ACCURAY

A Definitive Guide to a New Reality

Thriving Under the Radiation Oncology Alternative Payment Model (RO-APM)

Contents

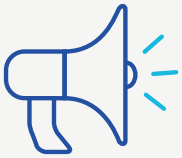
INTRODUCTION

RO-APM: an Inflection Point for the Field

The Centers for Medicare and Medicaid Services (CMS) set the radiation oncology industry abuzz with the announcement of the final rule of the Radiation Oncology Alternative Payment Model (RO-APM). The RO-APM's approval is the latest in a growing list of efforts aimed at modernizing the way patient care is delivered, and it signals a clear inflection point: the field of radiation oncology is shifting to adopt the principles of value-based care, and that shift will have profound impacts on the clinical and economic realities for everyone in the field.

INTRODUCTION

This eBook Provides a Clear Perspective on Three Key Facets of the RO-APM



WHAT IT SAYS:
The specifics of the recent RO-APM ruling and the initial test period.

WHAT IT MEANS:
How the RO-APM changes economic considerations for practices, how it impacts clinical best practices, and how forward-thinking radiation oncology (RO) practices will adapt to thrive under these new realities.

WHAT IT REQUIRES:
How Accuray technologies provide unique capabilities that specifically fit the requirements of the RO-APM — designed to give Accuray customers and users of Accuray systems the confidence to achieve the core goal of reducing the cost of delivering radiation therapies, while protecting patient safety and ensuring the very best clinical outcomes.

WHAT IT SAYS

An Overview of the Radiation Oncology Alternative Payment Model

On September 18, 2020, the Centers for Medicare & Medicaid Services (CMS) and the Center for Medicare and Medicaid Innovation (Innovation Center) announced their approval of the Alternative Payment Model for Radiation Oncology (RO-APM). Here are the essential details regarding the RO-APM.

WHO is covered by the RO-APM?

The initial five-year test period for the model will include 30% of all radiation oncology episodes paid for by Medicare. The RO-APM will apply to those beneficiaries under Medicare A and B only. CMS will start by implementing RO-APM in pre-selected zip codes, and participation is mandatory.

WHEN does the test period begin?

The RO Model has a 4.5-year Model performance period that begins on July 1, 2021 and runs through December 31, 2025.

WHAT is the purpose or goal?

CMS states that the goal of the RO-APM is to "reduce Medicare expenditures while preserving or enhancing the quality of care."[1] CMS estimates cost savings of more than $230M — representing a 3% decrease in expenditures — over the five-year period.

WHAT IT SAYS

WHY is CMS focusing on radiation oncology?

Increasing cancer rates and a relatively high cost of care makes the overall field of oncology a prime target for uncovering new efficiencies by applying the principles of value-based care. Estimates suggest that up to 60% of diagnosed cancer patients will require some form of radiotherapy.[2]

CMS has been working on an episode-based payment model for radiation oncology for nearly five years. A 2017 report from the CMS Innovation Center identified three key factors that indicate the need for reformed payment and service delivery in Radiation Oncology:[3]

1. **Lack of site neutrality for payments**
   RO care is reimbursed at different levels depending on whether it is delivered at hospital outpatient departments (HOPDs), physician group practices (PGPs) or freestanding radiation therapy centers. This creates site-of-service payment differentials, which "may incentivize Medicare providers and suppliers to deliver radiotherapy services in one setting over another, even though the actual treatment and care received by Medicare beneficiaries for a given modality is the same in both settings."[4]

2. **Lack of clinical care consistency / payments based on volume**
   Under the fee-for-service (FFS) payment model, providers are paid incrementally based on the services they provide. This corresponds with radiation oncology clinical care patterns that vary widely — from the treatment modalities used, to more specific clinical decisions — despite established clinical guidelines and evidence-based best practices.

3. **Coding challenges**
   Because of the increasing use of new technologies and treatment modalities, CMS identified unique difficulties in coding and setting appropriate payment rates for radiation oncology services. This has led to unreliable and/or inconsistent valuation of RO services.

The net impact of these three factors are reimbursement differentials that create financial incentives that are not clearly aligned with clinical guidelines, best practices and evidence-based care principles. As CMS states, under the existing reimbursement model "incentives are not always aligned with what is clinically appropriate for the beneficiary."[5]

WHAT IT SAYS

HOW does the RO-APM aim to solve challenges?

The RO-APM rule establishes a prospective, episodic payment methodology that will establish an average payment for radiation oncology over a five-year horizon. The payment methodology will drive towards neutrality in reimbursement regardless of treatment technique, the number of fractions prescribed, and the setting or location where the care is delivered. The episode-based payments will be based on national historical base rates at the tumor-site-specific level (see Indications in the table), and will equally consider the various modalities/therapy types (see Modalities in the table) commonly used to treat each cancer type. Adjustments will apply based on specific participants' case mix, historical experience and geographic location. Finally, payments will be linked to clinical quality, patient safety and patient experience metrics to further hone in on the ideals of value-based reimbursement. Two key factors that can add to the variation in payment under the RO-APM are based on historical experiences and case mix that help to determine the status of a radiation oncologist as an Efficient Provider or an Inefficient Provider.

By combining these factors, the RO-APM serves to focus clinical decision-making on established guidelines and best practices, while incentivizing clinical efficiencies and cost-effectiveness where possible.

