolization" OR "radioconjugate" OR "radiopeptide" OR "Y-90" OR "90Y" OR "yttrium-90"[nm] OR "yttrium-90" OR "Yttrium Radioisotopes/therapeutic use"[mh] OR "131I" OR "I-131" OR "iodine-131" OR "Iodine radioisotopes/therapeutic use"[mh] OR "Ra-223" OR "223Ra" OR "radium-223" OR "radium-223"[nm] OR "Lu-177" OR "177Lu" OR "lutetium-177" OR "lutetium-177"[nm] OR "153Sm" OR "Sm-153" OR "samarium-153" OR "samarium Sm-153 lexidronam"[nm] OR "166Ho" OR "Ho-166" OR "holmium-166" OR "holmium-166"[nm] OR "211At" OR "At-211" OR "astatine-211" OR "astatine-211"[nm] OR AND ((clinical[Title/Abstract] AND trial[Title/Abstract]) OR clinical trials as topic[MeSH Terms] OR clinical trial[Publication Type] OR random\*[Title/Abstract] OR random allocation[MeSH Terms] OR therapeutic use[MeSH Subheading]) NOT ("brachytherapy" OR "external beam radiotherapy" OR "heavy ion radiotherapy" OR "radioisotope teletherapy" OR "proton therapy") AND ("prostate neoplasms"[mh] OR (("prostate" OR "prostatic") AND ("neoplasm" OR "neoplasms" OR "cancer" OR "cancers" OR "malignant" OR "malignancy" OR "tumor" OR "tumour" OR "tumors" OR "tumours"))))

#### **Alpha emitters:**

##### **Ac-225/Bi-213:**

("radionuclide"[tiab] OR "radiopharmaceuticals"[mh] OR "radiopharmaceutical" OR "radiopharmaceuticals" OR "radioimmunotherapy"[mh] OR "radioimmunotherapy" OR "immunoradiotherapy" OR "radioiodine" OR "radioembolization" OR "radioconjugate" OR "radiopeptide" OR "Y-90" OR "90Y" OR "yttrium-90"[nm] OR "yttrium-90" OR "Yttrium Radioisotopes/therapeutic use"[mh] OR "131I" OR "I-131" OR "iodine-131" OR "Iodine radioisotopes/therapeutic use"[mh] OR "Ra-223" OR "223Ra" OR "radium-223" OR "radium-223"[nm] OR "Lu-177" OR "177Lu" OR "lutetium-177" OR "lutetium-177"[nm] OR "153Sm" OR "Sm-153" OR "samarium-153" OR "samarium Sm-153 lexidronam"[nm] OR "166Ho" OR "Ho-166" OR "holmium-166" OR "holmium-166"[nm] OR "211At" OR "At-211" OR "astatine-211" OR "astatine-211"[nm] OR AND ((clinical[Title/Abstract] AND trial[Title/Abstract]) OR clinical trials as topic[MeSH Terms] OR clinical trial[Publication Type] OR random\*[Title/Abstract] OR random allocation[MeSH Terms] OR therapeutic use[MeSH Subheading]) NOT ("brachytherapy" OR "external beam radiotherapy" OR "heavy ion radiotherapy" OR "radioisotope teletherapy" OR "proton therapy") AND ("213Bi" OR "Bi-213" OR "bismuth-213" OR "bismuth-213"[nm] OR "Ac-225" OR "225Ac" OR "actinium-225" OR "actinium-225"[nm])

##### **At-211:**

("radionuclide"[tiab] OR "radiopharmaceuticals"[mh] OR "radiopharmaceutical" OR "radiopharmaceuticals" OR "radioimmunotherapy"[mh] OR "radioimmunotherapy" OR "immunoradiotherapy" OR "radioiodine" OR "radioembolization" OR "radioconjugate" OR "radiopeptide" OR "Y-90" OR "90Y" OR "yttrium-90"[nm] OR "yttrium-90" OR "Yttrium Radioisotopes/therapeutic use"[mh] OR "131I" OR "I-131" OR "iodine-131" OR "Iodine radioisotopes/therapeutic use"[mh] OR "Ra-223" OR "223Ra" OR "radium-223" OR "radium-223"[nm] OR "Lu-177" OR "177Lu" OR "lutetium-177" OR "lutetium-177"[nm] OR "153Sm" OR "Sm-153" OR "samarium-153" OR "samarium Sm-153 lexidronam"[nm] OR "166Ho" OR "Ho-166" OR "holmium-166" OR "holmium-166"[nm] OR "211At" OR "At-211" OR "astatine-211" OR "astatine-211"[nm]) OR AND ((clinical[Title/Abstract] AND trial[Title/Abstract]) OR clinical trials as topic[MeSH Terms] OR clinical trial[Publication Type] OR random\*[Title/Abstract] OR random allocation[MeSH Terms] OR therapeutic use[MeSH Subheading]) NOT ("brachytherapy" OR "external beam radiotherapy" OR "heavy ion radiotherapy" OR "radioisotope teletherapy" OR "proton therapy") AND ("211At" OR "At-211" OR "astatine-211" OR "astatine-211"[nm])

