The 6th International Clinical Oncology Congress

The 16th Iranian Annual Clinical Oncology Congress

16-18 February 2022
Tehran, Iran

Iranian Society of Radiation (Clinical) Oncology

President of Congress: Dr Yasha Makhdomi
Scientific Committee Chairperson: Dr Amir Mohammad Arefpour
Executive Committee Chairperson: Dr Taiebeh Taheripanah

Scientific Chairperson of Oncology Nursing: Dr Maryam Rasouli
Scientific Chairperson of Clinical Radiobiology: Dr Hossein Mozdarani
Scientific Chairperson of Medical Physics: Dr Ahmad Mostaar
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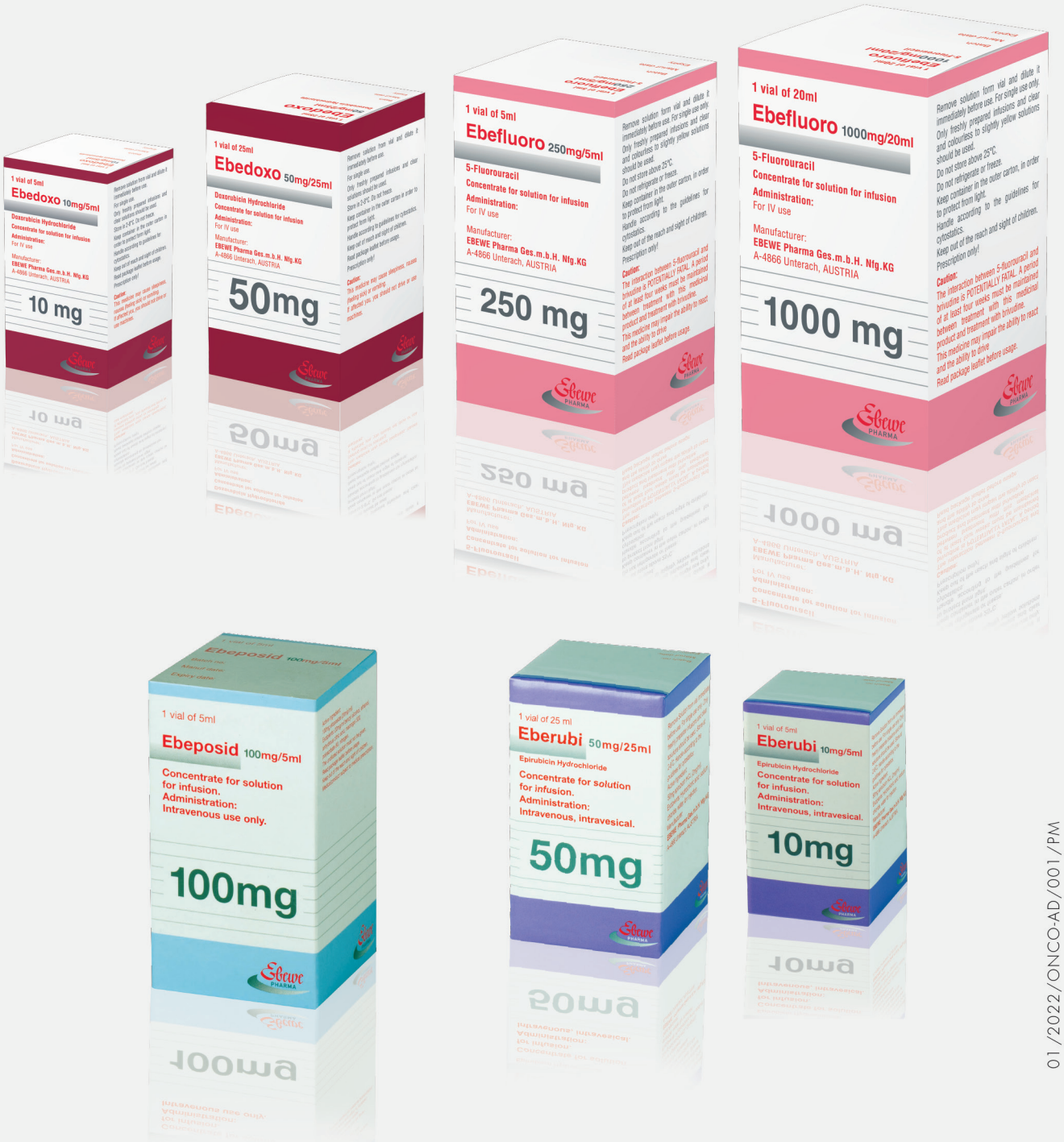

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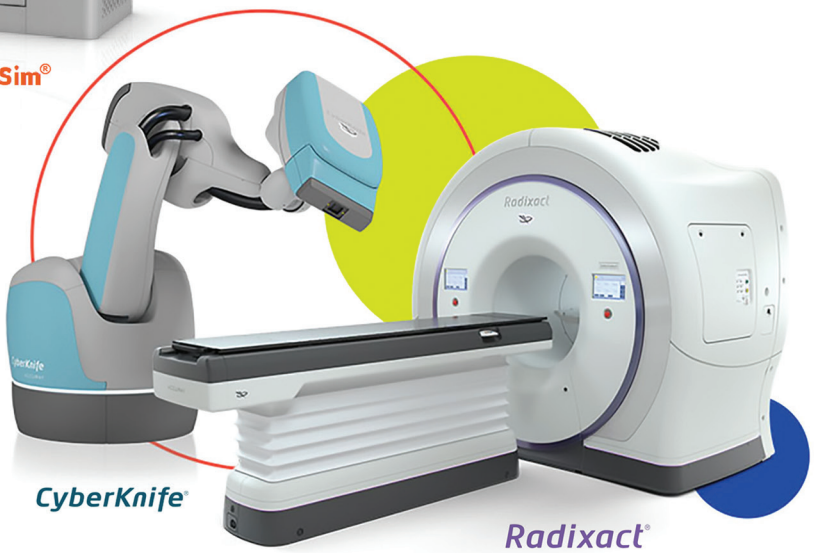

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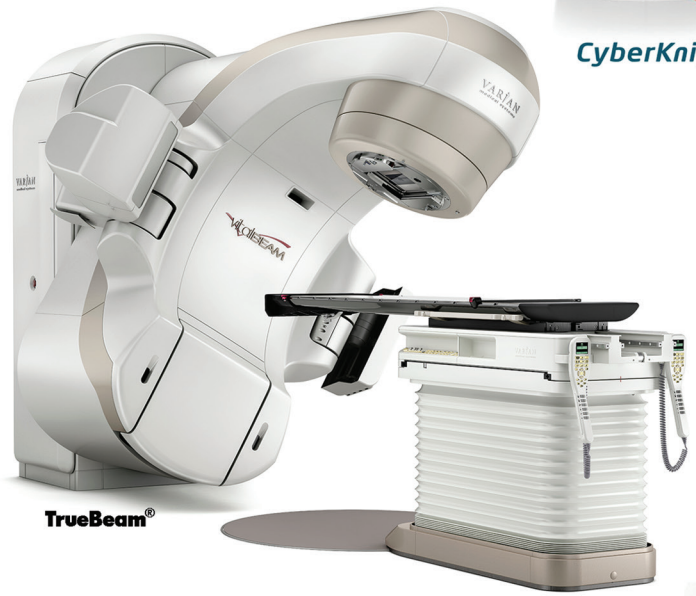

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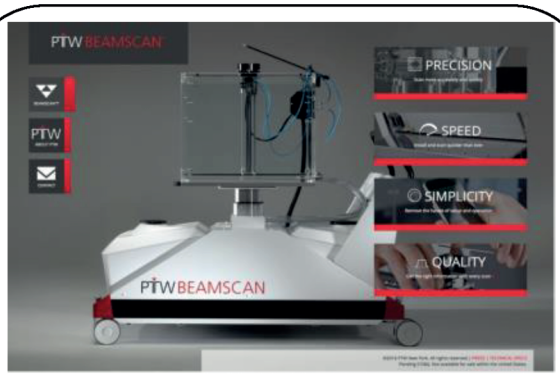

