

## Electronic supplementary information

### Emerging contrast agents for multispectral optoacoustic imaging and their biomedical applications

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**Table S1. Some commercially available multispectral optoacoustic imaging systems and their technical specifications.**<sup>1-6</sup>

Item	Nexus 128	VevoLAZR-X	MSOT Acuity
<b>Manufacturer</b>	Endra Life Science	Fujifilm VisualSonics	iThera Medical
<b>Wavelength Range</b>	680-950 nm	680-970 nm/1200-2000 nm	660-1300 nm
<b>Pulse Frequency</b>	20 Hz	20 Hz	25 Hz
<b>Peak Energy</b>	Undocumented	45±5 mJ	30 mJ
<b>Wavelength Tuning Speed</b>	12 sec	<1 sec	<10 msec
<b>Penetration Depth</b>	15 mm	Up to 30 mm	Up to 50 mm
<b>Spatial Resolution</b>	<280 µm	30-120 µm	< 400 µm
<b>Spectral Processing</b>	Offline spectral unmixing for several contrast agents	Offline spectral unmixing for several contrast agents	Real-time spectral unmixing for several contrast agents
<b>Sensitivity</b>	350 nM for dyes in phantoms	<500 nM for dyes in phantoms	<100 nM for dyes in phantoms
<b>Ultrasound Transducer</b>	Helical detector array, 128 elements, 5 MHz	Linear detector array, 256 elements, 9–70 MHz	Arc-shaped detector array, 256 elements, 4 MHz
<b>Features</b>	Fast imaging and high-resolution 3D image reconstruction	Whole-body imaging with sectional PAI options	Whole-body imaging with tomography and body navigations

**References:**

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## Abbreviation list:

<b>2D</b>	two-dimensional
<b>3D</b>	three-dimensional
<b>ALP</b>	alkaline phosphatase
<b>AuNC</b>	gold nanocage
<b>aza-BODIPY</b>	boron-azadipyrrromethene
<b>BAT</b>	brown adipose tissue
<b>Bchl</b>	bacteriochlorophyll
<b>BHQ</b>	black hole quencher
<b>BSA</b>	bovine serum albumin
<b>BVNP</b>	biliverdin nanoparticle
<b>CP</b>	conjugated polymers
<b>CT</b>	computed tomography
<b>CZTS</b>	$\text{Cu}_2\text{ZnSnS}_4$
<b>DLPC</b>	1,2-dilauroyl-sn-glycero-3-phosphocholine
<b>DMD</b>	Duchenne muscular dystrophy
<b>DOX</b>	doxorubicin hydrochloride
<b>FDA</b>	Food and Drug Administration
<b>FP</b>	fluorescent protein
<b>GECA</b>	genetically engineered contrast agent
<b>GLP-1R</b>	glucagon-like peptide-1 receptors
<b>GO</b>	graphene oxide
<b>HA</b>	hyaluronan
<b>HAase</b>	hyaluronidase
<b>Hb</b>	deoxyhemoglobin
<b>HbO<sub>2</sub></b>	oxyhemoglobin
<b>HS680</b>	HypoxiSense 680
<b>ICG</b>	indocyanine green
<b><i>L. lactis</i></b>	<i>Lactococcus lactis</i>
<b>LSPR</b>	localized surface plasmon resonance
<b>MB</b>	methylene blue
<b>MCA</b>	molecular contrast agent
<b>MMP-2</b>	matrix metalloprotease 2
<b>MOF</b>	metal–organic framework
<b>MR</b>	magnetic resonance
<b>MSOT</b>	multispectral optoacoustic tomography
<b>NCA</b>	nanosized contrast agent
<b>NE</b>	nanoemulsion
<b>NIM</b>	NO-insensitive molecule
<b>NIR</b>	near-infrared range
<b>NO</b>	Nitric Oxide
<b>NRM</b>	NO-responsive molecule
<b>OA</b>	optoacoustic

<b>OMV</b>	outer-membrane vesicle
<b>OPOs</b>	optical parametric oscillator
<b>PBS</b>	phosphate-buffered saline
<b>PEG</b>	polyethylene glycol
<b>PT</b>	photothermal
<b>PTT</b>	photothermal therapy
<b><i>S. aureus</i></b>	<i>Staphylococcus aureus</i>
<b>SERRS</b>	surface-enhanced resonance Raman scattering
<b>SLN</b>	sentinel lymph node
<b>SNR</b>	signal-to-noise ratio
<b>sO<sub>2</sub></b>	blood oxygen saturation
<b>TA</b>	tannic acid
<b>TCHM</b>	tricyanofuran-containing polyene
<b>TIC</b>	tumour initiating cells
<b>X-gal</b>	5-bromo-4-chloro-3-indolyl- $\beta$ -D-galactopyranoside
<b><math>\beta</math>-Gal</b>	$\beta$ -galactosidase