#### **Pb-212/Bi-212:**

("radionuclide"[tiab] OR "radiopharmaceuticals"[mh] OR "radiopharmaceutical" OR "radiopharmaceuticals" OR "radioimmunotherapy"[mh] OR "radioimmunotherapy" OR "immunoradiotherapy" OR "radioiodine" OR "radioembolization" OR "radioconjugate" OR "radiopeptide" OR "Y-90" OR "90Y" OR "yttrium-90"[nm] OR "yttrium-90" OR "Yttrium Radioisotopes/therapeutic use"[mh] OR "131I" OR "I-131" OR "iodine-131" OR "Iodine radioisotopes/therapeutic use"[mh] OR "Ra-223" OR "223Ra" OR "radium-223" OR "radium-223"[nm] OR "Lu-177" OR "177Lu" OR "lutetium-177" OR "lutetium-177"[nm] OR "153Sm" OR "Sm-153" OR "samarium-153" OR "samarium Sm-153 lexidronam"[nm] OR "166Ho" OR "Ho-166" OR "holmium-166" OR "holmium-166"[nm] OR "211At" OR "At-211" OR "astatine-211" OR "astatine-211"[nm]) OR AND ((clinical[Title/Abstract] AND trial[Title/Abstract]) OR clinical trials as topic[MeSH Terms] OR clinical trial[Publication Type] OR random\*[Title/Abstract] OR random allocation[MeSH Terms] OR therapeutic use[MeSH Subheading]) NOT ("brachytherapy" OR "external beam radiotherapy" OR "heavy ion radiotherapy" OR "radioisotope teletherapy" OR "proton therapy") AND ("212Pb" OR "Pb-212" OR "Lead radioisotopes/therapeutic use"[mh] OR "212Bi" OR "Bi-212" OR "bismuth-212" OR "bismuth-212"[nm])

#### **Ra-223:**

("radionuclide"[tiab] OR "radiopharmaceuticals"[mh] OR "radiopharmaceutical" OR "radiopharmaceuticals" OR "radioimmunotherapy"[mh] OR "radioimmunotherapy" OR "immunoradiotherapy" OR "radioiodine" OR "radioembolization" OR "radioconjugate" OR "radiopeptide" OR "Y-90" OR "90Y" OR "yttrium-90"[nm] OR "yttrium-90" OR "Yttrium Radioisotopes/therapeutic use"[mh] OR "131I" OR "I-131" OR "iodine-131" OR "Iodine radioisotopes/therapeutic use"[mh] OR "Ra-223" OR "223Ra" OR "radium-223" OR "radium-223"[nm] OR "Lu-177" OR "177Lu" OR "lutetium-177" OR "lutetium-177"[nm] OR "153Sm" OR "Sm-153" OR "samarium-153" OR "samarium Sm-153 lexidronam"[nm] OR "166Ho" OR "Ho-166" OR "holmium-166" OR "holmium-166"[nm] OR "211At" OR "At-211" OR "astatine-211" OR "astatine-211"[nm]) OR AND ((clinical[Title/Abstract] AND trial[Title/Abstract]) OR clinical trials as topic[MeSH Terms] OR clinical trial[Publication Type] OR random\*[Title/Abstract] OR random allocation[MeSH Terms] OR therapeutic use[MeSH Subheading]) NOT ("brachytherapy" OR "external beam radiotherapy" OR "heavy ion radiotherapy" OR "radioisotope teletherapy" OR "proton therapy") AND ("Ra-223" OR "223Ra" OR "radium-223" OR "radium-223"[nm])