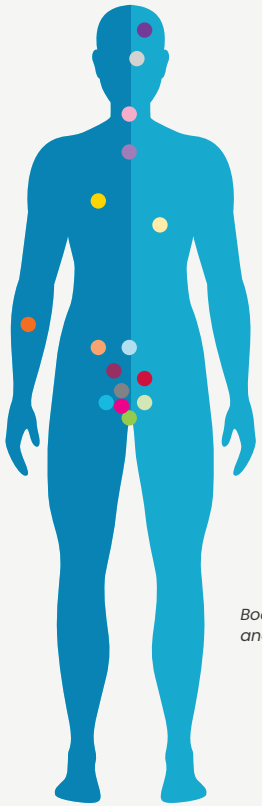
Episode-based payments would cover most radiation oncology services provided within a 90-day time period.*

MODALITIES

- 3DCRT
- IMRT
- SRS
- SBRT
- PBT
- IGRT
- Brachytherapy

INDICATIONS

- Anal Cancer
- Bladder Cancer
- Bone Metastases
- Brain Metastases
- Breast Cancer
- Cervical Cancer
- CNS Tumors
- Colorectal Cancer
- Head & Neck Cancer
- Liver Cancer
- Lung Cancer
- Lymphoma
- Pancreatic Cancer
- Prostate Cancer
- Upper GI Cancer
- Uterine Cancer



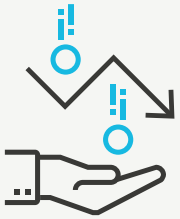
Body represents male and female indications and is intended for illustration purposes only.

*Initial treatment planning, followed by the delivery of the first treatment fraction (within 28 days), will trigger this 90-day period.

WHAT IT MEANS

RO-APM Reshapes the Future of Radiation Oncology

The significant changes to reimbursement methodology under the RO-APM will undoubtedly transform the practice of radiation oncology in the U.S. in profound ways. While every practice will feel unique pressures based on their specific case-mix and other variables — and while the impacts of the RO-APM will be compounded by other aspects of the U.S. healthcare system that remain in a state of dynamic uncertainty — the implementation of the RO-APM signals three dramatic shifts for the field of radiation oncology.

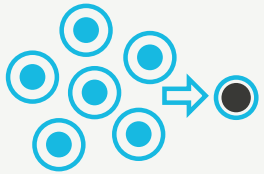


1

Declining reimbursement challenges traditional fractionation

2

A new equation for cost of care

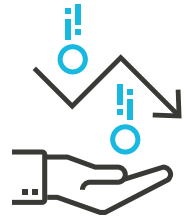


3

Hypofractionation becomes an essential treatment modality*

*In those indications in which they are clinically appropriate.

WHAT IT MEANS



1 Key Shift #1
Declining Reimbursement Challenges Traditional Fractionation

Payments Under the RO-APM Weigh Treatment Modalities Equally

As previously mentioned, the episode-based payment rates of the RO-APM are based on a number of factors, including the tumor-site-specific indication. These payments do not vary based on the modality used or the fractionation scheme selected for treatment of an indication.

Conventional Fractionation Sees Deep Reimbursement Cuts

The basic math of this equation means that, for many cancer types, conventional fractionation schedules see deep reimbursement cuts. Put another way, under the new model, the cost to deliver additional fractions is owned by the provider — not passed along to the payer and/or patient.

The chart below shows the current fee-for-service reimbursement rates alongside the estimated APM reimbursement rate:

	CONVENTIONAL FRACTIONATION	FEE FOR SERVICE	ESTIMATED RO-APM*	DIFFERENCE	% DECREASE
PROSTATE CANCER*	IMRT 40x Fractions	$29,076.00	$24,702.00	$4,374.00	15%
LUNG CANCER*	IMRT 30x Fractions	$22,580.00	$14,898.00	$7,682.00	34%
BREAST CANCER*	IMRT 30x Fractions	$14,436.00	$12,837.00	$1,599.00	11%

[5]

The elimination of the reimbursement differential that currently favors conventional fractionation creates new challenges, questions and concerns for radiation oncology practices that predominantly offer this traditional treatment modality.

*Analysis based on following assumptions: A historically Inefficient Provider, at Year 5 of the model with a Trend Factor = 4%, No Geographic Adjustment, Case Mix = 2%, Historical Experience Technical = +.11, Historical Experience Processional = +.14, all withholds and adjustment, no quality/pt experience recoupment, no incorrect payment recoupment.

WHAT IT MEANS

2

Key Shift #2

New Equations For Cost of Care and Total Cost of Ownership

Practices Must Focus on Expenses — While Making Smart Investments

Reductions in reimbursement rates for common radiation oncology treatment modalities put new focus on the expense side of economic equations for radiation oncology practices. But practices can't simply tighten the purse strings. Now, more than ever, they need to continue investing in new technologies that push treatment efficacy and efficiency forward — to drive better outcomes for their patients, to differentiate their practices and drive patient volume, and to begin achieving the objectives of value-based care delivery under the RO-APM.

Specialized Systems Less Feasible Under New Model

While the RO-APM will undoubtedly inspire — and require — practices to make investments in advanced treatment technologies, we believe the episodic reimbursement model will make many highly specialized systems and technologies significantly less feasible from an economic perspective. Because payments will not be differentiated based on the specific treatment modalities — but instead driven by outcomes data, pushing toward standardization and evidence-based care — practices may not be able to count on higher reimbursement rates to offset the high costs of extremely specialized treatment technologies, such as proton therapy and magnetic resonance imaging guided radiation therapy (MR-gRT or MR linacs). Most likely, these specialty systems and technologies will only be viable in unique specialty clinics — and the academic and research environments focused on nurturing and testing innovation.

