VISUALSONICS

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Vevo® LAZR

Application Feature Sheet

INSIGHT THROUGH *IN VIVO* IMAGING™

Cancer Biology

The field of cancer biology requires tools for early tumor detection, studying angiogenesis and measuring cellular and molecular factors implicated in cancer progression.

- ### Early tumor detection

  Down to 30 µm resolution for orthotopic & xenograft tumor models.

- ### Non-invasive, real-time imaging for longitudinal studies

  Study treatment safety and efficacy with fewer sacrificed animals.

- ### Oxygen Saturation

  Assess hemoglobin content and measure oxygen distribution within the tumor microenvironment.

- ### Vasculature/Angiogenesis

  Investigate vascular structure *in vivo* in 2D and 3D in order to assess angiogenesis progression and quantify perfusion kinetics.

- ### Lymph Node Imaging

  Map sentinel lymph nodes to detect metastasis & guide fine-needle aspiration biopsies for staging cancer progression.

- ### Nanoparticles

  Target specific cancer receptors, proteins and cells with highly biocompatible materials that enhance signal through photoacoustic imaging. In addition to being highly customizable, nanoparticles can also be used for endogenous blood & vascular signal enhancement.

- ### Molecular Imaging

  Target & measure intracellular biomarkers and study multiple contrast agents simultaneously.

- ### Non-invasive, real-time imaging for longitudinal studies

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Brain Imaging

The Vevo LAZR system offers researchers the ability to measure & detect anatomical, physiological and functional hemodynamic processes within the central nervous system of small animals.

- Oxygen Saturation
  Detect & quantify hypoxia and oxygen saturation within the cerebral cortex.
- Perfusion
- Vasculature
  Visualize cerebral vasculature including angiogenesis and hemoglobin content.
- Non-invasive, real-time imaging for longitudinal studies

Diabetes

Studies in the mouse hindlimb model have demonstrated the applicability of photoacoustic imaging for diabetes research with the ability to visualize and quantify ischemia and reperfusion, as well as percentage of oxygen distribution in tissues of interest.

- Oxygen Saturation in Tissues & Organs
  Investigate physiological and biological hemodynamic changes in tissues and organs affected as a result of diabetes and therapeutic intervention. For instance, ischemia induced in a rat hindlimb serves as an adequate model for visualizing changes in blood oxygenation levels.
- Vasculature/angiogenesis
  Quantify percent vascularity & blood flow in the eye, hindlimb and kidney.
- Perfusion
  Study contrast uptake kinetics & late phase targeted enhancement in specific tissues, organs and regions of interest.
- Molecular imaging
  Target & measure intracellular biomarkers and study multiple contrast agents simultaneously.
- Nanoparticle detection
  Target specific receptors, proteins and cells involved in the prognosis of diabetes with highly biocompatible materials that enhance signal through photoacoustic imaging. In addition to being highly customizable, nanoparticles can also be used for endogenous blood & vascular signal enhancement.
- Non-invasive, real-time imaging for longitudinal studies

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Developmental Biology

Embryos require optimal amounts of nutrient, protein and oxygen delivery to every organ and tissue for growth and survival. Anemia, hypoxia, low vascular growth rate and abnormal vascular formation can stall or inhibit normal development. Bi-directional blood flow, vascularity and percent oxygenation measurements captured by the Vevo LAZR system ensure proper growth.

- ### Embryonic Screening
  Monitor the effect of interventional therapeutics on physiological functions and processes in the developing embryo.

- ### Placental Studies
  See instantaneous changes in placental oxygen saturation levels important for obstetric and gynecological research.

- ### Perfusion imaging
  Study contrast uptake kinetics, intensity and late phase targeted enhancement of the molecular signal on a parametric image of an organ or tissue of interest.

- ### Oxygen Saturation
  Observe the link between maternal conditions (ie. preeclampsia) and umbilical abnormalities (i.e. hypercoiled cord) on placental oxygen distribution.

- ### Cardiovascular function
  Observe cardiovascular function as early as embryonic day 8.

- ### Nanoparticle Imaging
  Study intraplacental factors and perform drug delivery with targeted nanocarriers capable of travelling through the placental barrier and binding to specific intracellular receptors & biomarkers.

- ### Blood flow studies
  Conduct angiogenesis and blood flow studies, as well as evaluation of arteries and veins.

- ### Molecular imaging
  Target & measure intracellular biomarkers and study multiple contrast agents simultaneously.

- ### Non-invasive, real-time imaging for longitudinal studies

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Nephrology

Kidney images in 2D and 3D can be obtained to assess blood flow and tissue perfusion involved in renal function *in vivo*, in real-time and most importantly, non-invasively.

- ## Kidney Blood Flow
  Visualize blood flow and perfusion within renal microstructure to obtain hemodynamic measurements rapidly and non-invasively with minimal harm to experimental animals.

- ## Cyst & Tumor Monitoring
  Perform longitudinal studies of cyst & tumor progression and regression important for monitoring the effects of therapeutic intervention. Drug-induced nephrotoxicity can also be monitored to ensure compound safety.

- ## Oxygen Saturation
  See oxygen distribution and quantify hemoglobin levels within detailed kidney structures such as the capsule, cortex, corticomedullary junction, medulla, papilla, pelvis and hilum vasculature.

- ## Nanoparticles
  Target specific receptors, proteins and cells with highly biocompatible materials that enhance signal through photoacoustic imaging. In addition to being highly customizable, nanoparticles can also be used for endogenous blood & vascular signal enhancement.

- ## Molecular imaging
  Target & measure intracellular biomarkers and study multiple contrast agents simultaneously.

- ## Non-invasive, real-time imaging for longitudinal studies