#### **Th-227:**

("radionuclide"[tiab] OR "radiopharmaceuticals"[mh] OR "radiopharmaceutical" OR "radiopharmaceuticals" OR "radioimmunotherapy"[mh] OR "radioimmunotherapy" OR "immunoradiotherapy" OR "radioiodine" OR "radioembolization" OR "radioconjugate" OR "radiopeptide" OR "Y-90" OR "90Y" OR "yttrium-90"[nm] OR "yttrium-90" OR "Yttrium Radioisotopes/therapeutic use"[mh] OR "131I" OR "I-131" OR "iodine-131" OR "Iodine radioisotopes/therapeutic use"[mh] OR "Ra-223" OR "223Ra" OR "radium-223" OR "radium-223"[nm] OR "Lu-177" OR "177Lu" OR "lutetium-177" OR "lutetium-177"[nm] OR "153Sm" OR "Sm-153" OR "samarium-153" OR "samarium Sm-153 lexidronam"[nm] OR "166Ho" OR "Ho-166" OR "holmium-166" OR "holmium-166"[nm] OR "211At" OR "At-211" OR "astatine-211" OR "astatine-211"[nm]) OR

AND

((clinical[Title/Abstract] AND trial[Title/Abstract]) OR clinical trials as topic[MeSH Terms] OR clinical trial[Publication Type] OR random\*[Title/Abstract] OR random allocation[MeSH Terms] OR therapeutic use[MeSH Subheading])

NOT

("brachytherapy" OR "external beam radiotherapy" OR "heavy ion radiotherapy" OR "radioisotope teletherapy" OR "proton therapy")

AND

("227Th" OR "Th-227" OR "thorium-227" OR "thorium-227"[nm])

#### **Beta emitters:**

##### **I-131:**

("radionuclide"[tiab] OR "radiopharmaceuticals"[mh] OR "radiopharmaceutical" OR "radiopharmaceuticals" OR "radioimmunotherapy"[mh] OR "radioimmunotherapy" OR "immunoradiotherapy" OR "radioiodine" OR "radioembolization" OR "radioconjugate" OR "radiopeptide" OR "Y-90" OR "90Y" OR "yttrium-90"[nm] OR "yttrium-90" OR "Yttrium Radioisotopes/therapeutic use"[mh] OR "131I" OR "I-131" OR "iodine-131" OR "Iodine radioisotopes/therapeutic use"[mh] OR "Ra-223" OR "223Ra" OR "radium-223" OR "radium-223"[nm] OR "Lu-177" OR "177Lu" OR "lutetium-177" OR "lutetium-177"[nm] OR "153Sm" OR "Sm-153" OR "samarium-153" OR "samarium Sm-153 lexidronam"[nm] OR "166Ho" OR "Ho-166" OR "holmium-166" OR "holmium-166"[nm] OR "211At" OR "At-211" OR "astatine-211" OR "astatine-211"[nm] OR AND

((clinical[Title/Abstract] AND trial[Title/Abstract]) OR clinical trials as topic[MeSH Terms] OR clinical trial[Publication Type] OR random\*[Title/Abstract] OR random allocation[MeSH Terms] OR therapeutic use[MeSH Subheading])

NOT

("brachytherapy" OR "external beam radiotherapy" OR "heavy ion radiotherapy" OR "radioisotope teletherapy" OR "proton therapy")

AND

("131I" OR "I-131" OR "iodine-131" OR "Iodine radioisotopes/therapeutic use"[mh])

##### **Lu-177:**

("radionuclide"[tiab] OR "radiopharmaceuticals"[mh] OR "radiopharmaceutical" OR "radiopharmaceuticals" OR "radioimmunotherapy"[mh] OR "radioimmunotherapy" OR "immunoradiotherapy" OR "radioiodine" OR "radioembolization" OR "radioconjugate" OR "radiopeptide" OR "Y-90" OR "90Y" OR "yttrium-90"[nm] OR "yttrium-90" OR "Yttrium Radioisotopes/therapeutic use"[mh] OR "131I" OR "I-131" OR "iodine-131" OR "Iodine radioisotopes/therapeutic use"[mh] OR "Ra-223" OR "223Ra" OR "radium-223" OR "radium-223"[nm] OR "Lu-177" OR "177Lu" OR "lutetium-177" OR "lutetium-177"[nm] OR "153Sm" OR "Sm-153" OR "samarium-153" OR "samarium Sm-153 lexidronam"[nm] OR "166Ho" OR "Ho-166" OR "holmium-166" OR "holmium-166"[nm] OR "211At" OR "At-211" OR "astatine-211" OR "astatine-211"[nm] OR AND