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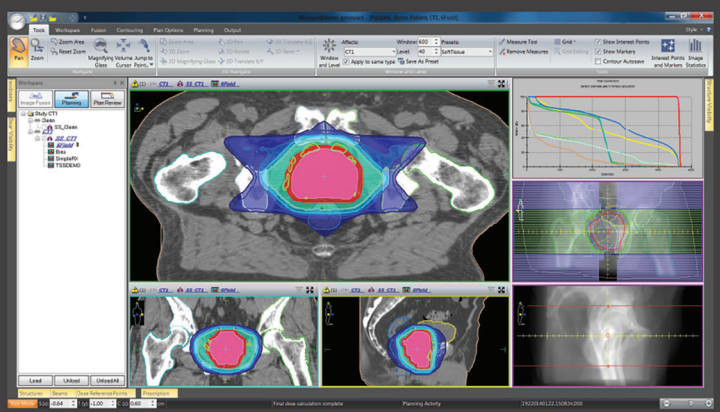

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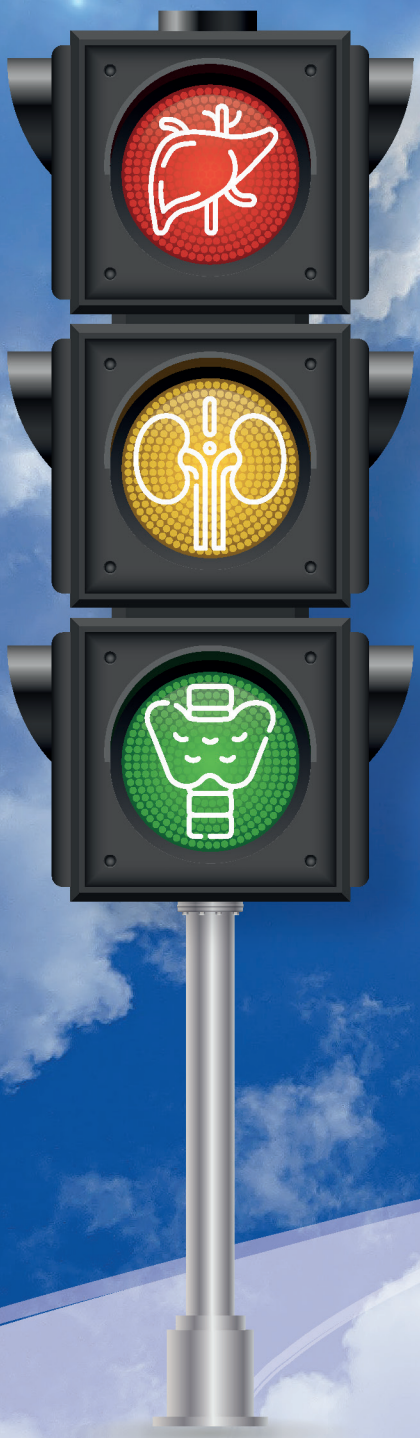

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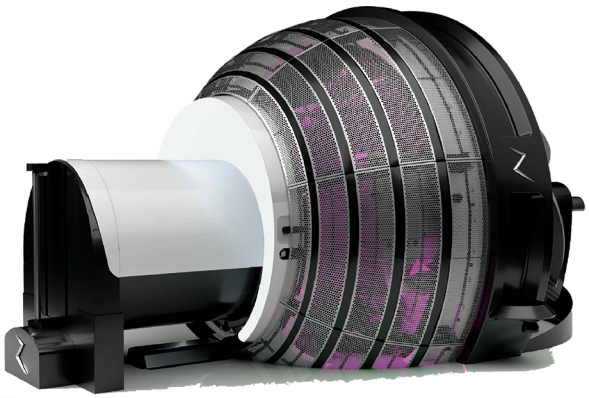

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These highlights do not include all not include all the information needed to use zoladex 10.8 mg & 3.6 mg safely and effectively. See full prescribing information for zoladex 10.8 mg& 3.6 mg

API drafted on 5th June 2018 . Date of revision of the text: July 2015 . Doc ID-002764123 V11.0

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†The EXTREME study excluded patients who had a recurrence <6 months after the last dose of CT for LA disease.
‡36% ORR with Erbitux® (CR 6.8%; PR 28.8%; N=222) vs 20% with platinum-based CT alone (p<0.001; CR 0.9%, PR 18.6%; N=220).
CR: complete response; CT: chemotherapy; LA: locally advanced; ORR: overall response rate; PR: partial response; R/M: recurrent and/or metastatic; SCCHN: squamous cell cancer of the head and neck.
IR-ERBSCCHN-00048
References: 1. NCCN Guidelines: Head and Neck Cancers V2.2017; 2. Vermorken JB et al. N Engl J Med 2008;359:1116–1127; 3. de Mello RA et al. PLoS One 2014;9:e86697; 4. Nakano K et al. ESMO 2016 (Abstract No. 1003P); 5. Regnier-Gavier O et al. ECCO 2017 (Abstract 914).

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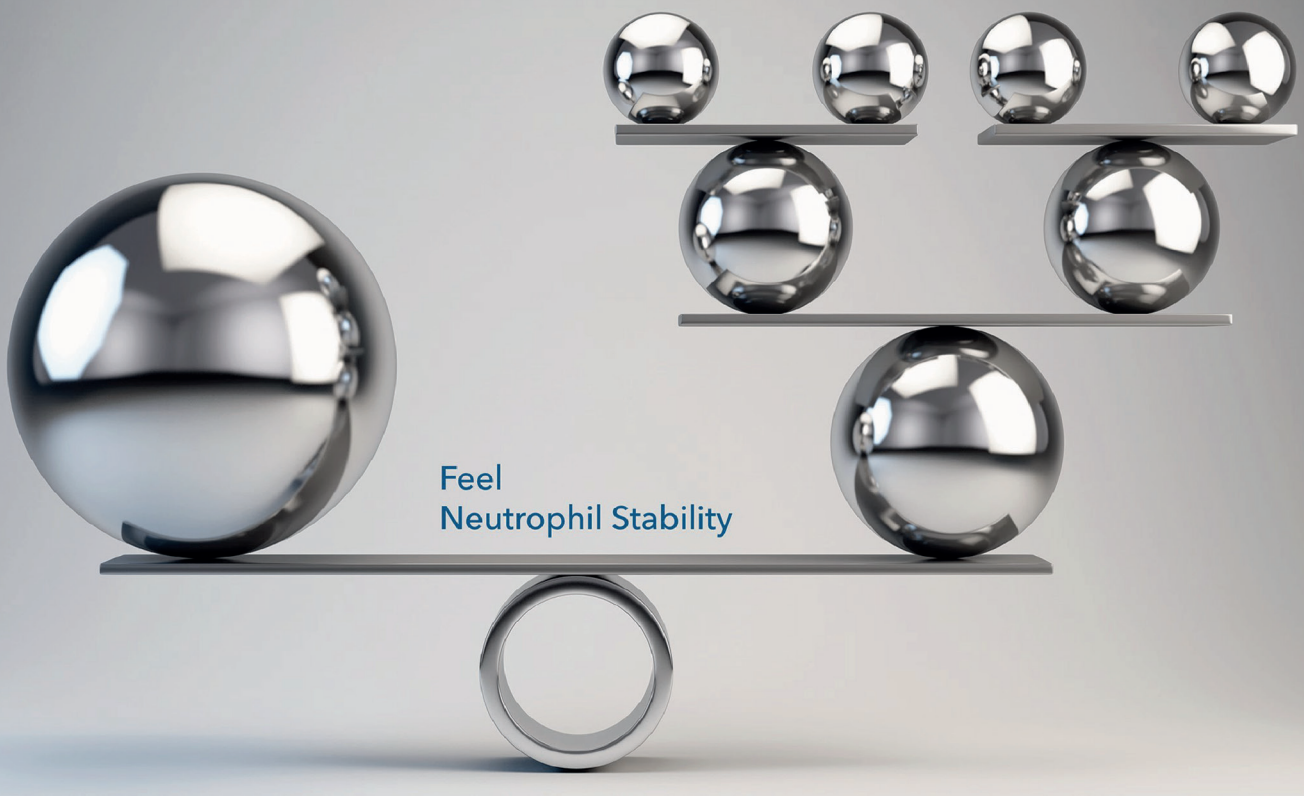

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Dr. Yasha Makhdomi

President of ISRO and ISCO Congress

The Sixth International Clinical Oncology Congress

Welcome

In the Name of God

We have been fighting with covid-19 for the past two years which resulted in endeavor and sacrifice of medical staff as well as their death toll, similarly for the oncologists. During this battle the efforts of junior assistants of Radioncology in emergency ward have been unparalleled.

