

5-year Capital Planning

Preparing for Disruption, Growth, and Innovation

Tim Remus, PhD

Senior Director, Sg2





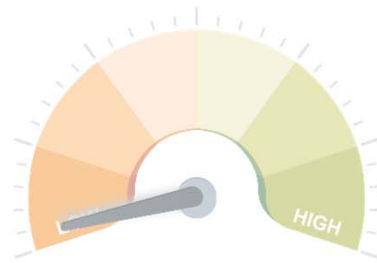
Preparing for Site of Care Shifts

Payers Are Making Bold Moves Regarding Site of Care

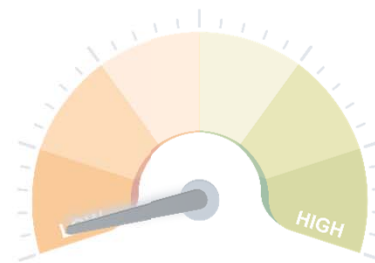
SHIFTING SITE OF CARE RISK



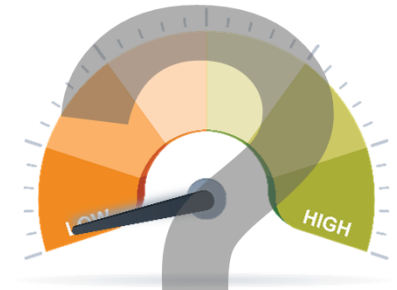
Advanced Imaging



Autoimmune Disorders



Chemotherapy



Radiation Therapy

Services

CT, MR, PET

BDAID
(eg, Remicade)

Infused therapies

External beam
radiation therapy

BDAID = biologic drugs for autoimmune disorders.

**CASE
STUDY**

Hospital-based Radiation Programs May Be Faced with Shifting Volumes in the Future

Radiation Therapy Center



8,910
treatments
per year

32%

Percent of total
Radiation
treatments
delivered at non-
hospital sites

Office/Clinic Infusion Center



10%

Additional commercial
treatments shifted to
non-hospital site


Source: IMV. Radiation Therapy Benchmarks 2017.

Confidential and Proprietary © 2018 Sg2

CASE STUDY

Hospital-based Radiation Programs May Be Faced with Shifting Volumes in the Future

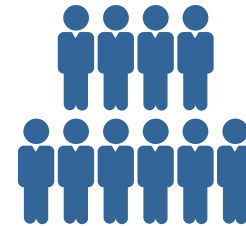
Capacity

 **+890**
open
treatment slots



New Patients Needed

 **+30–45**
new
oncology patients



Source: IMV. Radiation Therapy Benchmarks 2017.

Now Is the Time to Think About Your Future Strategy

A. If you are in a competitive market.

B. If your radiation program is at capacity.

C. Will your payers dictate site of service?

D. If you want to maintain status quo...

- Look for a “work-around”?

- Become the preferred provider in

- Consider a regional strategy to radiation oncology
- Site-neutrality levels the playing field moving forward anyways

- Be proactive, negotiate better (ie, clinic) rates.
- Payers won't negotiate after the fact!

Make the best choice with the information you have.

