Building a World Class Cancer Center at Henry Ford: 
Cancer Surgery

Steven N. Kalkanis MD

Henry Ford Medical Group
Jubilee Reunion
October 9, 2015
Surgical Oncology plays a leading role in our *Out-State Growth Strategy*
Where we started…
HFH draws patients from our “backyard”
2014 New MRNs

✓ Total: 1273
✓ Outside of MI: 228
2014 Growth over 2013

- Transfers 15% ↑
- Out-patient appointments 33% ↑
- New Medical Record #'s 28% ↑
- $87.5M in net contribution margin
- 43% of all new referrals = surgical oncology
Henry Ford Center for Cancer Surgery: Opportunities

- Differentiate our Cancer Institute, fully partner with JFCI
  
  Develop, promote unique capabilities, publish superior outcomes, NCI

- Enhance our Customer Experience
  
  Access portal: “if you have cancer, call this number…”, nurse navigation, protocols, multidisciplinary coordination of care, concierge services

- Build our Internal Team Identity
  
  Virtual and Physical Space, Signage, Web Presence

- Build our External Brand and Public Perception
Henry Ford Center for Cancer Surgery

Vision
Business Plan
Surgeon and JFCI Buy-In, Gap Analysis

Infrastructure Development:
Admin, Nursing, Patient Advocate Support

Website Development:
http://www

888-777-4167
Patient Phone Triage
Infrastructure:
Call Center, JFCI, RPO, Surgical Departments

PR/Marketing Plan
Creative Content Development

November 2012
New Website

select a location
Please select a location from the list below, or click the region on the body for more information about cancer types in that location.

- brain
- breast
- head & neck
- lung
- pancreas
- liver
- kidney
- colon/rectal
- prostate
- skin
- bone
- spine

henryford.com/cancer
Talk to Us

If you would prefer to speak with someone immediately please call us at (888) 777-4167. A nurse is available to take your call 24 hours a day, seven days a week.

Please complete the form below and someone will respond to you within 24 hours.

* Indicates required information

Name *

Email address *

Phone number

How do you prefer we contact you? *

- Email
- Phone

Reason for request
Since 1915, Henry Ford physicians and scientists have focused their efforts in a wide variety of research areas critical to understanding diseases and bringing new treatment options to the patients’ bedsides. Every day, hundreds of physicians and scientists are looking for the treatments that will bring hope to you and your family.

Brain/Meningioma

Breast

✓ Gastro

Gastro/Colorectal

Gastro/Esophageal
Pioneer in Radiosurgery Technology

Henry Ford Hospital was the first in the United States to treat metastatic spine tumors using Novalis® shaped-beam radiosurgery technology.

Radiosurgery refers to the noninvasive destruction of a discrete target area in the brain or spine using the precise delivery of a high dose of radiation. This noninvasive
Henry Ford Center for Cancer Surgery:  
*The Case for Surgical Oncology*

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<th>Cancer Group</th>
<th>Hem Onc</th>
<th>Radiation</th>
<th>Surgery</th>
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<td>36%</td>
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<td>20%</td>
<td>37%</td>
<td>6%</td>
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Where should you go for cancer care?

MERRILL GOOZNER Editor

When it comes to cancer care, there is a huge disconnect between the possibilities of modern medicine and its day-to-day practice. As last fall’s troubling report from the Institute of Medicine noted, variation in oncology practice is wide; collection of quality and outcomes data is poor; and progress in learning what works best for any particular cancer remains slow and halting.
14 Multidisciplinary Tumor Boards:

- Brain
- Breast
- GI
- GU
- Gyn
- Head & Neck
- Leukemia/Lymphoma
- Liver
- Lung
- Musculoskeletal
- Pancreas
- Spine
- Thyroid
- Pain
PATIENT-CENTERED CARE

Personalized Medicine *in every sense of the word*

In addition to 14 multidisciplinary tumor boards, we currently have 5 multidisciplinary clinics, with the potential for many more when all cancer specialties are housed in one building:

- Breast
- Lung
- Head & Neck
- Pancreas
- Prostate
Survival Rates for Colon Cancer Patients

Surgery for Colon Cancer, 2008 - 2013

<table>
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<th>Stage</th>
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<th>National</th>
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<tr>
<td>0</td>
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Survival Rates for Head & Neck Cancer Patients

Surgery for Head & Neck Cancer, 2010 - 2013
Survival Rates for Lung Cancer Patients

- Stage 0: Henry Ford 47.0%, National 23.1%
- Stage 1: Henry Ford 46.8%, National 29.5%
- Stage 2: Henry Ford 27.6%, National 15.8%
- Stage 3: Henry Ford 11.2%
- Stage 4: Henry Ford 1.9%, National 2.7%
Survival Rates for Brain Cancer Patients

- Henry Ford: 32.3%
- National: 20.9%

Surgery for Brain Cancer, 2005 - 2012
Annual Brain Tumor Experience

- More than 700 new brain tumor patients per year
- More than 7,000 patient visits per year
- More than 2,000 tumor board evaluations per year
- More than 4,000 clinically annotated tissue specimens

State of Michigan Data
~ 750 – 1,000 Primary
~ 3,500 Brain Mets
1.5 Tesla fully-integrated iM Ri is the first in Michigan and one of 30 in the United States and 58 worldwide.

