

Effect of Gold Nanoparticle Size on Their Properties as Contrast Agents for Computed Tomography

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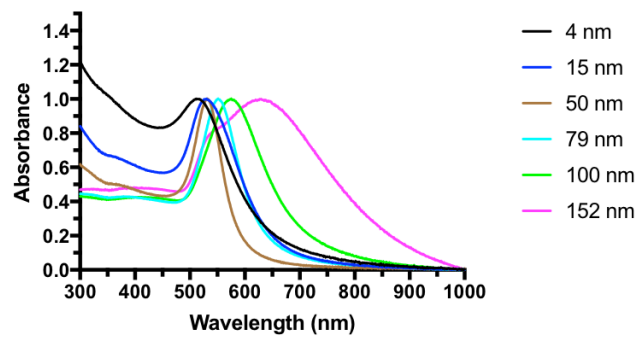
Centre de Recherche en Acquisition et Traitement de l'Image pour la Santé (CREATIS)⁵, UMR CNRS 5220, Inserm U1044, University Lyon1 Claude Bernard, Lyon, France

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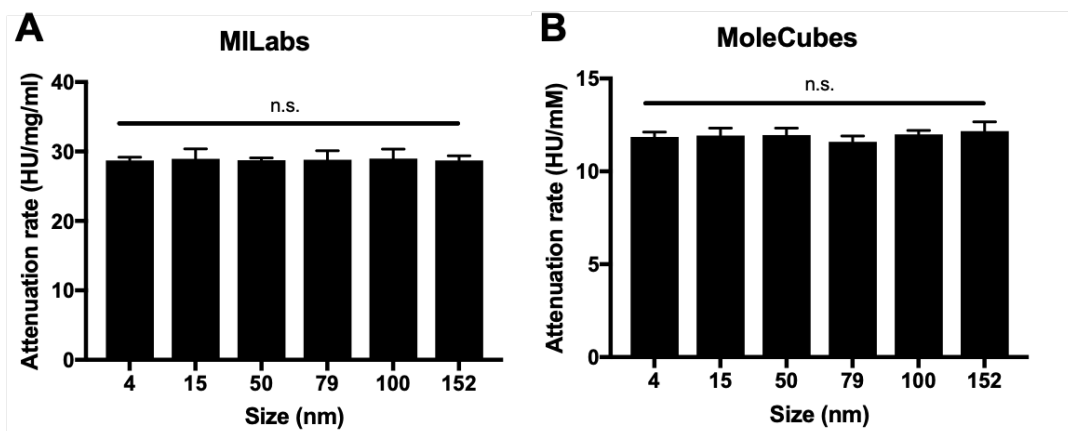
† These authors contributed equally.



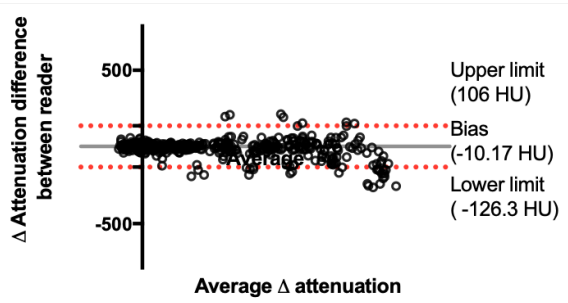
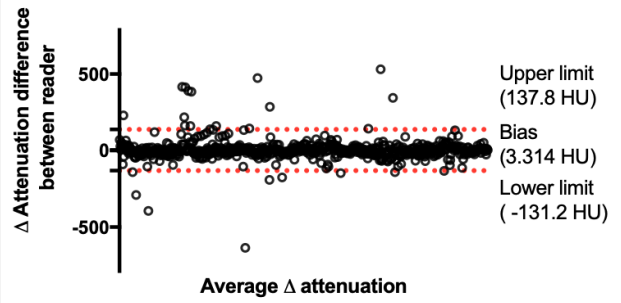
Supporting Figure 1: A phantom setup for the SPCCT scanner. Tubes with the concentrations of AuNP noted (in mg/mL) suspended in 1% agarose gel were placed in the outer eight holes.