Nevertheless, to continue making headway in oncology and its non invasive therapeutic methods which are managed by our association, it is require to hold the main annual congress (**6th international oncology congress**) a along with other individual webinars with the participation of all associated nurses, medical physicists and technicians in radiotherapy.

This congress has been affirmed and supported by two main European association ESMO and ESTRO. The lecturers from these two association will have presentation as well.

I appreciate all colleagues, specially scientific and executive secretaries , board of directors, all associate companies and executive team.

ISRO Iranian Society of Radiation Oncology

دکتر یاشا مخدومی

رئیس انجمن رادیوانکولوژی و کنگره کلینیکال انکولوژی ایران

The Sixth International Clinical Oncology Congress

Welcome

بسعه تعالی

در حالی‌که دومین سال مبارزه با پاندمی کرونا را می‌گذرانیم که انرژی فراوانی از کادر درمان و بهداشت ضرف ان شد و شهدایی نیز از کادر درمان تقدیم شد که گروه متخصصین درمانگر سرطان از این مجاهدت بی‌بهره نبوده‌اند و مجاهدت‌های همکاران در میدان کرونا و به‌خصوص دستیاران سال رشته رادیوانکولوژی در اورژانس‌های کرونا فراموش نشدنی بود اما چرخه پیشرفت علم سرطان‌شناسی و درمان‌های ان که انجمن ما متولی اضلی تمام درمان‌های غیرجراحی می‌باشد ایجاب می‌کرد که گردهمایی اصلی سالیانه خود را که **ششمین کنگره بین‌المللی کلینیکال انکولوژی** می‌باشد در کنار سایر برنامه‌های وبیناری و منفرد با شرکت تمام همکاران وابسته پرستاران سرطان و فیزیک پزشکان و تکنولوژیست‌های پرتودرمانی سرطان برگذار نماید که خوشبختانه با تایید و پشتیبانی علمی دو انجمن اصلی اروپایی ESMO و ESTRO و سخنرانانی از ان انجمن‌ها می‌باشد. در انتها از تمام همکاران به‌خصوص دبیران علمی و اجرایی و هیأت مدیره انجمن و تمام عوامل اجرایی و شرکت‌های همکار کمال تشکر را دارم.

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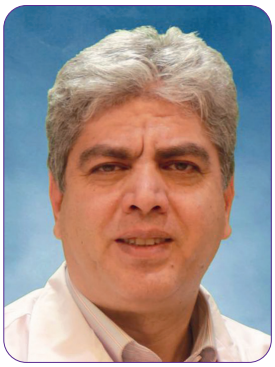

Dr. Amir Mohammad Arefpour

Scientific Chairperson

The Sixth International Clinical Oncology Congress

Welcome

Dear professors and friends

I was honored to be the Scientific Secretary of the Annual Clinical Oncology Seminar.
In numerous meetings and preparation for holding this seminar as best as possible, in addition to emphasizing the topic of oncology and inviting prominent professors of international clinical oncology and medical physics,our effort was to hold a comprehensive conference after the COVID-19 Pandemic situation.
May we be successful in this important matter.

Best Regards

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Iranian Society of Radiation Oncology

دکتر امیرمحمد عارف‌پور

دبیر علمی کنگره

The Sixth International Clinical Oncology Congress

Welcome

سلام

اساتید و دوستان گرامی

افتخار دبیر علمی سمینار سالانه کلینیکال انکولوژی به من داده شد.

در جلسات متعدد و آماده‌سازی جهت برگزاری هر چه بهتر این سمینار علاوه بر تاکید بر طرح مباحث به روز انکولوژی و دعوت از اساتید مطرح رادیوانکولوژی و فیزیک رایوتراپی بین‌المللی، تلاش ما بر برگزاری حضوری کنفرانس به‌صورت همه‌جانبه پس از معضل جهانی کووید-۱۹ بود. باشد که در این مهم موفق بوده باشیم.

دوستدار همگی

ISRO
Iranian Society of Radiation Oncology

Dr. Taiebeh Taheripanah

Executive Chairperson

The Sixth International Clinical Oncology Congress

Welcome

Dear esteemed colleagues, distinguished members and valued guests,

It is with a great deal of pride and enthusiasm that on behalf of the executive committee, I invite you to attend the **16th national** and **6th International Congress of Clinical Oncology**, held on February 16-18 at the Olympic Hotel.

The charming point of this scientific event is the strive of the involved clinicians and treatment teams to use their utmost capabilities and facilities to reduce the pain and suffering of cancer patients, inducing "hope" in the lives of patients and their loved ones, improving the quality of life and increasing their life expectancy through their knowledge and empathy.

In the hard times of COVID-19 pandemic, where it has not been possible to meet many loved ones for a long time, the decision to hold a face-to-face congress and inviting the foreign guests was a really challenging choice, made through continual consultations and the judgment of the board of directors of the Iranian Scientific Oncology Radiotherapy Association. The intention was that this scientific collaboration will further promote our knowledge and exchange experiences.

I would like to thank the sincere cooperation of the Board of Directors and the Secretary of the Association, members of the Scientific Committee and members of the Executive Committee, especially the heads of various subcommittee groups, who truly and patiently supported us to prepare a better congress. I also would like to extend my gratitude in advance to all the esteemed participants, speakers, poster presenters and esteemed participants who will enrich the scientific outcomes of this conference.

ISRO Iranian Society of Radiation Oncology

دکتر طیبه طاهری‌پناه

دبیر اجرایی کنگره

The Sixth International Clinical Oncology Congress

Welcome

بسم الله الرحمن الرحیم

سلام

پس از سپاس به درگاه الهی و با افتخار برای شانزدهمین بار میزبان همکاران عزیز از سراسر کشور و دانشمندانی از سایر کشورها در **ششمین کنگره بین‌المللی کلینیکال آنکولوژی**، در تاریخ ۲۷ لغایت ۲۹ بهمن، در محل هتل المپیک هستیم. تمامی زیبایی این گردهمایی علمی و مباهات ما به حضور اندیشمندان حوزه درمان سرطان است که از تمام توان خود برای کاهش درد و رنج بیماران و افزایش امید در ایشان و خانواده‌های افراد مبتلا به سرطان بهره می‌گیرند تا با همدلی برای بهبود کیفیت زندگی بیماران و توسعه کمی یا کیفی طول عمر ایشان بی‌دریغ تلاش می‌کنند.

در شرایط سخت کرونایی که مدتها است دیدار نزدیک بسیاری از عزیزان میسر نشده، تصمیم برای برگزاری کنگره حضوری و حتی دعوت از میهمانان خارجی با رایزنی‌های مکرر و تصمیم اعضای محترم هیأت مدیره انجمن علمی رادیوتراپی انکولوژی ایران صورت گرفت و امیدوار هستیم فراهم‌شدن دیدارها و هم‌اندیشی علمی ما باعث رونق بیشتر این دانش و تبادل تجربه‌ها شود.

جا دارد از همکاری صمیمانه هیأت مدیره محترم انجمن علمی و همه دوستان عزیز کمیته اجرایی خصوصاً، سرپرست‌های کارگروه‌های اجرایی و علمی، که صمیمانه و با صرف وقت بسیار زیاد برای هرچه بهتر برگزارشدن کنگره با ما همدلی کردند تشکر کنم و برای آنان آرزوی سلامتی داشته باشم.

همچنین از تمامی شرکت‌کنندگان محترم اعمّ از سخنرانان و صاحبان پوستر و شنوندگان ارجمند که باعث غنا و شور و شوق علمی این همایش شدند سپاسگزارم.

ISRO
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Dr. Ahmad Mostaar

Scientific Chairperson of Radiotherapy Physics Section
6th International Congress of Iranian Clinical Oncology

The Sixth International Clinical Oncology Congress

Welcome

Dear colleagues

Thanks to the wise God who gave man the ability to learn knowledge and apply it, and gave us the success to have meetings this year, as in previous years, with the **6th International Clinical Oncology Congress** and the **16th Iranian Annual Clinical Oncology Congress**, presenting topics related to clinical medical physics in the field of radiotherapy which expert scientists and researchers in the field to share their latest achievements in cancer diagnosis and treatment with other colleagues.