Gross total resection of primary brain tumors can be achieved in approximately 50% of patients by current standards but can be increased to >95% with iMRI.
iMRI

- Allows real-time near 100% resection of low grade brain tumors
- Extent of resection directly correlates with quality of life and survival.
- In several case series the difference between 75% and 99% resection correlated with 20+ year survival
- Allows real-time near total resection of enhancing tumor in malignant primary brain tumors, potentially doubling survival times
iMRI can be used in combination with **awake surgery** when working in eloquent brain regions and is also easily integrated with **neuro-navigation**, **diffusion tensor imaging** and **functional MRI**, all of which improve surgical outcomes by greatly enhancing the surgeon’s ability to accurately delineate the relationship between tumor and normal brain.
Thermal Therapy + iMRI

- Laser-Heat Ablation under direct vision
- Spherical well-circumscribed lesions may lend themselves exceptionally well to this technology → avoid radiotherapy?
Ablation of High-grade Astrocytoma 1mm from brainstem
Raman Spectroscopy: Identification of Brain Cancer

Smart Sensors & Integrated Microsystems, WSU (G. Auner)
HFII (S. Dulchavsky)
Hermelin (S. Kalkanis, T. Mikkelsen)
Raman Spectroscopy

- Adapted by DoD 10 years ago to detect wartime IEDs
- Results took minutes to hours
- 10’ (w) x 15’ (l) x 7’ (h)
- Difficulty with sample validation
- Inelastic light scattering from molecules produce a unique spectral fingerprint

Inelastic light scattering from molecules produce a unique spectral fingerprint.
After IRB approval, Hermelin tumor bank provided 587 blinded tissue samples for tissue validation and paradigm “learning”
GBM Raman Spectra: Four Tissue Types

Validation of tumor samples: 99% sensitivity and 97% specificity

Double blinded validation of Henry Ford tissues allowed WSU/SSIM engineers to develop detection codes, decreasing the yield time for a 99% correct tissue diagnosis from 47 minutes to 0.25 seconds.
Preliminary principal component analysis of samples over the region 900-1800 cm\(^{-1}\) showed good separation of tumor spectra, and a continuum of separation between normal brain, infiltrating tumor, and necrosis.

Major advances in microsensor technology from 2010-2013 allowed the giant room-sized detection and processing hardware now to fit on the tip of a pen.
HFHS IRB Approval Nov 2014: Testing the integrated navigation/Raman probe on 25 GBM patients during iMRI-surgery, on regions of the brain already selected for removal by the surgeon. Raman results recorded separately prior to pathology validation (Tumor, Necrosis, Infiltrating, Normal).
Imaging Multiple Molecular Species

94% correlation between intraoperative real-time (4 seconds) Raman results vs. pathology frozen section validation (30-45 minutes)
A New Paradigm?

Resect Tissue → Send to Pathology → frozen section best guess → full pathology analysis

20 min+ → Several Days Later

Days Later: Final Pathology Verification

5-10 sec.
The Cancer Genome Atlas

HFHS and MD Anderson largest contributors in country
GBM: The Henry Ford Experience

Case Set: User-defined
Case List: User-defined case list.
Altered in 31 (100%) of cases

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<th>&lt;9mos</th>
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<tr>
<td>RB1</td>
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RTK/RAS/PI3K

miR-424 (Down in short)

RB

Verhaak Class
MGMT Methylation

Amplification | Homozygous Deletion | Mutation

copy number alterations are putative.
Verhaak | Proneural | Classical | Neural | Mesenchymal
MGMT Promoter | Methylated | Unmethylated | Unknown
5) Molecular profile

4) intracranial implant

3) cell culture

2) Enzymatic dissociation

1b) germline DNA

1a) fresh resected tissue (pathology, consent, clinical data)

high grade tumor

Mouse xenograft

Avatar
Comprehensive and Integrative Genomic Characterization of Diffuse Lower Grade Gliomas

Submitted by The Cancer Genome Atlas Network

* Published in NEJM

* LM Poisson, T Mikkelsen, L Scarpace, A Raghunathan
Cancer Biorepository
NEW CLINICAL TRIALS

Interim analysis of the EF-14 trial: A prospective, multicenter trial of NovoTTF-100A together with temozolomide compared to temozolomide alone in newly diagnosed glioblastoma
Following excitation with blue light emitted from a special filter attachment on the operative microscope, the PpIX, which has accumulated selectively in malignant tissue, emits a red-violet light enabling the surgeon to resect the red-violet tumor tissue in a gross total fashion.
Targeted Intra-operative Gene Therapy
What’s Old is New Again: Retroviral Gene Transfer

- Unlike conventional cancer treatments (cytotoxic chemotherapy and radiation therapy) gene transfer can enable delivery of high concentrations of cancer killing drugs selectively to cancer tissue while leaving healthy tissue unharmed.

- The genes serve as the instructions for producing therapeutic proteins that are designed to kill cancer cells directly, with fewer side effects.

Tocagen Surgery Trial: UCLA, Cleveland Clinic, UCSF, HFHS
Future National Cancer Landscape
• Significant commitment to infrastructure, research, recruitment of cancer superstars: *Massive investment for massive reward*
• Given IOM report, big risk of losing current ground if we don’t invest now
• National presence trumps local competitors: *Halo effect for entire HFHS*
Introducing a New Cancer Center at Henry Ford Hospital
Coming 2018...
Henry Ford Cancer Center