

Supplemental Table 1. Nanoparticle imaging agents used in the clinic and clinical trials. Overview of nanoparticles routinely used or in clinical trials for diagnostic and theranostic applications. Also therapeutic nanoparticles with intrinsic imaging properties are included. The order is based on year of approval or year of entering clinical trials. For the complete list of clinical trials and NCT numbers, please see Table S2.

Name	Trade Name	NP type	Application	Approval / Clinical trial *
Technetium 99m Sulfur Colloid Injection (Mallinckrodt)	TechneColl	Technetium-99m sulfur colloid	Diagnosis: Localization of sentinel lymph nodes	FDA (1974) Currently discontinued
Technetium 99m Sulfur Colloid Injection (Pharmalucene)	AN-Sulfur Colloid	Technetium-99m sulfur colloid	Diagnosis: Localization of sentinel lymph nodes	FDA (1978)
Iron Dextran (Pharmacosmos)	CosmoFer / Ferrisat (EU) INFeD (USA)	Iron oxide NP	Therapy: Treatment of iron deficiency	FDA (1992) Some countries in Europe (2001)
Technetium 99m Rhenium Sulfide Nanocolloid (CIS Bio International)	Nanocis	Technetium-99m rhenium sulfide colloid	Diagnosis: Lymphoscintigraphy and sentinel lymph node localization	Some countries in Europe (1993)
Technetium 99m Albumin Nanocolloid (GE Healthcare)	Nanocoll	Technetium-99m albumin colloid	Diagnosis: Lymphoscintigraphy and sentinel lymph node localization	Denmark (1995) Currently discontinued
Iron Dextran (American Reagent)	DexFerrum (USA) DexIron (Canada)	Iron oxide NP	Therapy: Treatment of iron deficiency	FDA (1996)
Ferumoxide (AMAG Pharmaceuticals)	Feridex	Iron oxide NP	Diagnosis: Imaging liver lesions	FDA (1996) Discontinued (2008)
Ferric Gluconate (Sanofi)	Ferrlecit	Iron oxide NP	Therapy: Treatment of iron deficiency in patients with chronic kidney dysfunction	FDA (1999)
Technetium 99m Albumin Nanocolloid (Medi-Radiopharma)	Senti-Scint	Technetium-99m albumin colloid	Diagnosis: Lymphoscintigraphy and sentinel lymph node localization	Some countries in Europe (1999)
Iron Sucrose (American Reagent)	Venofer	Iron oxide NP	Therapy: Treatment of iron deficiency in patients with chronic kidney dysfunction	FDA (2000)
Ferucarbotran or Ferrixan (Bayer Schering Pharma AG)	Resovist	Iron oxide NP	Diagnosis: Imaging liver lesions	EMA (2001) Discontinued (2009)
Technetium 99m Tin Fluoride Nanocolloid (Gipharma)	Hepatate	Technetium-99m tin fluoride colloid	Diagnosis: Lymphoscintigraphy and sentinel lymph node localization	France (2002)
Ferumoxytol (AMAG & Takeda)	Feraheme Rienso	Iron oxide NP	Therapy: Treatment of iron deficiency in patients with chronic kidney dysfunction	FDA (2009)

10% Iron Isomaltoside (Pharmacosmos)	Monofer	Iron oxide NP	Therapy: Treatment of iron deficiency	Several countries in Europe (2009)
SPION (Magforce)	Nanotherm	Iron oxide NP	Theranostics: Magnetic thermal ablation of glioblastoma	EMA (2011)
Technetium 99m Albumin Nanocolloid (ROTOP Pharmaka)	Nanotop	Technetium-99m albumin colloid	Diagnosis: Lymphoscintigraphy and sentinel lymph node localization	Germany (2011) EMA (2014)
Technetium 99m Albumin Nanocolloid (Medi-Radiopharma)	Nanoscan Nanoalbumon (Italy) Nanoscient (Belgium)	Technetium-99m albumin colloid	Diagnosis: Bone marrow and inflammation scanning Lymphoscintigraphy and sentinel lymph node localization	Denmark (2011)
Ferric Carboxymaltose (Vifor Pharma)	Ferinject (EU) Injectafer (USA)	Iron oxide NP	Therapy: Treatment of iron deficiency	FDA (2013)
5% Iron Isomaltoside (Pharmacosmos)	Diafer	Iron oxide NP	Therapy: Treatment of iron deficiency	Several countries in Europe (2013)
Ferumoxtran-10 (AMAG Pharmaceuticals)	Sinerem (EU) Combidx (US)	Iron oxide NP	Diagnosis: Imaging lymph node metastases	The Netherlands (2013)
SPION (Mammotome)	Magtrace	Iron oxide NP	Diagnosis: Imaging lymph node metastases	FDA 2018
NBTXR3 (Nanobiotix)	Hensify	Hafnium oxide NP	Therapy: Radiosensitizers for external-beam radiotherapy of multiple cancers	EMA (2019)
⁶⁴ Cu-MM-302		HER2-targeted liposome radiolabeled with ⁶⁴ Cu and loaded with doxorubicin	Theranostics: Treatment and imaging of advanced HER2+ cancer with brain metastases	Phase I (2017)
NU-0129		Gold NP conjugated with nucleic acids	Therapy: Treatment of recurrent glioblastoma or gliosarcoma undergoing surgery	Phase I (2020)
⁸⁹ Zr-CPC634		Polymeric NP radiolabeled with ⁸⁹ Zr and loaded with docetaxel	Theranostics: Treatment and imaging of ovarian cancer	Phase II (2020)
AuroShell		NP made of silica core and gold shell	Therapy: Photothermal ablation of different types of cancer	No phase (2021)
⁶⁴ Cu-Macrin		⁶⁴ Cu-labelled polyglucose NP	Diagnosis: PET imaging of macrophage at disease sites	Phase I (2021)
Radiolabeled Cornell dots		RGD-targeted silica NP radiolabeled with ¹²⁴ I or	Diagnosis: Imaging of various cancers	Phase I (2022)