Advances in radiotherapy in recent years and the introduction of new treatment techniques with high accuracy, increase the efficiency of treatment of patients that the role of medical physicists in performing these advanced radiotherapy techniques is very prominent. Recently, in our country, advanced machines that have made it possible for specialists to perform these techniques have been installed in public and private centers. Therefore, in these sessions dedicated to the physics of radiotherapy, we decided to focus on new methods and techniques of radiotherapy and the role of medical physicist in providing this service to cancer patients. This is not possible except with the support of prominent medical physicists who are the main pillar in achieving this goal. Therefore, I hope that the presence of numerous prominent professors of radiotherapy physics along with students and young researchers in the scientific and intimate atmosphere of this congress, will lead to a step towards the development and empowerment of radiotherapy physicists in our country. Like before, at this year's congress, we will present the latest radiotherapy physics achievements in the form of lectures, posters and specialized panels. Also challenging debates and exchange of scientific opinions between Iranian and foreign scholars would definitely make it a fully dynamic meeting.

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دکتر احمد مستعار
دبیر علمی بخش فیزیک رادیوتراپی
ششمین کنگره بین‌المللی کلینیکال انکولوژی ایران

با درود خدمت همکاران گرامی

سپاس خالق دانا و توانا را که به آدمی توان آموختن دانش و بکارگیری آن را عطا فرمود و به ما این توفیق را داد تا امسال نیز همچون سالهای گذشته همراه با **ششمین کنگره بین‌المللی کلینیکال انکولوژی ایران**، جلساتی را با ارائه موضوعات مرتبط با فیزیک پزشکی بالینی در حوزه رادیوتراپی داشته باشیم تا دانشمندان و پژوهشگران خبره در این حوزه، جدیدترین دستاوردهای خود را در تشخیص و درمان سرطان با دیگر همکاران به اشتراک گذارند.

پیشرفت‌های چند سال اخیر در حوزهٔ رادیوتراپی و ارائه تکنیک‌های نوین درمانی همراه با دقت بالا، منجر به افزایش بهره درمان بیماران سرطانی شده است که برای اجرای این تکنیک‌های پیشرفته رادیوتراپی، نقش متخصصین فیزیک پزشکی بسیار برجسته است. اخیراً در کشور ما نیز دستگاه‌های پیشرفته‌ای که امکان اجرای این تکنیک‌ها را برای متخصصین فراهم کرده است، در مراکز دولتی و خصوصی نصب و راه‌اندازی شده‌اند. از این رو بر آن شدیم تا در این جلسات اختصاص داده شده به موضوعات فیزیک رادیوتراپی، تمرکز را بر روش‌ها و تکنیک‌های نوین رادیوتراپی و نقش فیزیک پزشکان در ارائه این خدمت به بیماران سرطانی قرار دهیم. این مهم جز با همراهی اساتید و دانشمندان برجسته فیزیک پزشکی که رکن اصلی در تأمین این هدف می‌باشند، مقدور نمی‌باشد. لذا امیدوارم حضور پرشمار استادان برجسته فیزیک رادیوتراپی در کنار دانشجویان و محققین جوان در فضای علمی و صمیمی این کنگره، گامی مهمّ در راستای تحول و توانمندسازی فیزیست‌های رادیوتراپی کشور به حساب آید.

به سیاق گذشته در کنگره امسال نیز ارائه آخرین دستاوردهای فیزیک رادیوتراپی را در قالب سخنرانی، پوستر و پانل‌های تخصصی خواهیم داشت که همراهی بحث‌های چالشی روز دنیا و تبادل نظرهای علمی میان اساتید ایرانی و خارجی به پویاترشدن این محفل خواهد افزود.

ISRO
Iranian Society of Radiation Oncology

Hossein Mozdarani, Ph.D
Professor of Medical Genetics/ Radiobiologist
Tarbiat Modares University, Tehran

Dear honorable colleagues,

It is my honor to invite you to join us in the radiobiology sessions to be held on 16-17 February 2022 as a part of the **6th International** and **16th Annual Congress of Clinical Oncology**. Although, there are various radiobiology subjects dealing with clinical oncology practice to discuss, but some limitations made us to arrange two short sessions of radiobiology to share and exchange our experiences as well as getting familiar with the advancements in the field of molecular radiobiology and its application in clinical oncology. Over the last decades, we have witnessed the advancement and application of molecular biology/genetics techniques in radiobiology that significantly improved our understanding of cellular responses of both normal tissue and tumor cells to ionizing radiation. Our understanding from a DNA-centric view of radiation induced damages has shifted to a biological view that appreciates the importance of cellular macro- and microenvironment as well as underlying genetic mechanisms during last three decades. We try to discuss the importance and impact of radiobiological phenomena such as genome instability, inherent radio-sensitivity, radio-adaptation and bystander effect on the outcome of radiation therapy. While the mechanisms underlying these effects and responses are not well defined, it is apparent that their implications are more panoramic than the field of radiobiology. Consequently, regarding to modern radiation oncology, mechanistic insights resulting from molecular radiation biology research will provide tools to develop new strategies of individualized therapy and molecular targeting to further improve tumor responses and reduce normal tissue reactions. In radiation oncology, research and development in the last three decades has led to considerable improvement in our understanding

of the differential responses of normal and cancer cells. The toxicity reactions of normal tissues to ionizing radiation are a major limitation in efficiency of radiotherapy. Therefore, identification of molecular markers in various cellular response pathways may help prediction and management of radiation toxicity in normal tissues following radiotherapy.
That's why our emphasis in this meeting is to discuss about subjects such as future radiobiology for advanced radiotherapies, radiogenomic, precision and personalized radiotherapy. In general we aim to briefly discuss the latest developments in the fields of basic and clinical radiobiology with our clinical oncologists' colleagues. To promote translation of basic research results into clinical application, an intensified dialogue between basic and clinical scientists is important.

We look forward to your warm participation in the conference.

Best Regards

برای توسعه استراتژی‌های جدید درمان فردی و هدف‌گیری مولکولی در انکولوژی پرتوی برای بهبود بیشتر پاسخ‌های تومور و کاهش واکنش‌های بافت طبیعی فراهم خواهد کرد. در انکولوژی پرتوی، تحقیق و توسعه در سه دهه اخیر منجر به بهبود قابل توجهی در درک ما از پاسخ‌های سلول‌های طبیعی و سرطانی شده است. واکنش‌های سمیت بافت‌های طبیعی به پرتوهای یونساز یک محدودیت عمده در کارایی پرتودرمانی است. بنابراین شناسایی نشانگرهای مولکولی در مسیرهای مختلف پاسخ سلولی ممکن است به پیش‌بینی و مدیریت سمیت پرتوی در بافت‌های طبیعی پس از پرتودرمانی کمک کند.

به همین دلیل است که تأکید ما در این نشست بحث در مورد موضوعاتی مانند رادیوبیولوژی آینده برای رادیوتراپی‌های پیشرفته و دقیق، رادیوژنومیک و پرتودرمانی شخصی شده است. به طور کلی، هدف ما بحث در مورد آخرین تحولات در زمینه‌های رادیوبیولوژی پایه و بالینی با همکاران انکولوژیست بالینی است. برای ترویج ترجمه نتایج تحقیقات بنیادی به کاربرد بالینی،گفتمان و تبادل اطلاعات بین دانشمندان علوم پایه و علوم بالینی حائز اهمیت و ضروری است.

مشتاقانه منتظر مشارکت و حضور گرم شما در کنگره هستیم.

