High Throughput Subcutaneous Tumor Measurement & Tracking System

- Make accurate tumor volume measurements fast (scan time <1.4 sec)
- Improve statistical significance and sensitivity
- Eliminate manual data transcription errors
- Eliminate operator bias
- Decrease manual repetitive tasks
- Increase productivity
- Reduce labor costs (up to 50%)
- Reduce animal costs (up to 35%)
- Shorten time to IND

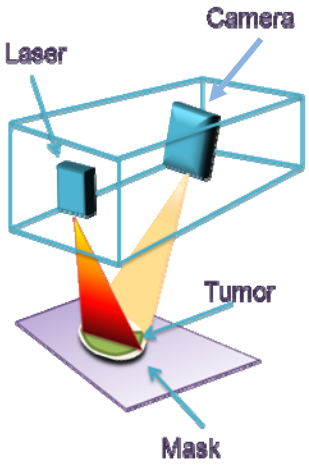
Tumor Management System

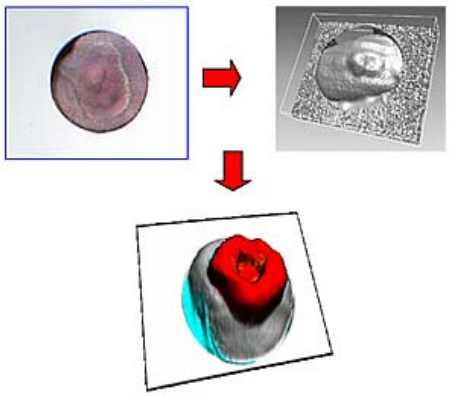
A Complete Solution for Subcutaneous Tumor Measurements

Biopticon Corporation

Discovery through Imaging

TumorImager™ provides the most accurate results…





TumorImager™ is a 3D laser scanning device for subcutaneous tumor measurements on small lab animals. It uses a laser and camera system that projects a laser line on the tumor to be measured. As the laser line moves over the tumor placed within the mask, the camera takes pictures of the line and calculates the x, y, and z coordinates of the surface of the tumor. The patented algorithms then segment the tumor out of all the data points and calculate the volume. This leads to more accurate volumes than the simple formulas assumed when using calipers.

TumorImager™ accurately measures the volume of necrotic as well as odd shaped tumors while Calipers are recognized as highly inaccurate.

Comparison with Caliper Measurements

Function	Caliper	TumorImager™
Average deviation[1]	-0.36	-0.1
Measurement time[2]	7-10 sec	<3.0 sec
Recording time[3]	9 sec	0 sec
Tumor shape dependency	Half ellipsoid	Shape independent
Tumor size (long axis)	Any	<2.8 cm[4]
Operators needed	1-2	1

1. Average of deviations from plethysmometer measurements (mm^3)
2. Time for making one tumor measurement.
3. Time to record results to paper/Excel or to a database for manual entry systems only.
4. With the use of a special larger mask.

TumorImager™

- **Accurate volume measurements**
- **Improved p values and greater detection sensitivity**
- **Fast (scan animal in <1.4 sec)**
- **Sedation of animals is not required**
- **Real time data analysis**
- **Eliminate operator bias**
- **Tumor Shape independent measurements**
- **Measure necrotic tumors accurately**
- **Save scanned tumor images automatically for further analysis**

TumorManager™ automates data management …

The integrated program controls the scanner plus collects and manages tumor data for oncology drug research. It consists of study protocol creation; tabular and graphical presentation of individual and group animal volume, weight and clinical observational data; real time tumor metric calculations; statistical analysis; survival tests; integrated randomization of animal grouping; cage handling; user defined task management; and extensive reporting of results.

Comparison with Current Processes

Function	Typical Lab	TumorManager™
Data recording	Spreadsheet	SQL Server Database
Statistics	Limited	Extensive
Data protection	Password	Database, password, task and user dependent
Tumor metric calculations	If calculated they are not real time.	Real time calculations of Volume, TDT, LogCellKill etc.
Data display	Requires programming	Real time table/ graphs
Animal grouping	Either manually or by use of a program	Volume/weight based randomization integrated
Reports	Tables, manual transfer to Word, pdf, Excel etc.	30+ reports on protocol, data and analysis integrated

TumorManager™

- **Multi-source data entry**
  - TumorImager™
  - Calipers
  - Balances
  - RFID Readers
  - Manual data entry
  - Import study data from other imagers
- **Multiple Tumor Metrics**
  - T-C, TDT, TVDD
  - Log Cell Kill
  - Tumor Growth Inhibition
- **Protocol driven**
  - Study creation
  - User roles
  - Task scheduling
  - Dosing
  - Animal Fate
  - User defined terms
- **Animal Randomization**
  - Animal ID
  - Tumor Volume
  - Body Weight
  - Weight stratification
  - User defined
  - Manual
- **Statistical Analysis**
  - Descriptive
  - Normality, Homogeneity
  - ANOVA
  - DOE
  - Multiple Comparisons
- **Reports**
  - 30+ user selected reports
  - Export data to Word, Excel, PDF & html

Tumor Management System: A Complete Solution

Studies have shown that the TumorImager™ gives you more accurate volume data with better p-values, resulting in Dose Response curves that are more sensitive allowing drug response to be detected earlier in xenograft studies than is possible with calipers.

TumorImager™ Specifications

• Scan range (along y axis)	35 mm
• Camera working distance	100 mm
• Maximum tumor size along x-y	25 (28) mm
• Maximum tumor height	18 mm
• Tumor scan time	<1.4 sec
• Resolution, z axis	0.04% (10 µm)
• Linearity, z axis (±3 sigma)	0.2% (50 µm)
• Light source laser diode	655 nm, 15 mW
• Laser class	Class 2M
• Computer Interface	Firewire & USB 2.0
• Interface cable length	Up to 6ft

TumorManager™ Specifications

- Interfaces to TumorImager™, serial balances, calipers and RFID readers.
- Protocol driven functions such as data entry, dosing and task generation.
- Program limits: 50 groups/study, 100 animals/group, 20 drugs/study.
- Reports and data can be exported to Word, Excel, and Prism.
- Windows based user interface allows the user to choose a mouse, touch screen, and/or foot pedals to control the system.
- SQL Server 2005/8 backend.
- Program security, access and user control.
- Report generation for volume/weight data & plots.
- 21 CFR Part 11 compliant.

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