WHAT IT MEANS

2 Key Shift #2

New Equations For Cost of Care and Total Cost of Ownership

New Paradigm: Time-Driven Activity-Based Costing (TDABC)

As forward-thinking practices evaluate new tools and technologies, they are recognizing that the costs surrounding the care delivery workflow — treatment planning time, quality assurance (QA) time, patient prep time, treatment delivery time, etc. — often carry more weight in determining the long-term cost-effectiveness of a treatment system than the cost of the machine itself. These complex workflow-based expense considerations drive a new paradigm in calculating the cost of care: time-driven activity-based costing, or TDABC.

TDABC: A Complex Acronym for a Simple (and Useful) Accounting Method

TDABC is simply a cost accounting method designed to measure the time and cost of delivering various forms of care, including radiation therapy. It is designed to give providers insight and control as the U.S. healthcare market migrates to value-based care. These insights are important, because, in general, the cost of providing medical treatments has historically been neither transparent nor well understood. Deployed properly, TDABC enables analytics around productivity, effectiveness, cost and margins for the procedures and processes surrounding specific medical interventions.

Deploying an effective TDABC model requires collaboration between financial, clinical and operational team members. In general terms, the first step in building the model is creating a process flow map to identify the resources and time required to perform a specific activity, such as radiation therapy. Accurate data collected from this workflow map allows for accurate cost calculations for the procedure.

2 Key Shift #2

New Equations For Cost of Care and Total Cost of Ownership

The Hidden Factor that Drives Up System Cost

A critical — and often overlooked or underestimated — component of TDABC calculations are machine QA activities for radiation therapy systems and technologies. Surprisingly, QA times can vary greatly from one brand of radiation therapy system to another. Unlike patient-specific quality assurance, which is a direct cost, machine QA is a fixed cost — and QA processes for machines must be performed regardless of patient volume or number of fractions. The impact of QA costs in the overall cost calculation is typically significant. As radiation oncology practices consider investing in new systems and technologies as part of their value-based care strategies, they must carefully account for this ongoing, often overlooked cost.

WHAT IT MEANS

3 Key Shift #3
Hypofractionation Becomes an Essential Modality

Current Reimbursement Differential Creates a Barrier to More Precise Treatment

Adoption and utilization of hypofractionated radiotherapy — delivering a higher dose per fraction across fewer total fractions — continues to accelerate across radiation oncology practices in the U.S. Hypofractionated treatments range from small increases in dose above 2 Gy per fraction all the way to ultra-hypofractionated (aka extreme hypofractionated) delivery up to and including stereotactic radiosurgery (SRS), stereotactic radiation therapy (SRT), stereotactic body radiotherapy (SBRT), and stereotactic ablative radiotherapy (SABR). Yet, under the current fee-for-service (FFS) reimbursement model, a reimbursement differential exists between hypofractionation and conventional fractionation. As it stands, the current differential supports long-term utilization of low-tech equipment that can't support the precision needed to deliver any form of hypofractionated treatments. In other words, under the current FFS system, older, less-precise technology — requiring weeks of low-dose radiation — is rewarded over high-performance radiation therapy systems that achieve equivalent to superior outcomes following 1-5 treatment sessions.

Growing Evidence Supports Adoption of Hypofractionated Radiotherapy

A growing body of clinical evidence supports hypofractionation as a proven treatment modality, delivering clinical outcomes as good as those from conventionally fractionated treatments while dramatically reducing the number of treatment fractions (dramatically lowering the total cost of care) and giving patients and their support systems the benefit of fewer clinic visits and a faster return to everyday life.

Hypofractionation in the Age of Value-Based Care
READ THE FULL EBOOK

WHAT IT MEANS

3 Key Shift #3
Hypofractionation Becomes an Essential Modality

RO-APM Establishes Hypofractionation as Leading Treatment Modality

The RO-APM eliminates the hypofractionation reimbursement gap, eliminating this barrier to adoption. The episode-based reimbursement model directly incentivizes the use of hypofractionation wherever clinically indicated, rewarding its clinical efficiency. Hypofractionation reduces the number of fractions delivered by as much as 80% compared to conventional fractionation, with mounting expense-side savings in the cost of delivering significantly fewer fractions.[6] Taking a wide-angle view brings the economic advantages of hypofractionation into clearer contrast, as existing TDABC studies demonstrate that hypofractionated radiotherapy is significantly less costly to deliver than other treatment modalities — reducing the total cost to deliver treatment by around 50%.[7]

The basic math is simple:

- Compared to the reimbursement received with conventional fractionation in the FFS model, the APM will offer a lower, fixed amount of reimbursement for a given indication.
- This reduced reimbursement will result in net losses or reductions in profitability for conventional fractionation schedules.
- Hypofractionation offsets these reductions in income by lowering the costs to deliver the total course of treatment.
- Radiation oncology practices can eliminate net losses or reductions in profitability resulting from APM through the use of hypofractionation and its associated cost savings.