دکتر حسین مزدارانی
استاد ژنتیک پزشکی / رادیوبیولوژیست
دانشگاه تربیت مدرس

به نام خداوند جان و خرد

همکاران ارجمند و گرامی
سپاس خداوندی را که به عنایت او و با همت و همکاری صمیمانه هیأت مدیرهٔ محترم انجمن کلینیکال انکولوژی، یکبار دیگر توفیق مطرح‌کردن مباحثی در زمینه رادیوبیولوژی بالینی را یافته‌ایم تا در خدمت اساتید معزز و همکاران محترم و دانشجویان گرامی فعال در حوزه رادیوبیولوژی و کلینیکال انکولوژی کشور باشیم.
اگرچه به دلیل فشردگی برنامه، زمان کوتاهی در دو جلسه به مباحث بسیار گسترده رادیوبیولوژی اختصاص داده شد، اما تلاش خواهد شد تا در این فرصت کوتاه، به هدف اصلی برگزاری این همایش علمی که همانا به روز نمودن اطلاعات، تبادل دیدگاه‌ها و آشنایی با پیشرفت‌های جدید در حوزه رادیوبیولوژی و استفاده درست از یافته‌های تحقیقاتی در شرایط بالینی است، دست یابیم. طی دهه‌های گذشته، توسعه و استفاده از روش‌ها و تکنولوژی زیست شناسی مولکولی و ژنتیک موجب شد تا آگاهی ما به طور قابل توجهی از پاسخ‌های سلولی سلول‌های تومور و سالم به تشعشع و نیز شیمی درمانی افزایش یابد. طی سه دهه گذشته درک ما از دیدگاه DNA محور از آسیب‌های ناشی از تابش به یک دیدگاه بیولوژیکی که اهمیت ریزمحیط سلولی و همچنین مکانیسم‌های ژنتیکی را شامل می‌شود، تغییر کرده است. در این جلسات سعی خواهد شد به مباحث مهمی مانند حساسیت پرتوی ذاتی، سازگاری پرتوی و اثر همسایگی، فرایندهای بیولوژیکی موثر بر نتیجه پرتودرمانی پرداخته شود. در حالی که مکانیسم‌های زمینه‌ای این اثرات و پاسخ‌ها به خوبی تعریف نشده‌اند، آشکار است که پیامدهای آن‌ها گسترده‌تر از حیطه رادیوبیولوژی است. در نتیجه با توجه به انکولوژی پرتوی مدرن، بینش مکانیستی ناشی از تحقیقات زیست‌شناسی پرتوی مولکولی ابزارهایی را

Maryam Rassouli, RN, PhD

Professor at Shahid Beheshti University of Medical Sciences
Director General of Health Services, MoHME

In recent years, the growing number of cancers shows that this disease is the third leading cause of death in the country. In addition to increasing the incidence of cancer, various complications of the disease and treatment, numerous physical, psychological, emotional, social, spiritual, and economic problems have caused many challenges for cancer patients on the one hand and care problems for the family caregivers of these patients on the other hand.

On the way to achieving the goals of universal health coverage in order to increase justice in accessing services and provide services with the highest quality and the lowest cost for the public in all the areas of health maintenance and improvement, prevention, treatment, rehabilitation and palliative care, still a lot of evidence related to cancer management and patient care strategies shows that patients and their families have many unmet needs during the long period of the disease, meeting which requires a team approach and nurses play multiple roles in this team. In addition to conventional medical treatments and surgeries, supportive-palliative care in order to care for the physical, mental, social, and spiritual health of cancer patients and their families to improve the quality of life has become more valuable and important, which adds to the importance of nursing care in this area.

In this regard, while expressing great satisfaction and joy for overcoming the numerous peaks of COVID19 pandemic and reaching relatively stable conditions, another opportunity was provided to exchange valuable knowledge and experiences of researchers, faculty members, and all the health system staff who have the responsibility of providing care for cancer patients and their families in any way. In this congress, an attempt has been made to review the topics of oncology nursing in the form of lectures, panels, and workshops, and to reach practical strategies to face and solve the related challenges through discussion and surveys.

Finally, the congress organizing committee appreciates the valuable presence of all the researchers, professors, nurses and students, and expresses its gratitude for the effective and valuable presence of the guests and the attendees. It is hoped that the achievements of this scientific community will pave the way for providing comprehensive care for cancer patients and their families in order to manage cancer in the country.

دکتر مریم رسولی
استاد دانشگاه علوم پزشکی شهید بهشتی
مدیر کل دفتر خدمات پرستاری وزارت بهداشت، درمان و آموزش پزشکی

در سال های اخیر، رشد روزافزون انواع سرطان در کشور نشان می‌دهد که این بیماری، سومین علت مرگ در کشور به حساب می‌آید. در کنار افزایش شیوع سرطان، عوارض مختلف ناشی از بیماری و درمان، مشکلات متعدد جسمی، روانی، عاطفی، اجتماعی، معنوی و اقتصادی، چالش‌های متعددی را برای بیماران مبتلا به سرطان از یک سو و مشکلات مراقبتی برای مراقبین خانوادگی این بیماران از سوی دیگر ایجاد کرده است.

در مسیر تحقق اهداف پوشش همگانی سلامت به منظور افزایش عدالت در دسترسی به خدمات و ارائه خدمت با بالاترین کیفیت و کمترین هزینه برای آحاد مردم در کلیه حوزه های حفظ و ارتقای سلامت، پیشگیری، درمان، توان‌بخشی و مراقبت تسکینی، همچنان بسیاری از شواهد مرتبط با مدیریت سرطان و راهبردهای مراقبت از بیماران مبتلا نشان می‌دهد که بیماران و خانواده آن‌ها در طی دوره طولانی بیماری، نیازهای برآورده نشده فراوانی دارند که پاسخ به آن‌ها مستلزم اتخاذ رویکردی تیمی است و پرستاران نقش‌های متعددی را در این تیم ایفا می‌نمایند. در کنار انجام درمان‌های طبی و جراحی متداول، مراقبت‌های حمایتی-تسکینی به منظور مراقبت از سلامت جسمی، روانی، اجتماعی و معنوی بیماران مبتلا به سرطان و همچنین خانواده آن‌ها به منظور ارتقای کیفیت زندگی، ارزش و اهمیت بیشتری پیدا کرده که اهمیت مراقبت‌های پرستاری در این حوزه را پر رنگ‌تر می‌نماید.

در این راستا، ضمن ابراز خرسندی و شعف بسیار به جهت پشت سر گذاشتن موج‌های متعدد پاندمی کووید و رسیدن به شرایطی نسبتاً پایدار، مجدداً فرصتی فراهم گردید تا فضایی جهت تبادل دانش و تجارب ارزشمند پژوهشگران، اعضای هیئت علمی و تمامی کارکنان نظام سلامت که به هر شکل، وظیفه مراقبت از بیماران مبتلا به سرطان و خانواده آن‌ها را عهده‌دار هستند، ایجاد شود. در این کنگره سعی گردیده تا مروری بر مباحث روز پرستاری انکولوژی در جهان، منطقه و کشورمان در قالب سخنرانی، پنل و کارگاه صورت گرفته و از طریق بحث و نظرخواهی، راهکارهایی عملیاتی برای مواجهه و حل چالش‌های مرتبط احصا شود.

در خاتمه، کمیته برگزاری کنگره، حضور ارزشمند همه پژوهشگران، استادان، پرستاران و دانشجویان را مغتنم دانسته و مراتب امتنان خود را از حضور مؤثر و ارزشمند مدعوین و حاضرین اعلام می‌دارد. امید است دستاوردهای این جمع علمی، راهگشای مراقبت جامع از بیماران مبتلا به سرطان و خانواده آن‌ها در راستای مدیریت سرطان در کشور باشد.

ISRO
Iranian Society of Radiation Oncology

Hassan Nosrati

Scientific Secretary of Radiotherapy Technologists' Congress

The Sixth International Clinical Oncology Congress

Welcome

We appreciate God that this year, with the help of the esteemed officials of the Iranian Radiation Oncology Association, the scientific and executive secretary of the Sixth International Clinical Oncology Congress, Iranian radiotherapy technologists were given the opportunity to hold their sixth annual scientific conference.

This year, due to the limited time of presentations, it was preferred to provide practical instructions related to important topics such as:

Recommendations to minimise risk of COVID-19 transmission in radiotherapy departments.

Guidelines for the management of unscheduled treatment interruptions.

Guidelines for positioning, immobilisation and position verification for RTTs;

that we are encountering with these days. It is hoped that this multidisciplinary effort can lead to the improvement of the quality of radiotherapy in our country.