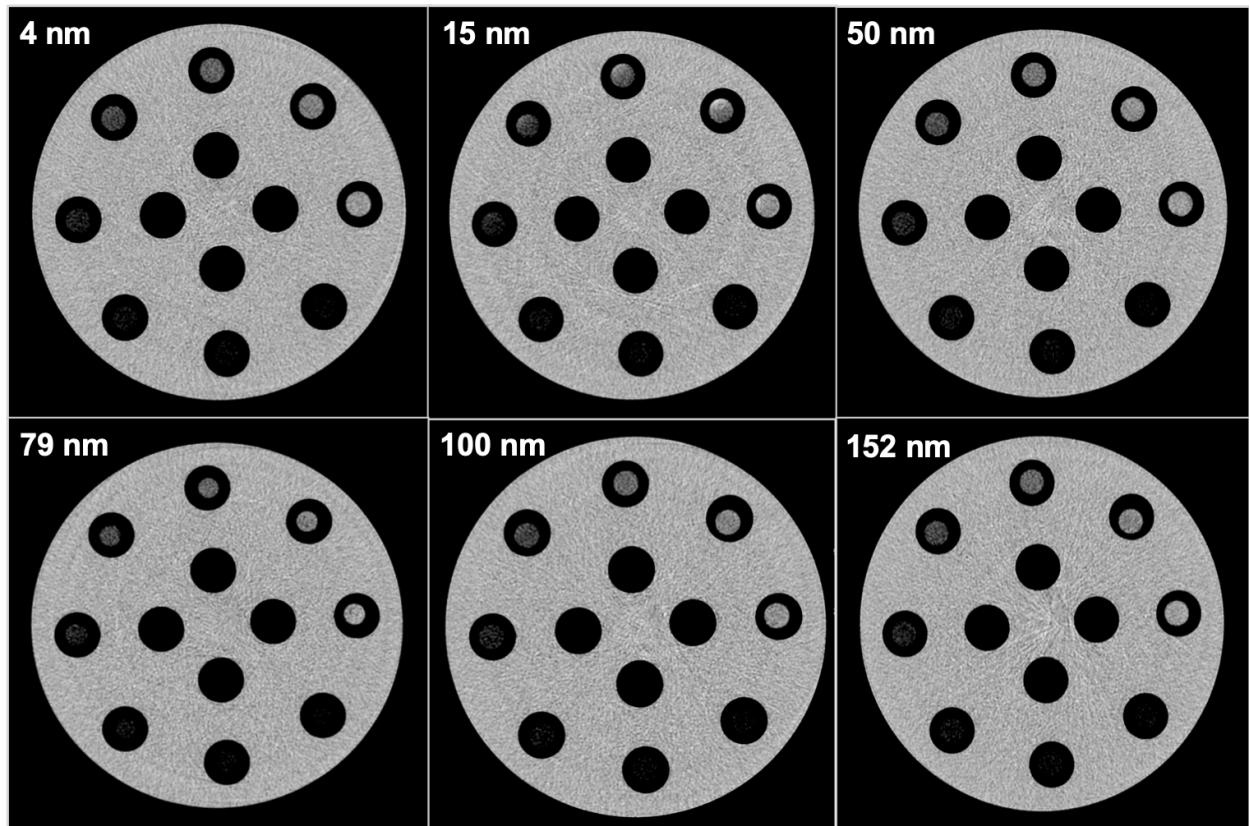
Supporting Figure 2: UV-vis absorption spectra for AuNP size of 4, 15, 50, 79, 100 and 152 nm.