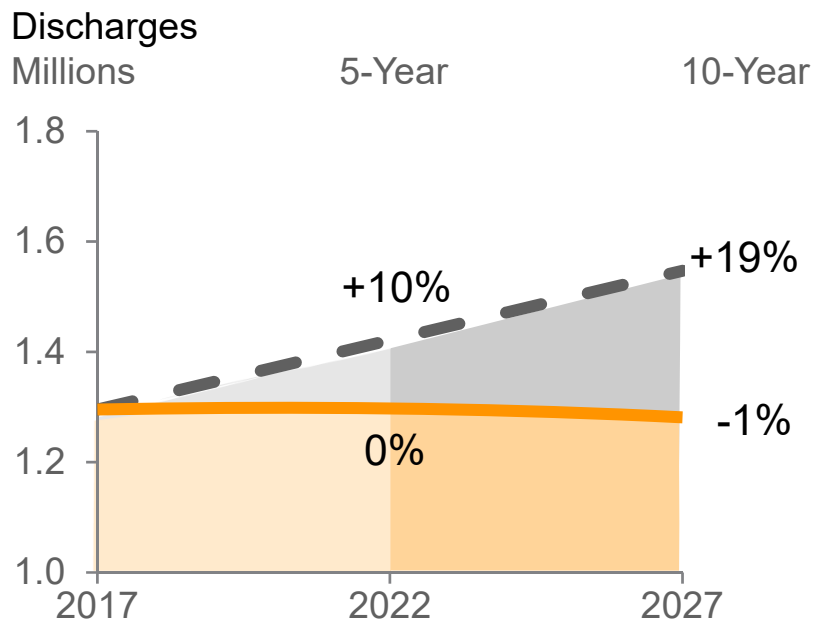


Capturing Smart Growth Opportunities

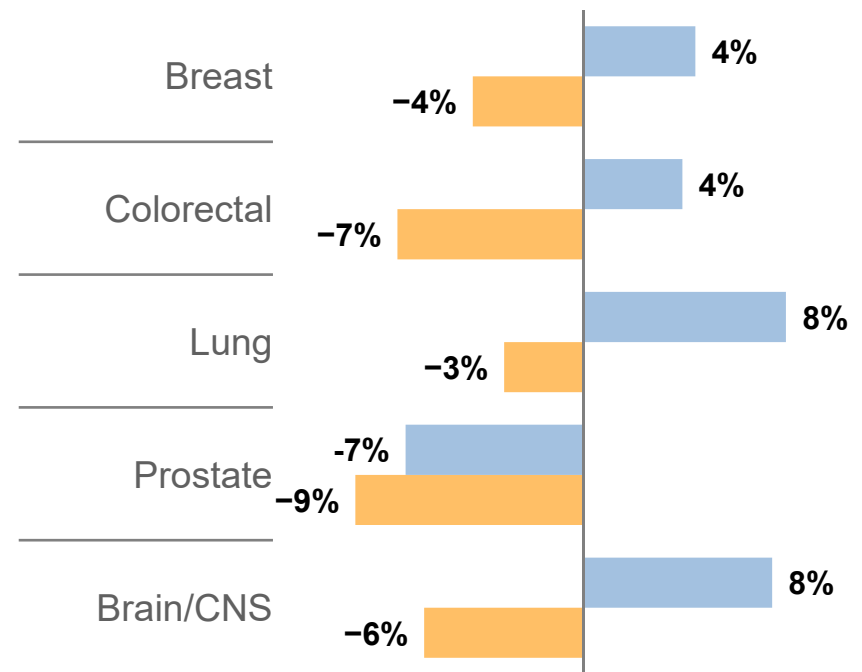


Inpatient Cancer Discharges Decline; Growth Opportunities Lie In Surgical Procedures

Cancer Inpatient Forecast US Market, 2017–2027



5-year Inpatient Cancer Discharges by Tumor Type, 2017–2022



■ Sg2
 ■ Population-Based

■ Medical Discharges
 ■ Surgical Discharges

Note: Analysis excludes 0–17 age group.

Sources: Impact of Change® 2017; HCUP National Inpatient Sample (NIS). Healthcare Cost and Utilization Project (HCUP) 2014. Agency for Healthcare Research and Quality, Rockville, MD; OptumInsight, 2015; The following 2015 CMS Limited Data Sets (LDS): Carrier, Denominator, Home Health Agency, Hospice, Outpatient, Skilled Nursing Facility; Claritas Pop-Facts® 2017; Sg2 Analysis, 2017.