		⁸⁹ Zr (in addition to NIR fluorophore)		
Radiolabeled Cornell dots		PSMA-targeted silica NP radiolabeled with ⁶⁴ Cu (in addition to NIR fluorophore)	Diagnosis: Imaging of prostate cancer	Phase I (2022)
Cornell dots		RGD-targeted silica NP labeled with near-infrared fluorophore	Diagnosis: Imaging of melanoma in head and neck area	Phase I/II (2022)
AGuIX		Polysiloxane core matrix bound to gadolinium chelate	Theranostics: Theranostics against various cancers	Phase II (2022)
ONM-100		pH-sensitive micelle encapsulating a fluorophore	Theranostics: Intraoperative fluorescence imaging	Phase II (2022)
* Year next to the clinical phase refers to the last time the clinical trial information was updated.				

Supplemental Table 2. Details of the clinical trials in which nanoparticle diagnostics and theranostics are investigated.

Name	NP type	Application	Clinical trial*
⁶⁴ Cu-MM-302	HER2-targeted liposome radiolabeled with ⁶⁴ Cu and loaded with doxorubicin	Treatment and imaging of advanced HER2+ cancer with brain metastases	NCT01304797, Phase I, Active (2011) NCT02735798, Phase I, Discontinued (2017)
AuroShell	NP made of silica core and gold shell	Thermal ablation of different types of cancer	NCT01679470, Terminated (2016) NCT00848042, Completed (2017) NCT02680535, Completed (2021) NCT04240639, Recruiting (2021)
AGulX	Polysiloxane core matrix bound to gadolinium chelate	Theranostics against various cancers	NCT02820454, Phase I, Completed (2019) NCT03308604, Phase I/II, Recruiting (2021) NCT04789486, Phase I/II, Recruiting (2021) NCT04881032, Phase I/II, Recruiting (2021) NCT04094077, Phase II, Terminated (2021) NCT04899908, Phase II, Recruiting (2021) NCT03818386, Phase II, Recruiting (2022) NCT04784221, Phase II, Not recruiting yet (2022)
NU-0129	Gold NP conjugated with nucleic acids	Treatment of recurrent glioblastoma or gliosarcoma undergoing surgery	NCT03020017, Phase I, Completed (2020)
NBTR3	Hafnium oxide NP	Radiosensitizers for external-beam radiation therapy against multiple cancers	NCT01433068, Phase I, Completed (2020) NCT04484909, Phase I, Recruiting (2020) NCT01946867, Phase I, Recruiting (2021) NCT02379845, Phase II/III, Completed (2021) NCT02721056, Phase I/II, Terminated (2021) NCT02805894, Phase I/II, Terminated (2021) NCT04505267, Phase I, Recruiting (2021) NCT04615013, Phase I, Recruiting (2021) NCT04834349, Phase II, Recruiting (2021) NCT04862455, Phase II, Recruiting (2021) NCT02901483, Phase Ib/II, Terminated (2022) NCT02465593, Phase Ib/II, Terminated (2022) NCT03589339, Phase I, Recruiting (2022) NCT04892173, Phase III, Recruiting (2022) NCT05039632, Phase I/II, Not yet recruiting (2022)
⁸⁹ Zr-CPC634	Polymeric NP radiolabeled with ⁸⁹ Zr and loaded with docetaxel	Treatment and imaging of ovarian cancer	NCT03742713, Phase II, Completed (2020)
⁶⁴ Cu-Macrin	⁶⁴ Cu-labelled polyglucose NP	PET imaging of macrophage at disease sites	NCT04843891, Phase I, Recruiting (2021)

Radiolabeled Cornell dots	RGD-targeted Silica NP radiolabeled with ¹²⁴ I or ⁸⁹ Zr (in addition to NIR fluorophore)	Imaging of various cancers	NCT01266096, Active (2021) NCT03465618, Phase I, Recruiting (2022)
Cornell dots	RGD-targeted Silica NP labeled NIR fluorophore	Imaging of head and neck melanoma	NCT02106598, Phase I/II, Recruiting (2022)
Radiolabeled Cornell dots	PSMA-targeted Silica NP radiolabeled with ⁶⁴ Cu (in addition to NIR fluorophore)	Imaging of various cancers	NCT04167969, Phase I, Recruiting (2022)
ONM-100	pH-sensitive micelle encapsulating a fluorophore	Intraoperative fluorescence imaging	NCT03735680, Phase II, Completed (2022) NCT05048082, Phase II, Recruiting (2022) NCT04950166, Phase II, Recruiting (2022)
* The year in the clinical trial row refers to the date when the clinical study was initiated.			