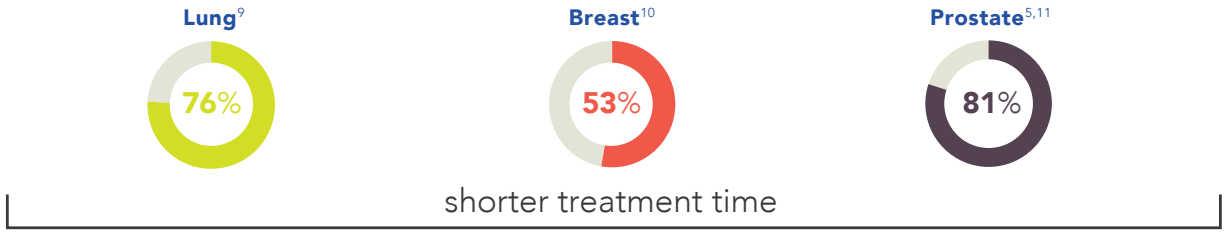
CMS directly advocates for the shift to using fewer fractions wherever clinically indicated:

"For example, for some cancer types, stages, and beneficiary characteristics, a shorter course of RT treatment with more radiation per fraction may be clinically appropriate."[8]

3 Key Shift #3
Hypofractionation Becomes an Essential Modality

A DRAMATIC REDUCTION IN CANCER TREATMENT TIMES

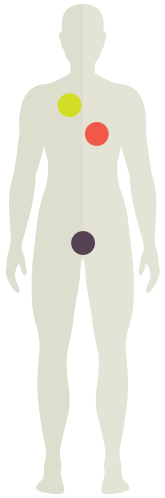
Hypofractionation typically reduces treatment times dramatically for a number of different indications:



Greater Confidence in Precision — Greater Efficiency Gains

RADIOTHERAPY TREATMENT OF PROSTATE CANCER

Ultra-Hypofractionation	Conventional Fractionation
≤5 FRACTIONS	**29 - 40 FRACTIONS**



53 – 81%
Reduction in time for total course of treatment[5,8,9,10]

FASTER
Higher dose rates per fraction dramatically reduces overall fractions

~ 50%
Reduction in cost to complete the total course of treatment[6]

LOWER COST
Fewer clinical actions reduce the total cost to treat a patient

3 Key Shift #3
Hypofractionation Becomes an Essential Modality

Zero Room for Patient Safety Risks

As radiation oncologists consider declining reimbursements, new financial incentives and evolving economic pressures, the pressing concern remains: patient safety. This foundational mission of the field is further codified into the structure of the RO-APM: practices must meet established clinical quality metrics or face substantial reimbursement penalties and can face additional penalties if their patient experience scores fall short of standards.

But beyond the details of the RO-APM, radiation oncology practices know they simply cannot afford any risk to their reputations. Thus, while many radiation oncology technology vendors will rush to capitalize on the shift toward hypofractionation, radiation oncologists know they cannot afford to simply follow the trends — they must have complete confidence in any treatment modality they offer their patients.

Clinicians must have

FULL CONFIDENCE

in safe hypofractionated treatment and delivery

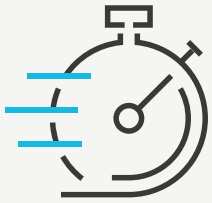
WHAT IT REQUIRES

Anticipating And Enabling The Future Of Radiation Oncology

The approval of RO-APM stands as a watershed moment that puts the field of radiation oncology on the path toward value-based care. But at Accuray, we've been on this path for decades. As a recognized leader in innovative cancer treatments, we've been investing in finding new ways to drive more efficient and cost-effective cancer care while protecting exceptional clinical outcomes — because we believe that better, faster, smarter cancer treatment technologies will enable clinicians to bring more precise and more personalized cancer care to more patients around the world. Based on this two-decade legacy of innovation toward the goals of value-based care, Accuray treatment delivery systems — the Radixact® and CyberKnife® Systems — deliver the two critical capabilities that radiation oncology practices need in order to achieve emerging clinical best practices, adapt to new economic realities and thrive in the new value-based care landscape.

Two Critical Capabilities for Radiation Oncology Practices:

1 **Delivering Hypofractionation with Confidence**



2 **Enabling Efficient Hypofractionation Workflows**

WHAT IT REQUIRES

Accuray Pioneered Hypofractionation and Remains the Leading Innovator

As the pioneer of stereotactic body radiotherapy (SBRT), Accuray technology was the first to make hypofractionation practical and safe* for any radiation oncology practice. For the last two decades, Accuray has remained the leading innovator in hypofractionation, continually developing and honing technologies that push the practice of hypofractionated radiotherapy forward. Today, Accuray technologies are supported by a broad range of clinical evidence demonstrating their safety and efficacy in delivering hypofractionated treatments.[1]

Accuray Precision Is Designed To Promote Safe Hypofractionation

By significantly increasing the dose per fraction, hypofractionation presents a greater risk of harmful side effects — if not delivered with extreme accuracy and precision.[11] Two decades ago, Accuray set about solving this challenge by creating delivery platforms designed to perform under the most stringent conditions:

1

Sub-millimeter precision:

To enable hypofractionation, clinicians must be confident that the radiation dose can conform as closely as possible to the target volume while minimizing the dose to healthy tissue.

2

Sub-millimeter accuracy:

To enable hypofractionation, clinicians must be confident that the treatment delivery system will deliver the dose as prescribed in the treatment plan.

3

Dose sculpting and manipulation:

To enable hypofractionation, clinicians must be confident that the delivery system can sculpt the radiation dose to match the shape of the target — no matter how irregular — while being able to deliver that dose from hundreds of angles to minimize unwanted radiation being delivered to healthy tissue or organs at risk.

4

Ability to synchronize with intra-fraction target motion:

To enable hypofractionation, clinicians must be confident that, in situations where the target is likely to move due to normal bodily processes, dose delivery can be adapted and synchronized in real time in order to minimize irradiation of healthy tissue.