Best regards

ISRO Iranian Society of Radiation Oncology

حسن نصرتی
دبیر علمی کنگره کارشناسان رادیوتراپی ایران

The Sixth International Clinical Oncology Congress

Welcome

خداوند بزرگ را سپاس می‌گوییم که امسال نیز با مساعدت مسئولین محترم انجمن رادیوتراپی آنکولوژی ایران، دبیر علمی و اجرایی ششمین کنگره بین‌المللی کلینیکال آنکولوژی، این فرصت به کارشناسان رادیوتراپی ایران داده شد که ششمین گردهمایی علمی سالانه خود را برگزار کنند.

امسال با توجه به محدود بودن زمان ارائه‌ها ترجیح داده شد که در این فرصت کوتاه بیشتر به ارائه دستورالعمل‌های کاربردی مرتبط با موضوعات پراهمیتی مانند:

- ارائه توصیه‌هایی برای کارشناسان رادیوتراپی به منظور به حداقل رساندن خطر انتقال COVID-19 در بخش‌های رادیوتراپی
- ارائه دستورالعمل‌هایی برای مدیریت وقفه‌های درمان برنامه ریزی نشده
- ارائه راهکارهایی برای پوزیشن‌دهی، بی‌حرکت‌سازی بهتر و چگونگی تایید تصاویر برای RTTs

که کارشناسان این روزها با آن درگیر هستند پرداخته شود. امید است که این تلاش جمعی بتواند زمینه رشد و ارتقاء سطح کیفی رادیوتراپی کشور عزیزمان ایران را فراهم آورد.

با آرزوی سلامتی و تندرستی

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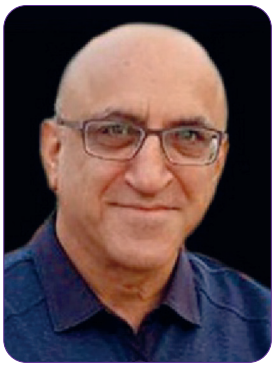

Incredible Oncologist, Productive Researcher;

Professor Peiman Haddad

Scientific Secretary of Radiotherapy Technologists' Congress

Professor Peiman Haddad was born on December 6, 1960 in Kashan, a small town in Iran, where his father was serving as the attorney general and his mother was a high-school teacher. Peiman went to elementary school in Firoozkooh and attended the prestigious Kharazmi high-school in Tehran. After receiving his high-school diploma, he started medicine at Tehran University of Medical Sciences in 1984. He finished Radiation Oncology specialty at the same university by 1994. Soon, he joined Iranian Cancer Institute and start working there from 1996.

Based on his incredible scientific activities he was promoted to full professor in radiation oncology in 2011, and was appointed to the position of the head of the Radiation Oncology department at Tehran University of Medical Sciences in 2015. Throughout his life, Peiman followed his great ambitions in scientific and research activities and his passion toward the community, his family and nature, climbing numerous and volcanos in Iran and in Asia.

John Yarnold, Emeritus Professor of Clinical Oncology, London, UK I first met Professor Peiman Haddad almost 30 years ago when I arrived in Tehran to visit centres collaborating in an international trial testing adjuvant chemo-endocrine therapies in women with early breast cancer. He later visited the Royal Marsden Hospital, London, UK, where he spent several months in clinic with me and other colleagues. I have just looked at a photograph of him from the late 1990s taken in the room at home where I am writing this. I remember he described his passion for climbing mountains, an activity that struck me at the time as consistent with his strength of character and multiple talents. He was never afraid to challenge received wisdom, not least mine, and his questioning was always probing in origina ways. As his many publications show, his academic interests were not restricted to breast cancer and included important challenges in radiotherapy. On visits to Iran in the 2000s, I kept in touch with Professor Haddad and visited the Radiation

Oncology Research Centre, of which he was Director, at the Tehran University of Medical Sciences. As recently as February 2021, I had the privilege and pleasure of contributing to a webinar he organised discussing recent advances in treatment of breast cancer, a meeting which he chaired with typical flare and confidence. He was a wonderful representative of our global oncology community and a colleague whom we shall keep in our hearts and minds.

Dr Andrea Bezjak, Professor, Department of Radiation Oncology, University of Toronto, and Princess Margaret Cancer Center

Dr Peiman Haddad had strong professional relationships with many at the Department of Radiation Oncology, University of Toronto, and the Princess Margaret Cancer Center. He spent a very productive year of fellowship with us in Toronto in 2002-2003, where he impressed everyone with his diligence, academic productivity and enthusiasm for improving outcomes of patients and knowledge within our field. During that year, he forged relationships and friendships that continued to grow despite the geographical distance. It was obvious then, and even more obvious over the ensuing years and decades, that we shared the same passion for radiation oncology, and for academic pursuits.

Peiman was a vocal and effective advocate for enhancements in radiation oncology in his center and in Iran in general, through international research collaborations, conferences, workshops and other ways to grow the quality and safety radiotherapy agenda within his country. He was well respected and well liked by all of us who interacted with him, and we were very saddened to hear of his sudden passing. His legacy will remain, and collaborations between our centers continue, as created by him. Our condolences go to his dear wife and daughters, his colleagues and friends. We have lost a wonderful person, oncologist, colleague and friend.

Dr. Mohammad Ali Mohagheghi, Professor of Surgical Oncology, the Head of Cancer Research Center Prophet Mohammad said: “When a scientist passes away, the damage done is so great that nothing can compensate for it.” The loss of Dr. Peiman Haddad, who was a great scientist and a philanthropist physician is very sad and heartbreaking and the academic community, patients and his family have suffered a lot, with whom I sympathize whole-heartedly. Dr. Peiman Haddad who was a man of great character in terms of medical ethics, compassion, and service left us and I ask Almighty God’ mercy for him.

The founding fathers of Radiotherapy and Radio-Oncology Department at Iran Cancer Institute, Dr. Kamaledin Dehshiri, Dr. Akbar Ghaffarian, Dr. Abbas Etemad, Dr. Sajjadi, and Dr. Peiman Haddad always kept up-to-date with the latest scientific

advancements in the world to solve numerous problems faced by cancer patients. As a veteran member of this unique community in the Middle East, I am confident that the Radio-Oncology Department will continue its progress in the right way envisioned by honest and philanthropic efforts of the late professors at this center including Dr. Peiman Haddad.

Shahin Akhondzadeh PhD., D.Sc., FBPhS, Professor of Clinical Psychopharmacology, Department of Psychiatry, Tehran University of Medical Sciences In the late 1990's when Iran's scientific growth started, I was responsible for Tehran University of Medical Sciences' publications and I also conducted the university's scientometric activities. I learned that one of the faculty members at the Radio-Oncology Department of the University, Dr. Peiman Haddad, was publishing very influential articles in highly credible international journals and thus I was acquainted with Dr. Peiman Haddad. Later on, he helped me with the School of Medicine's International Relations tasks, and in those years. I realized that in addition to his scientific abilities, he is also very nice, good-hearted, and a family man. In spite of his numerous scientific abilities, he was very modest and I believe those who live with their hearts, like Dr. Haddad, have a short life expectancy just as it happened to him. I have lost a very dear friend. I hope all the kindness that Dr. Haddad dedicated to

his patients and his colleagues would make full circle and come back to his family by God's will. Farnaz Amouzegar Hashemi, Professor of Radiation Oncology, Tehran University of Medical Sciences As I am writing this, I still find it extremely difficult to believe that Dr. Peiman Haddad is no more among us. My residency coincided with the beginning of his career as an Assistant Professor in 1994. Our Late Professor, Dr. Dehshiri, had mentioned how smart Dr. Haddad was and what a bright future he would have in radiation oncology, and he was indeed a truly brilliant individual. He invented a practical wooden device for craniospinal irradiation in children which helped to significantly improve fixation and reproducibility of treatment, in an era that cobalt units and twodimensional treatments were the only facilities. It was through his efforts that our department participated in two big international trials: ABC and ATLAS. In addition to completing an official fellowship at Princess Margaret Cancer Center, Professor Haddad visited many radiation oncology departments all over the world and made a positive contribution to our community by bringing back new research and teaching ideas.