Confidential and Proprietary © 2018 Sg2



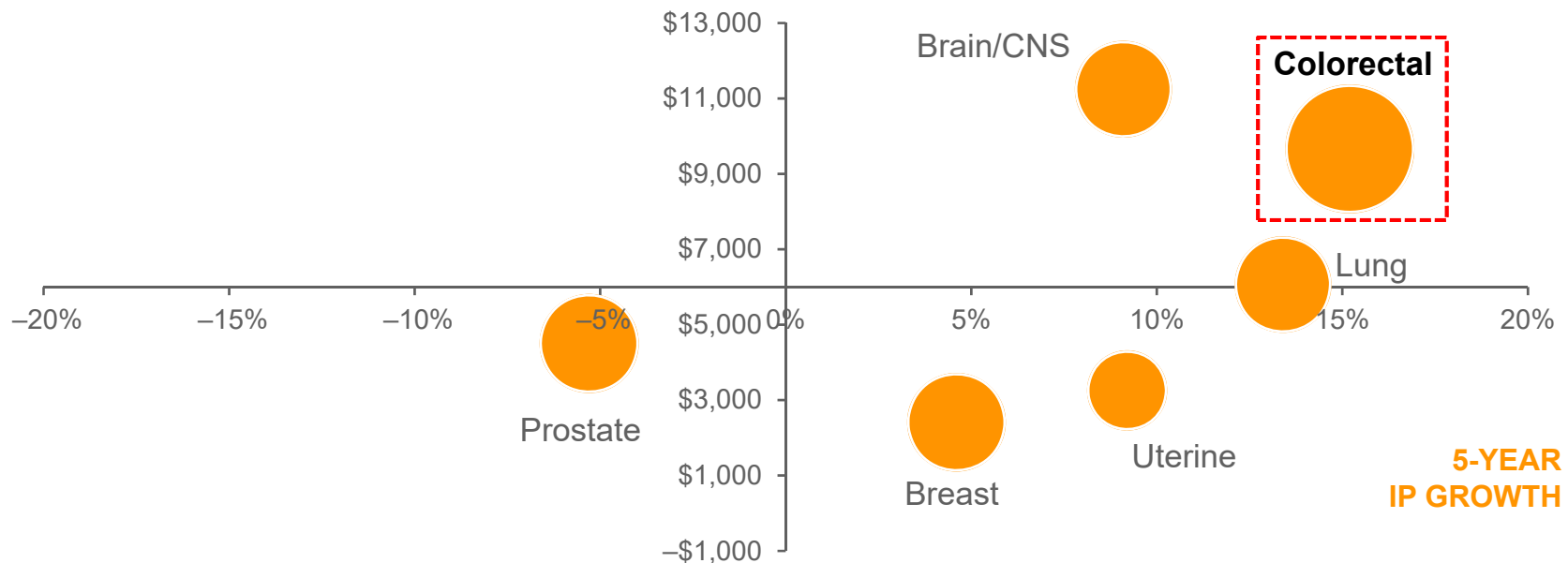
Pursuing Smart Inpatient Growth Opportunities

Inpatient Growth and Financial Performance

STRONG FINANCIALS; LOW IP GROWTH RATE

STRONG FINANCIALS; HIGH IP GROWTH RATE

AVERAGE CONTRIBUTION MARGIN/CASE



LOW FINANCIALS; LOW IP GROWTH RATE

LOW FINANCIALS; HIGH IP GROWTH RATE

CNS = central nervous system; GI = gastrointestinal.

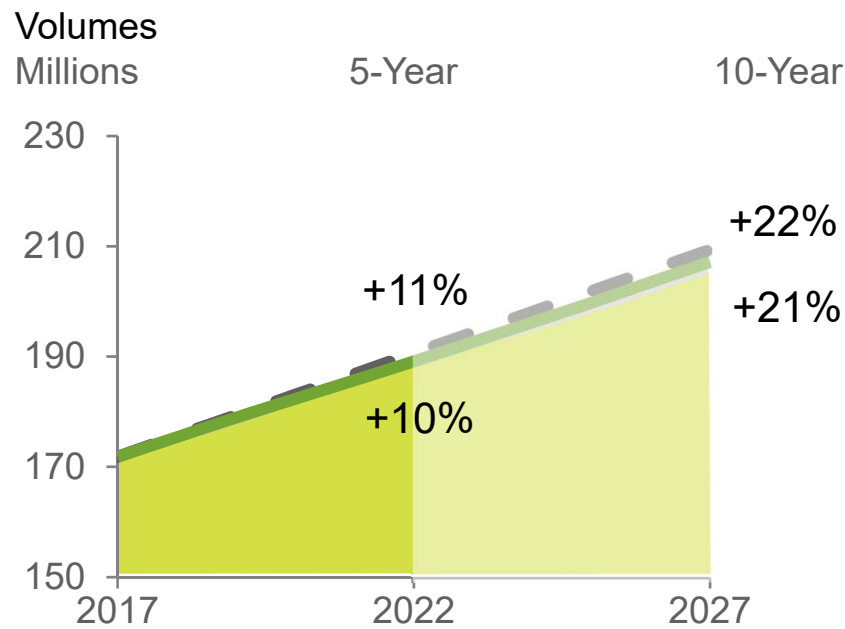
Sources: Sg2 Comparative Database, 2013; Impact of Change® v13.0; NIS; Sg2 Analysis, 2014.