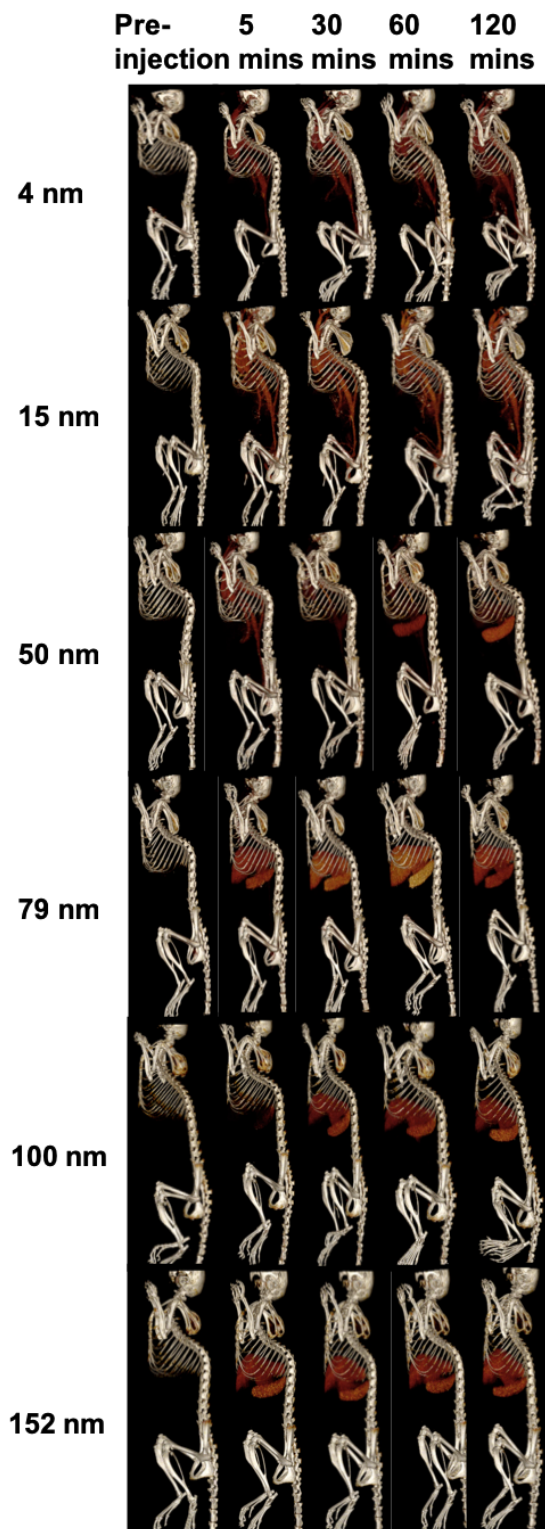
Supporting Figure 3: A) Attenuation rates for the MILabs micro CT system. B) Attenuation rates for the MoleCubes micro CT system.

A**B**

Supporting Figure 4: Bland-Altman plots of the data from the two observers for A) phantom scans and B) *in vivo* scans.



Supporting Figure 5: Conventional CT equivalent images of all AuNP sizes generated from SPCCT phantom scans. Images are displayed in window level of 250 HU and window width of 500 HU.



Supporting Figure 6: 3D volume rendered CT images at different post-injection time points.

Images are displayed in window level of 1090 HU and window width of 930 HU.

			95% Confidence Interval	
Intraclass Correlation			Lower Bound	Upper Bound
<i>In vivo</i> CT scan	Single Measures	.954	.947	.960
	Average Measures	.977	.973	.980
Phantom scan	Single Measures	.974	.968	.978
	Average Measures	.987	.984	.989

Supporting Table 1: Intraclass correlation coefficients calculated with a two-way mixed effect model for both Phantom scan CT contrast quantification and *in vivo* CT contrast quantification.