5

Ability to adapt to inter-fraction changes in the target:

To enable hypofractionation, clinicians must have the option to quickly and easily adapt the plan to anatomical changes over the course of treatment. Changes may present rapidly and failure to accommodate for those changes can result in unwanted dose being delivered to healthy tissue.

Today, these core capabilities remain the foundation of the entirely unmatched abilities of Accuray treatment delivery systems to perform under the demanding conditions required for hypofractionation.

*Safe refers to the capability of Accuray delivery systems that use Synchrony to deliver synchronized dose delivery to a moving target with minimal margins enabling hypofractionated treatment schedules without additional risk to healthy tissues.

WHAT IT REQUIRES

1 Critical Capability #1
Delivering Hypofractionation With Confidence

CyberKnife® System

Radixact® System

CONFIDENCE IN PRECISION

The CyberKnife® S7™ System uses the world's only radiotherapy robot — capable of delivering thousands of non-isocentric, non-coplanar or coplanar beam angles — to deliver SRS and SBRT treatments precisely to any point on the body.

The Radixact® System uses true, 360-degree helical imaging and delivery to deliver dose from literally any angle, setting a new standard for delivery precision anywhere in the body and enabling IG-IMRT, SRS, SBRT and 3DCRT for the full range of indications.

CONFIDENCE IN DOSE SCULPTING

The CyberKnife System features the industry's only robotic-arm-mounted multi-leaf collimator, the Incise™ MLC, capable of advanced beam-shaping that enhances delivery precision. This dose-sculpting ability enables clinicians to create treatment plans with significantly smaller margins and sharp dose gradients, supporting hypofractionated treatment.

The Radixact System features an ultra-fast multi-leaf collimator and TomoEDGE™ dynamic jaws for enhanced beam-shaping. Together with true helical delivery, these capabilities enable clinicians to confidently create plans with smaller margins and sharp dose gradients, supporting hypofractionated treatment.

CONFIDENCE IN MOTION SYNCHRONIZATION

Accuray pioneered the first-of-its-kind Synchrony® technology on the CyberKnife System more than 15 years ago. Today, the CyberKnife S7 System leverages robotic precision to enable automatic and real-time 6D motion synchronization and delivery adaptation.

The Radixact System's helical delivery and dynamic beam-shaping capabilities enable automatic and real-time motion synchronization, including the ability to leverage the proven, industry-leading Synchrony technology for treatment delivery adaptation. PreciseART® technology enables highly automated, efficient plan adaptation for inter-fraction anatomical changes.

CONFIDENCE IN ACCURACY

The unparalleled combination of precise dose-sculpting, delivery adaptation, and real-time motion synchronization offered by both the CyberKnife and Radixact Systems give clinicians confidence that small-margin, sharp-gradient treatment plans are delivered accurately to minimize dose to healthy tissue and minimize side effects — empowering ultra-precise delivery of hypofractionated treatments.

WHAT IT REQUIRES

1 Critical Capability #1
Delivering Hypofractionation With Confidence

Synchronizing with Intra-Fraction Target Motion — in Real-Time

Accuray Synchrony®

Accuray pioneered Synchrony®, the industry's first and only true motion-synchronization technology, giving radiation oncologists the ability to precisely adapt and synchronize treatment delivery with patient and tumor motion in real time. Accuray motion synchronization technologies — available for both the CyberKnife® and Radixact® Systems — combine fully integrated imaging and indication-specific tracking applications to enable constant intra-fraction position tracking and automatic motion synchronization of the treatment delivery beam to the moving target without involvement of the patient or intervention by the technologist. This adaptive delivery capability gives radiation oncologists the confidence to deliver hypofractionated treatments while helping to protect patient safety by minimizing dose to healthy tissue and organs at risk.

Traditional Motion Forces Tradeoffs

Traditional approaches to motion management involve interrupting treatment delivery (i.e., gating, stopping to re-position the patient) or restraint devices that cause significant patient discomfort (i.e., respiratory compression devices, head frames, rectal balloons, etc.). Accuray motion synchronization technology enables continuous treatment delivery while giving the patient the comfort to behave naturally without requiring restraints.

Add-On Motion Management Presents Risks

Because other radiation oncology treatment delivery systems were not built with fully integrated motion management, add-on technologies present risks and challenges. These range from the additional costs of purchasing and maintaining dedicated equipment for add-on motion management, to significant quality assurance (QA) tasks, to the time and costs of non-integrated clinical workflows. Each of these additional components presents an added patient safety risk. By contrast, the CyberKnife and Radixact Systems were built from the ground up with fully integrated motion synchronization, offering intuitive, streamlined clinical workflows and simplified technical maintenance.

Learn more about Synchrony

1 Critical Capability #1
Delivering Hypofractionation With Confidence

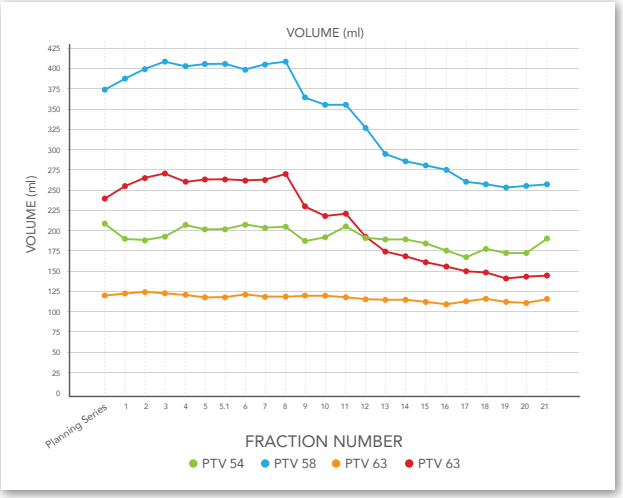
Automating Adaptive Radiotherapy

Accuray PreciseART® Adaptive Radiotherapy Option

In many cases, clinicians will want to adapt treatment plans to account for changes in tumor position and size and changes in patient anatomy over the course of treatment. However, the practice of adaptive radiotherapy has remained a time-intensive, highly manual process requiring a significant investment of clinical resources.