Confidential and Proprietary © 2018 Sg2

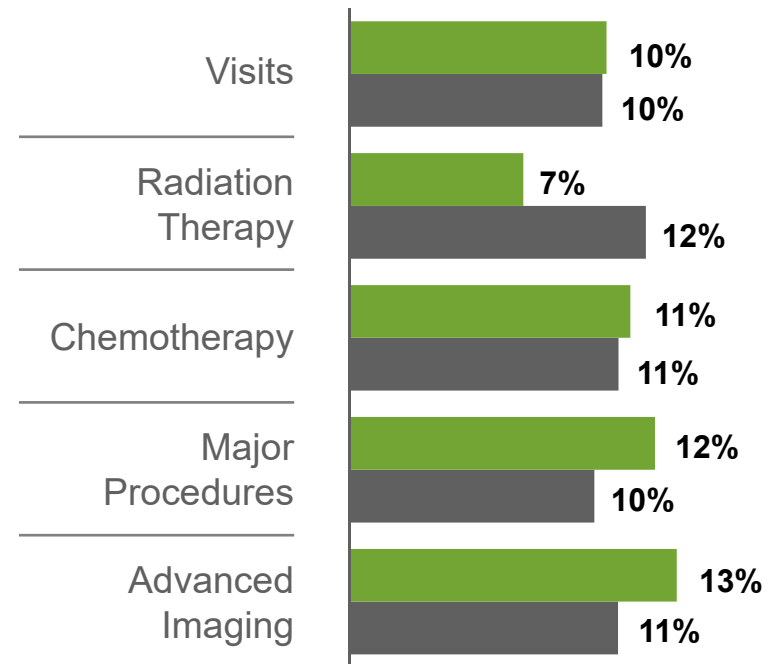


Changing Chemo and Radiation Therapy Delivery Methods Soften Overall Outpatient Demand

Cancer Outpatient Forecast US Market, 2017–2027



5-year Outpatient Growth by Procedure 2017–2022



■ Population-Based Forecast ■ Sg2 OP Forecast

Note: Analysis excludes 0–17 age group. Advanced imaging includes positron emission tomography, CT and MRI. Visits includes E&M visits. **Sources:** : Impact of Change® 2017; HCUP National Inpatient Sample (NIS). Healthcare Cost and Utilization Project (HCUP) 2014. Agency for Healthcare Research and Quality, Rockville, MD; Sg2 Analysis, 2017.



Overall Chemotherapy Forecast Softens; Targeted Therapies and Innovation Drive Early Growth

Oral Chemotherapy

- Robust drug pipeline.
- Barriers to adoption include potential revenue loss, higher costs to patients, and patient adherence.