((clinical[Title/Abstract] AND trial[Title/Abstract]) OR clinical trials as topic[MeSH Terms] OR clinical trial[Publication Type] OR random\*[Title/Abstract] OR random allocation[MeSH Terms] OR therapeutic use[MeSH Subheading])

NOT

("brachytherapy" OR "external beam radiotherapy" OR "heavy ion radiotherapy" OR "radioisotope teletherapy" OR "proton therapy")

AND

("Lu-177" OR "177Lu" OR "lutetium-177" OR "lutetium-177"[nm])

##### **Sm-153:**

("radionuclide"[tiab] OR "radiopharmaceuticals"[mh] OR "radiopharmaceutical" OR "radiopharmaceuticals" OR "radioimmunotherapy"[mh] OR "radioimmunotherapy" OR "immunoradiotherapy" OR "radioiodine" OR "radioembolization" OR "radioconjugate" OR "radiopeptide" OR "Y-90" OR "90Y" OR "yttrium-90"[nm] OR "yttrium-90" OR "Yttrium Radioisotopes/therapeutic use"[mh] OR "131I" OR "I-131" OR "iodine-131" OR "Iodine radioisotopes/therapeutic use"[mh] OR "Ra-223" OR "223Ra" OR "radium-223" OR "radium-223"[nm] OR "Lu-177" OR "177Lu" OR "lutetium-177" OR "lutetium-177"[nm] OR "153Sm" OR "Sm-153" OR "samarium-153" OR "samarium Sm-153 lexidronam"[nm] OR "166Ho" OR "Ho-166" OR "holmium-166" OR "holmium-166"[nm] OR "211At" OR "At-211" OR "astatine-211" OR "astatine-211"[nm] OR AND

((clinical[Title/Abstract] AND trial[Title/Abstract]) OR clinical trials as topic[MeSH Terms] OR clinical trial[Publication Type] OR random\*[Title/Abstract] OR random allocation[MeSH Terms] OR therapeutic use[MeSH Subheading])

NOT

("brachytherapy" OR "external beam radiotherapy" OR "heavy ion radiotherapy" OR "radioisotope teletherapy" OR "proton therapy")  
AND  
("153Sm" OR "Sm-153" OR "samarium-153" OR "samarium Sm-153 lexidronam"[nm])

**Y-90:**

("radionuclide"[tiab] OR "radiopharmaceuticals"[mh] OR "radiopharmaceutical" OR "radiopharmaceuticals" OR "radioimmunotherapy"[mh] OR "radioimmunotherapy" OR "immunoradiotherapy" OR "radioiodine" OR "radioembolization" OR "radioconjugate" OR "radiopeptide" OR "Y-90" OR "90Y" OR "yttrium-90"[nm] OR "yttrium-90" OR "Yttrium Radioisotopes/therapeutic use"[mh] OR "131I" OR "I-131" OR "iodine-131" OR "Iodine radioisotopes/therapeutic use"[mh] OR "Ra-223" OR "223Ra" OR "radium-223" OR "radium-223"[nm] OR "Lu-177" OR "177Lu" OR "lutetium-177" OR "lutetium-177"[nm] OR "153Sm" OR "Sm-153" OR "samarium-153" OR "samarium Sm-153 lexidronam"[nm] OR "166Ho" OR "Ho-166" OR "holmium-166" OR "holmium-166"[nm] OR "211At" OR "At-211" OR "astatine-211" OR "astatine-211"[nm] OR AND  
((clinical[Title/Abstract] AND trial[Title/Abstract]) OR clinical trials as topic[MeSH Terms] OR clinical trial[Publication Type] OR random\*[Title/Abstract] OR random allocation[MeSH Terms] OR therapeutic use[MeSH Subheading])  
NOT  
("brachytherapy" OR "external beam radiotherapy" OR "heavy ion radiotherapy" OR "radioisotope teletherapy" OR "proton therapy")  
AND  
("Y-90" OR "90Y" OR "yttrium-90"[nm] OR "yttrium-90" OR "Yttrium Radioisotopes/therapeutic use"[mh])