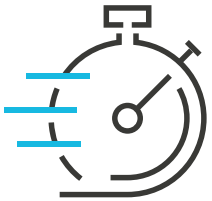
PreciseART makes it simple, fast and practical for radiation oncologists to evaluate and adapt patient plans. Fully integrated daily re-imaging, patient data analysis and automated reporting empower treatment teams to continuously monitor every patient treatment, identify patients that will benefit from re-planning and efficiently adapt plans with PreciseRTX®. This removes the subjective nature of re-planning decisions (i.e., outward patient appearance or replan all patients on their 15th fraction) and replaces it with automatically generated alerts based on predefined thresholds of automatically measured changes in anatomy. This gives radiation oncologists enhanced confidence in their ability to protect surrounding healthy tissues, minimize side effects and ensure the dose is delivered to the tumor as prescribed.

	Couch Shift	Plan Adaptation
TRANSLATIONAL ERRORS	✗ ✓	✓
ROTATIONAL ERRORS	✗ ✓	✓
DEFORMATIONAL ERRORS	✗	✓
TREATMENT RESPONSE VOLUME CHANGE	✗	✓
INDEPENDENT MOTION OF ORGANS	✗	✓



Watch the video

Download the brochure



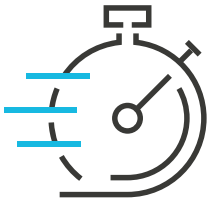
2 Critical Capability #2
Enabling Efficient Hypofractionation Workflows

Advances in Treatment Delivery Can't Sacrifice Efficiency

The economic incentives and pressures created by the RO-APM make hypofractionated radiotherapy an essential treatment modality — and will require many practices to invest in technologies to enable hypofractionation. However, the expense-side advantages of hypofractionation will not materialize if the number of fractions is reduced but the work and cost to deliver a fraction significantly increases.

Moreover, as discussed in the previous section, clinicians must have complete confidence in the precision and accuracy of their treatment delivery and delivered treatment in order to enable hypofractionation without increasing patient or other safety risks. Yet, many other treatment delivery platforms require radiation oncology practices to make significant efficiency tradeoffs to enable hypofractionated radiotherapy. Technologies and processes like 4DCT imaging, traditional motion management (gating, repositioning, etc.), and extensive patient training create efficiency burdens, complexities, and present significant costs that threaten to overwhelm any advantages gained by moving to fewer fractions.

WHAT IT REQUIRES



2 Critical Capability #2
Enabling Efficient Hypofractionation Workflows

Accuray Delivers Precision – Without Workflow Tradeoffs

As the pioneer in hypofractionation, Accuray designed its treatment delivery systems from the ground up to deliver on the full benefits — clinical, economic and patient — of hypofractionated radiotherapy. Accuray systems give clinicians industry-leading precision and accuracy without slowing clinical workflows and without burdening clinical efficiency.

Real-time adaptive treatment delivery — without extending normal treatment times or interrupting treatment delivery

Unlike gating or patient repositioning, Accuray motion synchronization technology, Synchrony, enables radiation oncologists to adapt and synchronize treatment delivery with target motion during continuous, uninterrupted treatment delivery. Synchrony is artificial intelligence driven and therefore requires no human intervention.

Making adaptive radiotherapy practical for every practice and every patient

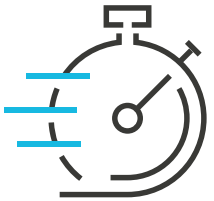
By automating patient data analysis and significantly streamlining plan adaptation workflows, Accuray's PreciseART® technology dramatically reduces the resources typically required to monitor and adapt patients between treatment sessions. This makes adaptive radiotherapy practical for more radiotherapy oncology practices, and makes it possible to apply the principles of adaptive radiotherapy to every patient.

SBRT treatments that fit in conventional time slots

Accuray customers are using the Radixact® System to deliver motion-synchronized SBRT lung treatments in as little as 15 minutes per fraction.[12] The new VOLO™ treatment optimizer for the CyberKnife® System enables a similar standard in streamlined treatment planning and rapid treatment delivery.

See how Synchrony® eliminates clinical tradeoffs

WHAT IT REQUIRES



2 Critical Capability #2
Enabling Efficient Hypofractionation Workflows

Accuray Simplifies Hypofractionation: Streamlined Workflows, Lower Costs

Safely and confidently delivering hypofractionated radiotherapy requires some of the most complex technologies that exist today. This complexity has remained another barrier to widespread adoption of hypofractionation — often concentrating the use of hypofractionation among academic medical centers with a large number of clinical resources (physicists, radiation technologists, etc.). Accuray's legacy of innovation removes this barrier with specific features and functionalities that streamline clinical workflows, reduce required resources and make the entire process more intuitive for clinical staff.