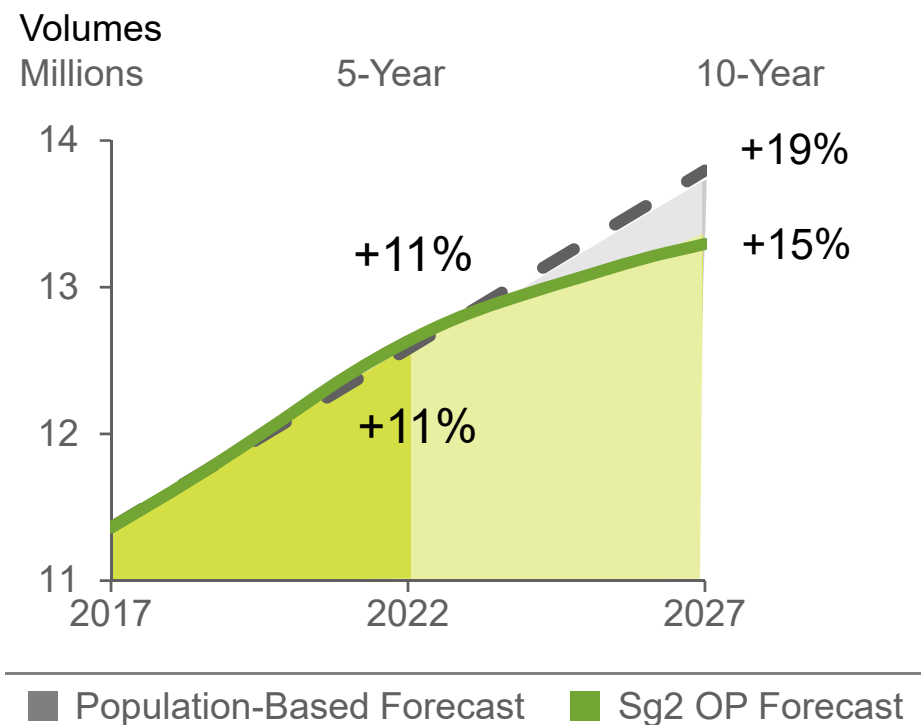
Immunotherapy

- Estimated to treat more than 50% of cancers by 2026.
- Growth in melanoma, lung, bladder, and rectal cancers.

Future Demand

- Balance infused versus oral therapies, impact of targeted and immunotherapies, and changing practice patterns at EOL

Outpatient Infused Chemotherapy Forecast US Market, 2017–2027



EOL = end of life; Sources: Impact of Change® 2017; HCUP National Inpatient Sample (NIS). Healthcare Cost and Utilization Project (HCUP) 2014. Agency for Healthcare Research and Quality, Rockville, MD; Sg2 Analysis, 2017.



