INTRAOPERATIVE HYBRID SENTINEL NODE IMAGING USING RADIOACTIVE /FLUORESCENT TRACERS

RENATO VALDES OLMOS

SINGLE FLUORESCENT AGENTS

INDOCYANINE GREEN (ICG)
FLUORESCEIN

SENTINEL NODE PROCEDURE
SINGLE FLUORESCENT AGENTS
INDOCYANINE GREEN (ICG)
FLUORESCEIN

EXCELLENT IMAGES IN EXPECTED DRAINAGE AREA
PASIVE DIFFUSION
NO LYMPH NODE UPTAKE
SHORT DIAGNOSTIC WINDOW

SENTINEL NODE SURGERY
PARALLEL WORLD
SEPARATED FROM
NUCLEAR MEDICINE

RADIOACTIVE TRACERS
SCINTIGRAPHY
OPERATING ROOM

FLUORESCENT AGENTS
OPTICAL IMAGING
RADIOACTIVITY AND FLUORESCENCE IN ONE SIGNATURE

Conventional: Radioactive

Hybrid tracer: Radioactive and fluorescent

PHAGOCYTOSIS IN MACROPHAGES

INTERNALIZATION & ACCUMULATION IN MACROPHAGES
HYBRID TRACER

ICG-${}^{99m}$Tc-nanocolloid

PHAGOCYTOSIS IN MACROPHAGES

${}^{99m}$Tc-Cy7 tilmanocept

Initial preclinical evaluation

Lymphatic flow

Single injection with a hybrid imaging agent

Surgical planning using the radioactive component

Surgical guidance using the fluorescent component

Preclinical studies confirmed the integrated use of combined pre- and intra-operative imaging
HYBRID TRACERS

ICG + $^{99m}$Tc-nanocolloid

Similarly to parental tracer, various patients/kit possible.
OPEN SURGERY: “SEE & OPEN & SEE AGAIN”

THE BEST OF BOTH WORLDS

ICG-99mTc-nanocolloid

LYMPHOSCINTIGRAPHY AND SPECT/CT POSSIBLE

HIGH RESOLUTION IMAGING AT THE OPERATING ROOM

SYNCHRONOUS DETECTION RADIOACTIVITY/FLUORESCENCE
HYBRID TRACER  $^{99mTc}$-nanocolloid

SIMILAR BIODISTRIBUTION THAN PARENTERAL RADIOPHARMACEUTICAL

$^{99mTc}$-nanocolloid

RESIDUAL LYMPH NODE RADIOACTIVITY 2nd DAY

100% CORRELATION

N = 25
10 melanoma head/neck - 6 melanoma trunk
9 penile carcinoma
66 SN IN 51 BASINS
22 head/neck - 2 parotid
18 inguinal - 9 axilar

FIRST INJECTION

SECOND INJECTION
HYBRID TRACER
ICG-99mTc-nanocolloid

SYNCHRONOUS DETECTION
DURING SURGICAL ACT

DUE TO FLUORESCENCE SIGNAL HIGH
RESOLUTION IMAGING DURING
SURGERY POSSIBLE
DUE TO FLUORESCENCE SIGNAL HIGH RESOLUTION IMAGING DURING SURGERY POSSIBLE

ORAL CAVITY MELANOMA

DUE TO FLUORESCENCE SIGNAL HIGH RESOLUTION IMAGING DURING SURGERY POSSIBLE
HEAD & NECK MELANOMA

ISOLATED MELANOMA METASTASIS

HYBRID TRACER IN LAPAROSCOPY
HYBRID TRACER IN ROBOT ASSISTED LAPAROSCOPY

NEEDS 2 SEPARATE DEVICES
PROLONGATION DETECTION TIME
ADDITIONAL COST

SENTINELLA

HAMAMATSU

HYBRID REALITY
IT IS NECESSARY TO DEVELOP A COMBINED DEVICE

THE HYBRID CONCEPT
HYBRID CAMERA

COMBINED IMAGING
SYSTEM INTEGRATION

INTEGRATED HYBRID CAMERA
INTEGRATED HYBRID CAMERA

OPTICAL + GAMMA-RAY CAMERA FOR OPEN SURGERY

GAMMA-RAY + OPTICAL IMAGES

OPTICAL + GAMMA-RAY + FLUORESCENCE
FROM HYBRID TRACERS TO THE DEVELOPMENT OF HYBRID IMAGING DEVICES

99mTc

Opto

HYBRID PROBE

ONE DEVICE CAN MEASURE BOTH SIGNATURES
Intraoperative fluorescence-based sentinel node identification: localization of a node near the prostate
THE SENTINEL NODE HUNTER OF THE FUTURE
NUCLEAR MEDICINE & ULTRASOUND

RADIOGUIDED SURGERY & INTERVENTION

CERENKOV LUMINESCENCE

$^{18}$F-FDG & $^{131}$I

CL DETECTION OF B-EMITTERS
HIGH
RADIOGUIDED
SURGERY
POTENTIAL

Purpose

The purpose of this study is to use a new way of imaging called the Cerenkov luminescence effect that is used in a standard clinical PET/CT scan to determine distances. The investigation being performed surgically to standardize procedures is currently being used in the future. The Cerenkov imaging could be used as a guide for surgeons and

The purpose of this study is to use the Cerenkov light from F-18 or I-131 to image tumors and its uses in the head, neck, breast, axilla, and pelvic regions with a high-sensitivity camera. The purpose of this study is to use the Cerenkov light from F-18 or I-131 to image tumors and its uses in the head, neck, breast, axilla, and pelvic regions with a high-sensitivity camera.

Head and Neck Cancers
Radiation: Cerenkov emissions from the PET scan and the radiotherapy 131 I

FDG-PET/CT
CERENKOV LUMINESCENCE
CL + BW PHOTO AXILLA
MAMMO CARE EU-PROJECT 2013-2015

TO PERFORM FDG-GUIDED BIOPSY IN BREAST LESIONS OCCULT ON RADIOLOGY

TO IMPROVE BIOPSY IN BREAST CANCER FOR (GENETIC) TUMOR PROFILES