Intuitive interface makes adoption easy:
All Accuray treatment delivery systems share a single, common treatment planning system: Accuray Precision®. The Accuray Precision Treatment Planning System is designed to enable clinicians to easily and efficiently create highly personalized treatment plans — without extensive time burdens. Unique features like Synchrony® motion synchronization are fully integrated within the Accuray Precision® Treatment Planning System, making it easy and practical for any practice to automatically adapt treatment delivery and use real-time motion synchronization to deliver SBRT treatments. The entire Precision interface is purpose-built to maximize ease of use, accelerating workflows for all clinicians — even those with no previous experience using Accuray systems and technologies.

Automated workflows reduce clinical resource burden:
Other systems that enable hypofractionated treatments place a heavy burden on clinical staff. Radiation technologists must be continuously involved, manually pushing buttons, making constant, discrete clinical decisions about actions like couch positioning, breath holds, external motion-detection systems, etc. Accuray designed treatment planning and delivery technologies — like our renowned Synchrony technology — to automate these corrections, streamline clinical decision-making and use artificial intelligence (AI) to dramatically reduce the clinical resources required to deliver hypofractionated treatments.

Robust training support:
All Accuray technologies are built to be easy to use and easy to adopt — and backed by a world-class training and support program, making comprehensive training and support rapidly available to every clinic. The Accuray training program consistently ranks as the highest-rated of any technology provider in the radiation oncology industry.

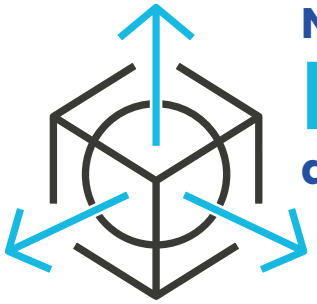
WHAT IT REQUIRES

2 Critical Capability #2

Enabling Efficient Hypofractionation Workflows

Making Hypofractionation Possible for Every Practice

By greatly reducing the clinical resource burden, Accuray technologies make it significantly easier for more clinics to begin utilizing hypofractionated treatments — and make the actual practice of delivering hypofractionated treatment significantly faster and less cost-intensive. This makes the demonstrated clinical and economic benefits of hypofractionation more readily accessible to all radiation oncology clinics and practices. Already today, dozens of small, community hospitals are leveraging the CyberKnife® System to deliver SRS and SBRT treatments to patients.[13]



New technologies must be

EASY TO USE

and EASY TO ADOPT

CONCLUSION

Preparing to Thrive in a Value-Based Care Environment

With the implementation of the RO-APM rapidly approaching, radiation oncology practices must prepare for a dramatic transformation of the economic pressures and clinical best practices guiding the field of radiation oncology. Those economic and clinical changes converge on a single maxim that will define the future of the field: fewer fractions — achieved via hypofractionation — deliver mutually beneficial outcomes for patients, clinicians and payers. Yet for radiation oncology practices developing new strategies to meet the evolving demands and challenges of the RO-APM landscape, expanding hypofractionation isn't simple. Hypofractionation potentially poses increased risks to patient safety — risks which cannot be tolerated by radiation oncologists whose reputations serve as both their professional legacy and their key competitive advantage. But elevating precision and accuracy cannot come at the expense of clinical efficiency, lest a practice defeat the very economic benefits that the transition to hypofractionation offers.

Accuray Technologies Empower Radiation Oncology Practices to Adapt and Thrive

At the center of this challenge — ensuring safety without sacrificing efficiency — Accuray stands as the pioneer and leading innovator in hypofractionation. Our two-decade legacy of leadership in developing and delivering technologies that enable hypofractionated radiotherapy includes the industry's most extensive body of clinical evidence and proof to support the safety, efficacy and efficiency of hypofractionation on our systems compared to standard fractionation. Our treatment delivery platforms — the CyberKnife® and Radixact® Systems — feature unique capabilities and one-of-a-kind technologies, purpose-built to give radiation oncologists the complete confidence they need to deliver hypofractionated cancer treatments to their patients while helping to protect patient safety by minimizing dose to healthy tissue and organs at risk. Accuray's unparalleled depth of experience in hypofractionation has allowed us to continually hone these technologies — including real-time motion synchronization and automated adaptive radiotherapy — to seamlessly fit within existing clinical workflows, achieving the necessary efficiencies to realize expense-side savings and protect economic outcomes. With this unmatched combination — confidence in precision and assurance in efficiency — Accuray is giving radiation therapy practices the essential tools they need to adapt to new realities, deliver on the principles of the RO-APM, and build a thriving practice in the new landscape of value-based care.

REFERENCES

1. https://innovation.cms.gov/initiatives/radiation-oncology-model/

2. Atun et al. Expanding global access to radiotherapy. Lancet Oncol 2015; 16:1153-86.

3. https://innovation.cms.gov/Files/reports/radiationtherapy-apm-rtc.pdf

4. Calculations are made based upon the final APM rule which can be found at: https://innovation.cms.gov/innovation-models/radiation-oncology-model. Analysis based on following assumptions: A historically Inefficient Provider, at Year 5 of the model with a Trend Factor = 4%, No Geographic Adjustment, Case Mix = 2%, Historical Experience Technical = +.11, Historical Experience Processional = +.14, all withholds and adjustments, no quality/pt experience recoupment, no incorrect payment recoupment

5. Meier, R. M., Bloch, D. A., Cotrutz, C., Beckman, A. C., Henning, G. T., Woodhouse, S. A., . . . Kaplan, I. D. (2018). Multicenter Trial of Stereotactic Body Radiation Therapy for Low- and Intermediate-Risk Prostate Cancer: Survival and Toxicity Endpoints. International Journal of Radiation Oncology*Biology*Physics,102(2), 296-303. doi:10.1016/j.ijrobp.2018.05.040

6. Laviana A, et al. Utilizing time-driven activity-based costing to understand the short-and long-term costs of treating localized, low-risk prostate cancer. Cancer. 2016 Feb 1;122(3):447-55.