Planning for Technology and Innovation

Genetics and Gene Therapies



AVAILABLE



DEVELOPING

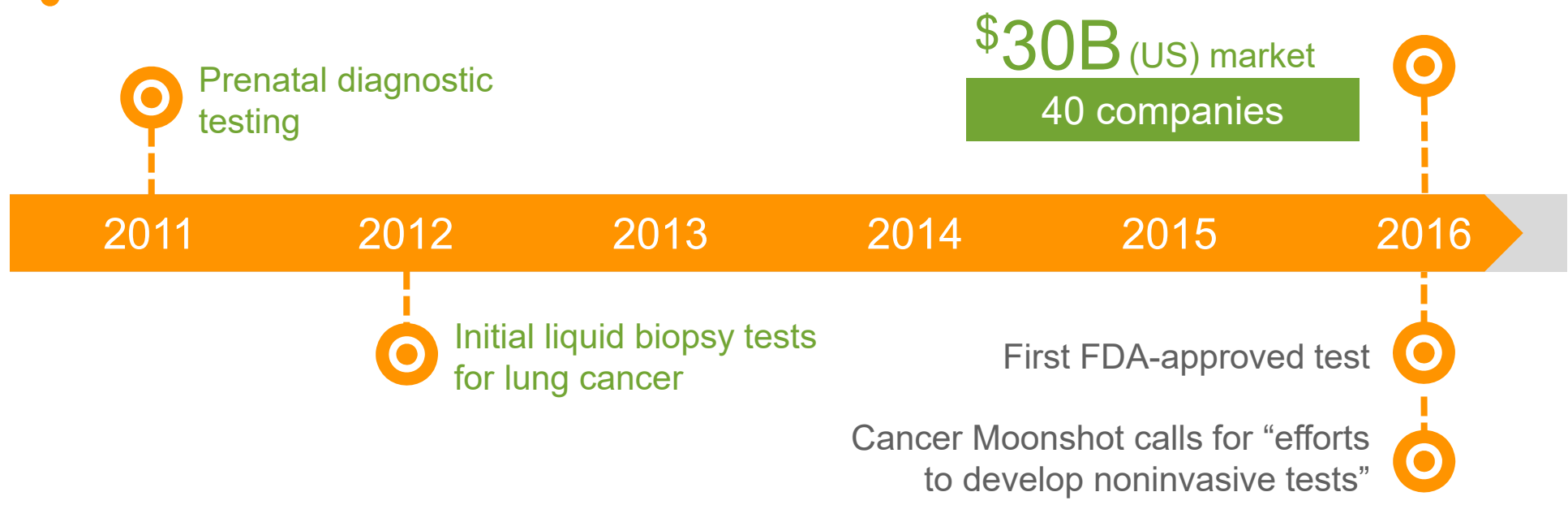


RESEARCH



AVAILABLE

Liquid Biopsy Tests Are Now 'Mainstream'



CURRENT IMPACT

Noninvasive	Inform treatment	Repeatable
-------------	------------------	------------

Source: Chen C. Bezos, Gates chase dream of a blood test that detects cancer. Bloomberg: April 6, 2016.



Will Liquid Biopsy Will Drive Down Lung Biopsies?...



Lung Biopsy

Percutaneous Biopsy Volume

- Lung cancer = 15% of total percutaneous biopsy volume
- Potential decline of 5% in the next 3–5 years; more later



...How Will They Impact Lung Cancer Therapies?...



Growth in Lung Cancer Surgery

- ↑ • Sg2 projects **27%** growth in lobectomy (10-year).

Growth in Lung Cancer Treatment

- ↑ Targeted Therapies
 - Sg2 projects **19%** growth in chemotherapy (10-year).
- ↑ Radiation Therapy
 - Sg2 projects **72%** growth in SBRT (10-year).

SBRT = stereotactic body radiation therapy. **Sources:** Impact of Change®, 2017; HCUP National Inpatient Sample (NIS). Healthcare Cost and Utilization Project (HCUP) 2014. Agency for Healthcare Research and Quality, Rockville, MD; OptumInsight, 2015; The following 2015 CMS Limited Data Sets (LDS): Carrier, Denominator, Home Health Agency, Hospice, Outpatient, Skilled Nursing Facility; Claritas Pop-Facts®, 2017; Sg2 Analysis, 2017.

Novartis and Kite Break Ground with FDA Approved CAR T-cell Therapies

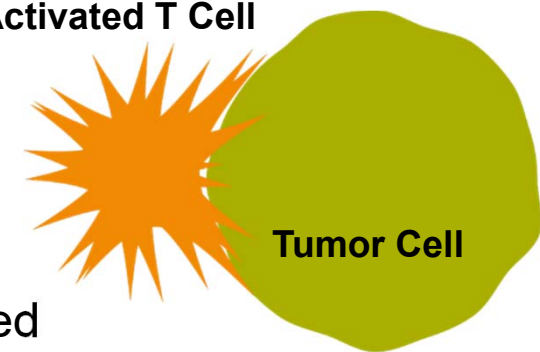


DEVELOPING

Description

Enable the immune systems ability to attack B-cell malignant tumors by infusing genetically engineered T-cells back into the patient

Activated T Cell



What Is the Current Impact?

- Novartis – ALL; Kite (Gilead) – NHL both FDA Approved
- Numerous trials in CLL, MM, AML, and 60+ trials in solid tumors
- Pending long-term response rates; maybe an alternative to BMT

Tumor Type	Annual Incidence	2017 IP/OP BMT Volume	% of Total BMT Volume
Leukemia's	62,130	4371	28%
Hodgkin's Lymphoma	8,260	842	5%
Multiple Myeloma	30,280	6445	42%
Non-Hodgkin's Lymphoma	72,240	3320	21%
TOTAL	172,910	15,509	100%

>50% of BMT volume

ALL = acute lymphoblastic leukemia; CLL = chronic lymphocytic leukemia; NHL = non-Hodgkin lymphomas; MM = multiple myeloma; AML = acute myelogenous leukemia.
 Source: American Cancer Society. 2017 Facts and Figures; Sg2 Impact of Change Forecast, 2017.