Comparison	p-value									
	5 minutes					30 minutes				
	B	L	S	K	T	B	L	S	K	T
4 nm vs. 15 nm	0.12	>0.99	0.99	>0.99	0.88	0.05	0.98	0.94	>0.99	0.72
4 nm vs. 50 nm	0.96	0.99	>0.99	0.97	0.83	>0.99	>0.99	0.95	>0.99	0.88
4 nm vs. 79 nm	0.39	0.20	0.77	0.99	0.85	<0.01	0.09	0.93	<0.01	0.19
4 nm vs. 100 nm	<0.01	<0.01	0.81	0.39	<0.01	<0.01	<0.01	0.69	<0.01	0.46
4 nm vs. 152 nm	<0.01	0.05	0.94	<0.01	0.53	<0.01	0.05	>0.99	<0.01	0.60
15 nm vs. 50 nm	0.40	0.91	>0.99	0.97	>0.99	<0.01	0.90	0.49	>0.99	>0.99
15 nm vs. 79 nm	<0.01	0.09	0.39	0.99	>0.99	<0.01	0.01	0.44	<0.01	0.92
15 nm vs. 100 nm	<0.01	<0.01	0.41	0.39	<0.01	<0.01	<0.01	0.17	<0.01	>0.99
15 nm vs. 152 nm	<0.01	0.02	0.66	<0.01	0.99	<0.01	<0.01	0.70	<0.01	>0.99
50 nm vs. 79 nm	0.04	0.54	0.71	>0.99	>0.99	<0.01	0.26	>0.99	0.03	0.84
50 nm vs. 100 nm	<0.01	0.01	0.75	0.85	<0.01	<0.01	<0.01	>0.99	<0.01	0.99
50 nm vs. 152 nm	<0.01	0.22	0.91	0.02	>0.99	<0.01	0.18	>0.99	0.01	>0.99
79 nm vs. 100 nm	0.12	0.60	>0.99	0.82	<0.01	0.93	0.21	>0.99	>0.99	>0.99
79 nm vs. 152 nm	0.01	>0.99	>0.99	0.02	>0.99	0.97	>0.99	>0.99	>0.99	0.98
100 nm vs. 152 nm	0.53	0.91	>0.99	0.28	<0.01	>0.99	0.31	0.96	>0.99	>0.99
Comparison	60 minutes					120 minutes				
	B	L	S	K	T	B	L	S	K	T
	B	L	S	K	T	B	L	S	K	T
4 nm vs. 15 nm	0.24	0.94	0.94	>0.99	0.83	0.21	0.98	0.74	>0.99	0.97
4 nm vs. 50 nm	0.85	0.92	0.53	0.86	0.83	0.01	0.13	0.21	0.12	0.89
4 nm vs. 79 nm	<0.01	<0.01	0.27	0.01	0.43	<0.01	<0.01	0.73	<0.01	0.44
4 nm vs. 100 nm	<0.01	<0.01	0.56	<0.01	0.27	<0.01	<0.01	0.93	<0.01	0.24
4 nm vs. 152 nm	<0.01	0.05	>0.99	<0.01	0.92	<0.01	0.10	>0.99	<0.01	0.63
15 nm vs. 50 nm	<0.01	0.42	0.11	0.86	>0.99	<0.01	0.02	<0.01	0.12	>0.99
15 nm vs. 79 nm	<0.01	<0.01	0.04	0.01	0.98	<0.01	<0.01	0.08	<0.01	0.89
15 nm vs. 100 nm	<0.01	<0.01	0.11	<0.01	0.94	<0.01	<0.01	0.18	<0.01	0.72
15 nm vs. 152 nm	<0.01	<0.01	0.78	<0.01	>0.99	<0.01	0.02	0.89	<0.01	0.97
50 nm vs. 79 nm	<0.01	0.01	>0.99	0.31	0.99	0.55	0.61	0.96	0.92	0.98
50 nm vs. 100 nm	<0.01	<0.01	>0.99	0.03	0.96	0.15	0.15	0.75	0.29	0.91
50 nm vs. 152 nm	<0.01	0.42	0.83	0.09	>0.99	0.26	>0.99	0.16	0.40	>0.99
79 nm vs. 100 nm	0.97	>0.99	>0.99	0.94	>0.99	0.98	0.97	>0.99	0.90	>0.99
79 nm vs. 152 nm	0.99	0.65	0.57	>0.99	0.96	>0.99	0.68	0.62	0.94	>0.99
100 nm vs. 152 nm	>0.99	0.38	0.86	>0.99	0.90	>0.99	0.19	0.85	>0.99	>0.99

Supporting Table 2: P-values of every possible pairs of AuNP sizes in across all organs for attenuation changes over 2 hours imaging time points. The pairs that have statistically significant differences in change of attenuation are highlighted in blue. Organs names are abbreviated: B- Blood, L- Liver, S- Spleen, K- Kidney, T- Thigh.

Comparison	p-value				
	Blood	Liver	Lung	Spleen	Kidney
4 nm vs. 15 nm	0.71	0.99	>0.99	0.99	0.05
4 nm vs. 50 nm	0.46	0.03	0.99	<0.01	0.92
4 nm vs. 79 nm	0.44	0.02	0.58	<0.01	0.35
4 nm vs. 100 nm	>0.99	<0.01	0.03	<0.01	0.32
4 nm vs. 152 nm	0.99	0.15	<0.01	<0.01	0.08
15 nm vs. 50 nm	0.99	0.03	>0.99	<0.01	<0.01
15 nm vs. 79 nm	0.99	0.02	0.68	<0.01	<0.01
15 nm vs. 100 nm	0.75	<0.01	0.04	<0.01	<0.01
15 nm vs. 152 nm	0.53	0.13	<0.01	0.02	<0.01
50 nm vs. 79 nm	>0.99	0.99	0.84	0.99	0.91
50 nm vs. 100 nm	0.49	0.12	0.08	0.99	0.91
50 nm vs. 152 nm	0.30	0.95	<0.01	0.08	0.51
79 nm vs. 100 nm	0.47	0.33	0.61	>0.99	>0.99
79 nm vs. 152 nm	0.29	0.80	0.19	0.02	0.98
100 nm vs. 152 nm	0.99	0.01	0.98	0.02	0.97

Supporting Table 3: P-values of every possible pairs of AuNP sizes in across all organs for biodistribution at 2 hours post-injection. A Tukey's multiple comparisons test was used to compare the interactions between each AuNP size. The pairs that have statistically significant differences are highlighted in blue.