7. https://www.cms.gov/newsroom/fact-sheets/proposed-radiation-oncology-ro-model

8. Buyyounouski, M. K., Balter, P., Lewis, B., D'Ambrosio, D. J., Dilling, T. J., Miller, R. C., ... & Konski, A. A. (2010). Stereotactic body radiotherapy for early-stage non-small-cell lung cancer: report of the ASTRO Emerging Technology Committee. International Journal of Radiation Oncology• Biology• Physics, 78(1), 3-10.

9. Freedman, G. M., Anderson, P. R., Goldstein, L. J., Ma, C. M., Li, J., Swaby, R. F., ... & Morrow, M. (2007). Four-week course of radiation for breast cancer using hypofractionated intensity modulated radiation therapy with an incorporated boost. International Journal of Radiation Oncology* Biology* Physics, 68(2), 347-353.

Freedman, G. M., Anderson, P. R., Bleicher, R. J., Litwin, S., Li, T., Swaby, R. F., ... & Morrow, M. (2012). Five-year local control in a phase II study of hypofractionated intensity modulated radiation therapy with an incorporated boost for early stage breast cancer. International Journal of Radiation Oncology* Biology* Physics, 84(4), 888-893.

Jagsi, R., Griffith, K. A., Boike, T. P., Walker, E., Nurushev, T., Grills, I. S., ... & Pierce, L. J. (2015). Differences in the acute toxic effects of breast radiotherapy by fractionation schedule: comparative analysis of physician-assessed and patient-reported outcomes in a large multicenter cohort. JAMA oncology, 1(7), 918-930.

10. Shaikh, T., Li, T., Handorf, E. A., Johnson, M. E., Wang, L. S., Hallman, M. A., ... & Chen, D. (2017). Long-term patient-reported outcomes from a phase 3 randomized prospective trial of conventional versus hypofractionated radiation therapy for localized prostate cancer. International Journal of Radiation Oncology* Biology* Physics, 97(4), 722-731.

11. Tomas Kron , Reduction of margins in external beam radiotherapy, Journal of Medical Physics (Vol. 33, Issue 2.)

Brandner ED, Chetty IJ, Giaddui TG, Xiao Y, Huq MS. Motion management strategies and technical issues associated with stereotactic body radiotherapy of thoracic and upper abdominal tumors: A review from NRG oncology. Med Phys. 2017 Jun;44(6):2595-2612. doi: 10.1002/mp.12227. Epub 2017 Apr 20.

12. Froedtert and the Medical College of Wisconsin: World's First Radixact Synchrony System treatment https://www.youtube.com/watch?v=SRIbJ3_MeKs

13. Source: Accuray's internal CRM system SFDC

Anstadt EJ, Shumway R, Colasanto J, Grew D. Single community-based institutional series of stereotactic body radiation therapy (SBRT) for treatment of liver metastases. [ncbi.nlm.nih.gov] J Gastrointest Oncol. 2019 Apr;10(2):330-338. doi: 10.21037/jgo.2018.11.03

About Accuray

All cancer patients deserve the best possible treatment. Accuray is leading the way making some of the most advanced radiotherapy technologies and treatments more efficient and more practical — for more practices and more patients. Our radiotherapy delivery platforms and software solutions drive innovative efficiencies that deliver more precise treatments and better patient outcomes, faster than ever — radically expanding the curative potential of radiotherapy.

ACCURAY

UNITED STATES

Accuray Corporate Headquarters
1310 Chesapeake Terrace
Sunnyvale, CA 94089
USA
Tel: +1.408.716.4600
Toll Free: 1.888.522.3740
Fax: +1.408.716.4601
Email: sales@accuray.com

Accuray Incorporated
1240 Deming Way
Madison, WI 53717
USA
Tel: +1.608.824.2800
Fax: +1.608.824.2996

ASIA

Accuray Japan K.K.
Shin Otemachi Building 7F
2-2-1 Otemachi, Chiyoda-ku Tokyo 100-0004
Japan
Tel: +81.3.6265.1526 Fax: +81.3.3272.6166

Accuray Asia Ltd.
16/F, Tower 5, The Gateway
Harbour City
15 Canton Road, T.S.T
Hong Kong
Tel : +852.2247.8688
Fax : +852.2175.5799

Accuray Accelerator Technology (Chengdu) Co., Ltd.
No. 8, Kexin Road
Hi-Tech Zone (West Area)
Chengdu
611731 Sichuan
China

EUROPE

Accuray International Sarl
Route de la Longeraie 9
(3rd floor) CH – 1110 Morges
Switzerland
Tel: +41.21.545.9500
Fax: +41.21.545.9501

Important Safety Information: Most side effects of radiotherapy, including radiotherapy delivered with Accuray systems, are mild and temporary, often involving fatigue, nausea, and skin irritation. Side effects can be severe, however, leading to pain, alterations in normal body functions (for example, urinary or salivary function), deterioration of quality of life, permanent injury and even death. Side effects can occur during or shortly after radiation treatment or in the months and years following radiation. The nature and severity of side effects depend on many factors, including the size and location of the treated tumor, the treatment technique (for example, the radiation dose), the patient's general medical condition, to name a few. For more details about the side effects of your radiation therapy, and if treatment with an Accuray product is right for you, ask your doctor.