Potential Impact on Future Chemo and Radiation Therapy Volumes



What Is the Future Impact?

Tumor Type	Number of Clinical Trials	Phase	% of Total Chemotherapy	% of Total Radiation Therapy
Breast	13	Phase I/II	17%	22%
Gyn Onc	10	Phase I/II	5%	3%
Head and Neck	2	Phase I/II	2%	9%
Pancreatic	15	Phase I/II	4%	1%
Brain	9	Phase I/II	1%	5%
Prostate	3	Phase I/II	8%	22%
Lung	12	Phase I/II	10%	9%
Colorectal	5	Phase I/II	12%	4%
Liver	18	Phase I/II	1%	2%

Roadblocks to Solid Tumor Adoption Are Not Trivial

- Finding tumor specific (ie, unique) antigens and tumor heterogeneity
- Penetrating immunosuppressive microenvironment
- Delivering T-cells directly to the tumor and extending T-cell persistence

ALL = acute lymphoblastic leukemia; BMT = bone marrow transplant; CLL = chronic lymphocytic leukemia; NHL = non-Hodgkin lymphomas.

Source: ClinicalTrials.gov.

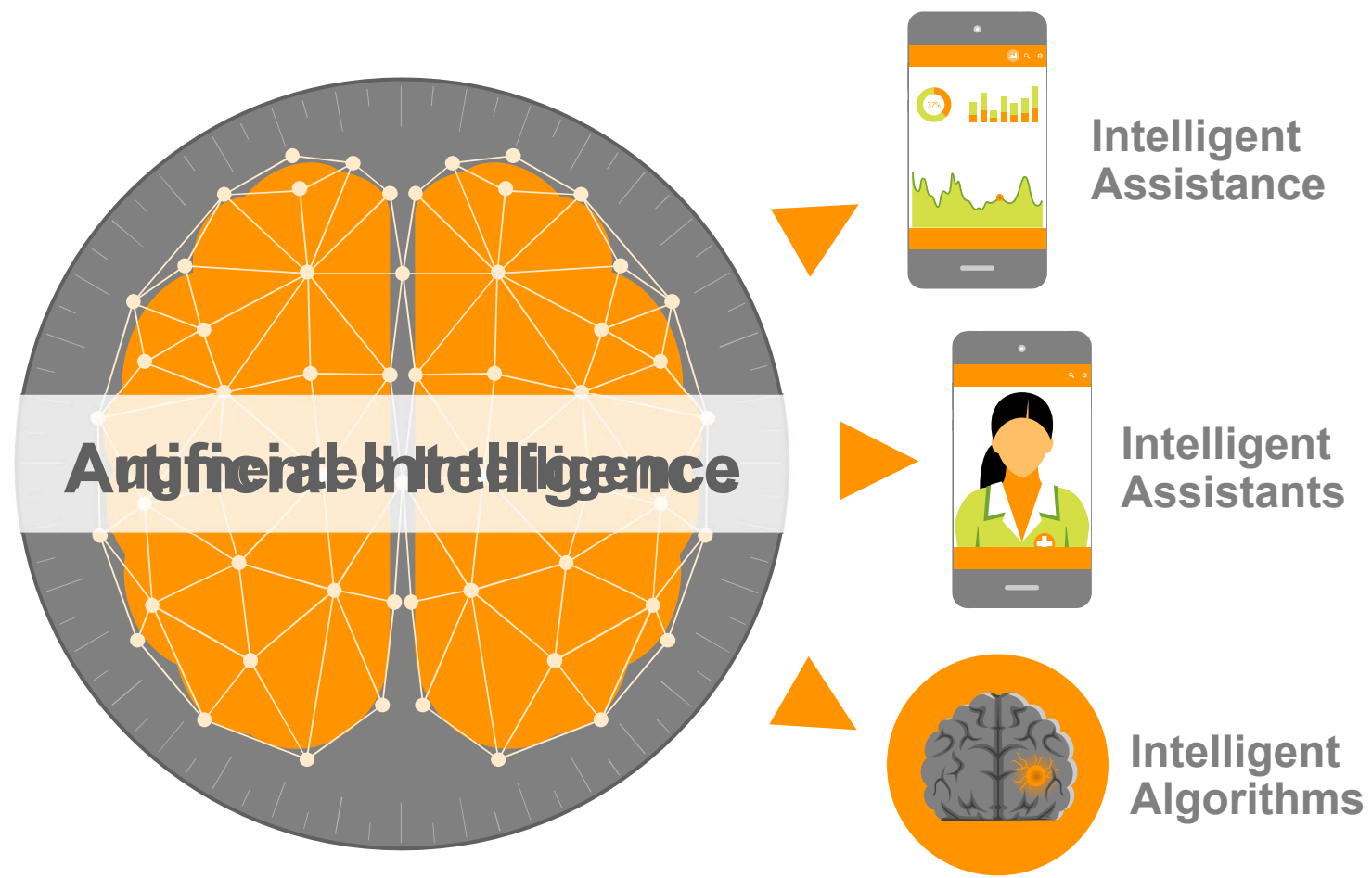


Artificial Intelligence



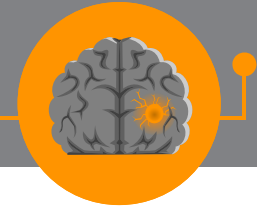
RESEARCH

Ignore the Hype—Focus on the End Use



Source: Adapted from: Friedman TL. *Thank You for Being Late*. Farrar, Straus & Giroux: November 2016.
Confidential and Proprietary © 2018 Sg2

Turn AI Into Intelligent Algorithms



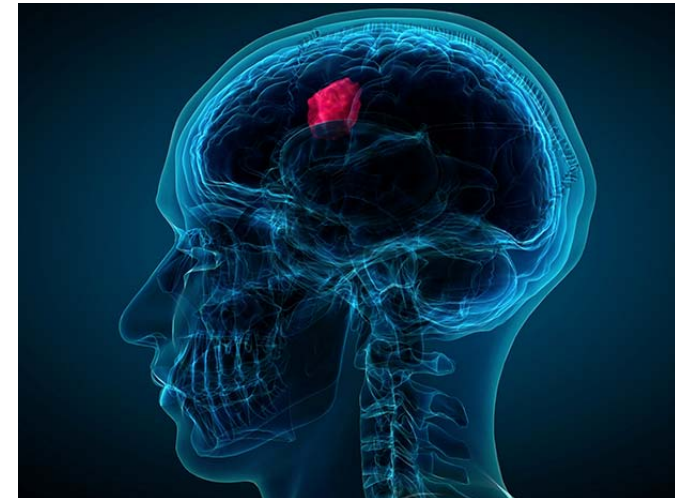
- AI-powered, machine learning applications address specific clinical problems and speed up or facilitate decision making in real time.



Artificial Intelligence Is Making A Move Into Radiation Therapy Treatment Planning



- **AI Works Alongside Doctors to Improve Radiation Treatment Planning Process**
 - Quickly differentiate tumor or healthy tissue on each image
 - Easily performs OAR analysis
 - Develop machine learning algorithms
 - Rely upon database of high-quality, previous patient's treatment plans



RaySearch

RayStation/UHN

- Uses machine learning and image processing from thousands of previous plans
- Integrated into existing RayStation platform

Microsoft

InnerEye/Addenbrooke

- Assistive AI to treat cancer and monitor progress
- Goal is to have AI do 95% of work and shorten time from hours to minutes

Google

DeepMind Health/UCLH

- Partnership to develop new treatment planning tool
- 700 former head/neck patients
- 75% reduction in treatment planning time to 1hr

OAR = organs at risk; UCLH = University College London Hospital; UHN = University Health Network
Sources: University College London Hospital; RaySearch Laboratories, Google DeepMind Health, LLC.

QUESTIONS