He was very honest, kind-hearted, and respectful to his patients, residents and all the staff. Moreover, he was truly a well-rounded and athletic individual. I was astonished when he first told us

about his hike from Tehran all the way to the North of Iran for 3 consecutive days. He was a motivation for residents and colleagues, and a true role model for all. “Instead of running away from difficulties, I prefer to encounter and deal with them.” This is one of his quotes that I will never forget. Though the Iranian Radiation Oncology Society has lost one of his most effective members, Dr. Haddad’s story is not over yet. He will always be remembered.

سابقه قائم مقام رئیس بیمارستان امید

- عضو منتخب شورای آموزش و پرورش مشهد
- پزشک نمونه سال ۱۳۸۵ سازمان نظام پزشکی و دانشگاه علوم پزشکی مشهد
- پزشک نمونه سازمان‌های بیمه‌گر
- سردبیر مجله نظام پزشکی مشهد
- عضو هیئت تحریریه مجله نظام پزشکی مشهد
- نویسنده و مترجم

ترجمه و چاپ کتاب پیشگیری از سرطان با همراهی دوستان در بیمارستان امید

- شاعر
- ایراد سخنرانی در کنفرانس‌های متعدد علمی پزشکی
- چاپ مقاله،کتاب

کتاب‌های چاپ شده:

سرطان پستان (مزد من این نبود)

سرطان پستان (آنچه در حاشیه گذشت)

و**کتاب در دست چاپ:**

پزشک سرطان خود سرطان گرفت

و**کتاب آماده چاپ:**

سرطان پستان، مادر، تو بمان

- سابقه دبیر اجرائی برگزاری کنفرانس سالانه رشته رادیوتراپی انکولوژی ایران در جامعه جراحان (تهران)
- چند دوره عضو هیئت مدیره انجمن بیماران سرطانی مشهد تا کنون

بزرگداشت

دکتر غلامحسین نوفرستی

دکتر غلامحسین نوفرستی هستم. متخصص رادیوتراپی انکولوژی (فارغ‌التحصیل از دانشگاه علوم پزشکی مشهد) شاغل در بیمارستان امید، که اخیراً بازنشسته شده‌ام.

متولد ۵ شهریور ۱۳۳۴ در فریمان و در یک خانواده معمولی، کارمندی، مذهبی و نسبتاً متوسط به‌دنیا آمدم. پدر مسئول اداره تلفن فریمان و مادر خانه‌دار بود. دارای دو برادر و یک خواهر.

خواهر بزرگ خانه‌دار، و برادرانم فرهنگی و من فرزند چهارم هستم.

در دوران تحصیل، تمایل اولیه من برای شغل افسری بود. اما با فوت پدر، و همزمان توصیه یکی از دبیران در دبیرستان، علاقمند به پزشکی شده و تصمیم به تلاش بیشتر نمودم.

در سال‌های آخر دبیرستان جزو شاگردان ممتاز بوده و شاگرد اول کلاس شدم. آن سال در کنکور برای رشته پزشکی توفیق حاصل نشد و بناچار به خدمت مقدس سربازی رفته و سپس با حمایت برادر بزرگ، راهی هندوستان شدم.

آنجا هم گرفتن پزشکی آسان نبود و رقابت سنگین و سخت. اما با تلاش موفق به اخذ پذیرش پزشکی در یکی از دانشگاه‌های دولتی بزرگ و معتبر علوم پزشکی هند در مرکز ایالت آندرا پرادش شده و در سال ۱۳۶۶ به وطن برگشتم دوره انترنی را به همراه همسر و دو فرزندم در منطقه جنگی و در اهواز گذراندم. سال ۷۰ در امتحان تخصصی پذیرفته شده و در دانشگاه علوم پزشکی مشهد و بیمارستان امید ادامه تحصیل داده و در پایان همانجا مشغول به کار شدم. از همان ایام دانشجوئی اغلب در فکر پیشرفت ایران و ملت ایران بودم. به همین جهت در خلوت خویش به ایده‌پردازی و بلندپروازی اندیشه پرداخته و به این امید که شاید روزی قابل استفاده و اجرا برای پیشرفت کشور موثر باشد. اکنون هم خدا را سپاس که می‌توانم دل‌های نگران بیماران سرطانی و خانواده محترم آنها را مرحم باشم.

رزومه کاری:

دکتر غلامحسین نوفرستی

متولد شهریور ۱۳۳۴

پزشک، متخصص رادیوتراپی انکولوژی

- شاغل در بیمارستان امید (مشهد) و اکنون در مرکز رادیوتراپی انکولوژی رضا (ع) و بیمارستان ناظران وابسته به انجمن حمایت از بیماران سرطانی مشهد
- دو دوره عضو هیئت مدیره انجمن رادیوتراپی انکولوژی ایران (تهران)

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Dr. Elahi Nasrin
Dr. Eshaghian Azam
Dr. Eshghi Peyman
Dr. Ghahremanpour Samaneh
Dr. Irajpour Alireza
Dr. Karami Maryam
Dr. Khanali Mojen Leila
Dr. Sadeghi Reza
Dr. Salmani Nayyere
Dr. Shirinabadi Farahani Azam
Dr. Toolabi Tahereh
Dr. Valizadeh Leila

Executive Committee of Oncology Nursing

Alphabetical

Almasi Elham
Dadashi Nasrin
Jamshidi Sousan
Kazemzadeh Zeynab
Khademi Fatemeh
Khobin Khoshnazar Tahereh Sadat
Mehrnoosh Nasrin
Mirzaee Somayyeh
Norouzi Nastaran
Pour Azar Parand

The Sixth International Clinical Oncology Congress

Scientific Committee of Medical Physics

Alphabetical

Alaei Parham
Bakhshandeh Mohsen
Dr. Alinaghizadeh Mohammad Reza
Dr. Geraily Ghazaleh
Dr. Jomehzadeh Ali
Dr. Mahdavi Seyyed Rabi
Dr. Mesbahi Asghar
Dr. Montaseri Atoosa
Dr. Mosleh Shirazi Mohammad Amin
Dr. Mostaar Ahmad
Dr. Saeb Mohsen
Dr. Stock Markus
Koghan Aydin
Parsaei Esmaeil
Rohani Seyyed Aliasghar

Executive Committee of Medical Physics

Alphabetical

Etemadi Ghazal
Golbaz Rezvan
Seifi Bahmand Fatemeh
Tajiki Sara
Yekkeh Dehghan Amir Bahador
Yousefi Mohammad Reza

Scientific Committee of Radiobiology

Alphabetical

Dr. Mozdarani Hossein
Dr. Pakniyyat Fatemeh

Scientific Committee of Radiotherapy Technologists

Alphabetical

Alizadeh Hamed
Farmani Mohammad Kazem
Hafezi Davood
Hajian Mohammad Esmaeil
Hashemi Saedeh
Hasomi Nafiseh
Mahdikhani Mohammad
Murik Omar
Nosrati Hassan
Shalchi Keyvan

Executive Committee of Radiotherapy Technologists

Alphabetical

Abbasi Simin

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Invited International Speakers

Dr. Markus Stock, PhD in Medical Physics
- Head of Medical Physics Department,
- MedAustron Ion Therapy Center, Austria

All my professional career I dedicated to improve treatment outcome of radiotherapy for cancer patients by implementing new technology. Starting from high precision radiotherapy using stereotactic techniques as well as IMRT, IGRT, VMAT and personalized adaptive radiotherapy. I was part of the team at the Medical University of Vienna who implemented for the first time VMAT for clinical treatments on Elekta machines. I also conducted a short research sabbatical at the University Medical Centre in Utrecht where I was involved in the MR-Linac project. After finishing the tenure track at the Medical University in Vienna 2014 I had the chance to participate in building up a dual particle facility in Austria as Head of Medical Physics of the MedAustron Ion Therapy Centre. Under my supervision and guidance MedAustron started first proton treatments in 2016 and first carbon ion treatments in 2019. I am accredited as Medical Physics Expert since 2007 and currently give lectures in three different Universities or University of Applied Sciences. I am also acting as reviewer for more than 15 Journals as well as international research proposals and conference contributions. Finally, I could also contribute to more than 60 publications as first-, senior or co-author in peer-review journals.

Dr. Razvan Galalae, MD., PhD,
Radiation Oncologist

- Director at MedAustron Ion Therapy Center, Austria
- Associate Professor at Christian-Albrechts-University of Kiel, Germany

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Invited International Speakers

Associate Professor Galalae has graduated in 1989 in Human Medicine at University of Hamburg in Germany, and specialized in the following years at Ostsee Clinic Damp and University Hospital Kiel in Germany in surgery, diagnostic radiology and radiation oncology.

He completed the board examination in radiation therapy and reached the Doctor Degree in Medicine (MD Degree) with Magna cum laude in 1999. In addition, in the same year, he passed the test of the ECFMC (Educational Commission for Foreign Medical Graduates) and received the US Medical Licensure. In 2005 he achieved the PhD Degree (German "Habilitation") along with the Venia Legendi (Title Associate Professor) in radiation therapy at the Christian-Albrechts-University of Kiel. In 2005 he was nominated as Co-Director of the Clinic for Radiotherapy at the Kiel University Hospital (KUH). From 2009 to 2011 he specialized in proton therapy and worked also as a senior scientist at Paul Scherrer Institute in Switzerland with Prof. Eugen Hug. In 2012 Associate Professor Razvan Galalae has been elected as head of a newly constructed high-technology radiotherapy department focusing on high-precision radiotherapy, brachytherapy, and stereotactic whole-body radiotherapy with automatic respiratory gating in West Germany at the Evangelical Clinics Gelsenkirchen, being the first German user of Elekta's Versa HD™ and first user worldwide with the combination C-RAD™ and Elekta's Versa HD™ systems. Between 2012 and 2019 this department became under the leadership of Associate Professor Galalae one of the most significant Interventional Radiooncology institutions in West Germany.

In addition, Associate Professor Razvan Galalae specialized in

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the early 1990s in image-guided brachytherapy and helped to develop and implement the Kiel method of prostate HDR brachytherapy. He published long-term results of this method as first scientist in the literature in 2002 (Red J. 2002 Jan 1; 52:81-90), and recently the 15-years outcomes (Brachytherapy. 2014; 13:117-22). He is active in DEGRO, ASTRO, ESTRO, GEC-ESTRO, ABS, EORTC Quality of Life Group and is also member in further numerous professional societies. Since 2006 he is developing as active scientific member of the Quality-of-Life Group (QLG) of EORTC many health-related quality of life (HRQOL) disease specific questionnaires, e.g., breast update, head & neck update, endometrium, cervix, and vaginal cancer etc. Since 1999 he is responsible and organizing a University Cooperation between KUH in Germany and Chiang Mai University in Thailand. Within this platform advanced gynecological image-guided adaptive brachytherapy, by CT, US and MRI, was developed and implemented. He also worked as an international expert and reviewer for the IAEA (International Atomic Energy Agency) in Vienna e.g., in North Africa.

He has released numerous publications (>220) in Peer Reviewed Journals and is member in Journal Editorial Boards e.g., Journal of Brachytherapy (official organ of American Brachytherapy Society), and also works as a consultant for courts as prostate cancer expert.

Dr. Pedro C Lara, MD., PhD,
Radiation/Clinical Oncologist

- Director Canarian Comprehensive Cancer Center, San Roque University Hospital, Spain
- Full Professor and Chair Oncology and Radiotherapy Universidad Fernando Pessoa Canarias
- President Radiation Oncology National Commission, Spanish Government Ministry of Health

The Sixth International Clinical Oncology Congress

Invited International Speakers

Prof. Pedro C Lara obtained his Medical Degree in 1985 in the University of Granada. During his medical studies was appointed as medical student in the Oncology Dept of the Granada University Hospital where was trained in Radiation Oncology from 1987 to 1991, including training stages at Instituto de Tumori de Milano (1987) MD Anderson Cancer Houston (1988) and Academisch Medisch Centre Amsterdam (1990). During this period, he was also involved in translational research obtaining the PhD degree in the University of Granada in 1988. In 1991 moved to the Radiation Oncology Dept of the University Hospital of Las Palmas, as Associate Professor of Radiation Oncology. In 1995 was hired by the European Cancer Center, to develop a project on radiation oncology translational research in the Netherlands Cancer Institute in Amsterdam. Being appointed as Professor of Radiation Oncology in the University of Las Palmas (1996) returns to the Canary Islands. At the present time, Prof Lara is Chair of Oncology and Radiotherapy Hematology Fernando Pessoa Canarias University, Spain. He is also Director of the Canarian Institute of Cancer Research and member of several oncological Spanish and European societies. His main fields of interest are clinical treatment of tumors, especially those related to hormonal promotion and translational research on predictive assays on tumor response to oncological therapies. He is actively publishing, editing and reviewing scientific articles and participating in national and international meetings. He is also founder of CEAMED, SA a biotechnology enterprise related to transference of technology from plants to antitumor active compounds. He created and serves as volunteer in the Canary Against Cancer Program, devoted to make cancer prevention information available for the Canarian society.

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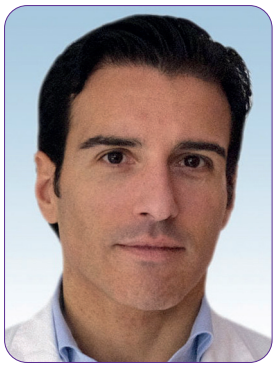

Dr. Filippo Alongi, MD, Radiation Oncologist

- Head of Advanced Radiation Oncology Department at IRCCS Sacro Cuore Don Calabria Cancer Care Center, Italy
- Associate Professor at University of Brescia, Italy

Previously, he was:
-Clinical researcher at the National Research Council (CNR Institute of Bioimaging and Molecular Physiology) where he conducted experimental studies on high technologies in the field of oncology (IORT, IMRT, MRgFUS).
-Responsible for "Prostate SBRT program" at radiotherapy and radiosurgery department of the Humanitas scientific Institute in Milan.
He conducted several studies as "principal investigator" or co-investigator "published in various journals (Radiotherapy and Oncology, International Journal of Radiation Oncology Biology Physics, Radiation Oncology, Acta Oncology, etc).
For the Italian Association of Radiotherapy and Clinical Oncology (AIRO), he had various positions including the role of national coordinator of the under 40 group and national secretary of the prostate group.
He was a member of the executive board and of the national scientific committee of AIRO. He was also the national coordinator of the uro-oncological group of the same association and now the coordinator of oligometastases AIRO group.
Prof. Alongi is the author of several book chapters, more than 300 scientific articles on radiotherapy and oncology (clinical studies, reviews, editorials on pubmed). He has been lecturer at more than 250 meetings and university courses, in Italy, Europe and other countries, including US. He presented more than 200 scientific communications as a speaker at national and international congresses / symposia. He is part of the "editorial board" of several journals in oncology and radiotherapy (Radiation Oncology, Technology in Cancer Research and Treatment, Tumori Journal) and is a reviewer for the EORTC, the European Organization of Research and Treatment of Cancer.
To consult the publications produced by prof Alongi click here:

www.ncbi.nlm.nih.gov/pubmed/?term=filippo+alongi

Dr. Matthias Guckenberger, MD, Radiation Oncologist

- Chairman of the Department of Radiation Oncology of the University Hospital Zurich (USZ)
- Full Professor at the University of Zurich (UZH)

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Invited International Speakers

Matthias Guckenberger (MG) is Chairman of the Department of Radiation Oncology of the University Hospital Zurich (USZ) and he is full Professor at the University of Zurich (UZH). He serves on the Board of Directors of the European Society for Radiation Oncology (ESTRO) and is member of the EORTC Radiation Oncology Science Council. His clinical and research focus is image-guided high-precision radiotherapy, especially for lung cancer, prostate cancer and oligometastatic disease. His work is published in > 350 Pubmed listed articles resulting in a h-index of 59 and two patents. The scientific achievements have been acknowledged with several national and international awards, most recently as “Honorary Physicist” by the ESTRO society in 2019.

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Dr. Stephanie Kroeze, MD, PhD, Radiation Oncologist

- Associate Professor at University hospital of Zurich, Switzerland

Stephanie Kroeze is a radiation oncologist at the Department of radiation oncology at the University Hospital Zürich. She does research in Oncology, especially in the field of Radiation Oncology. Her main specialty is in uro-oncology, lung carcinoma, and combination therapies of stereotactic radiotherapy and immunotherapy/targeted therapy. She is member of several international societies such as ESTRO, DEGRO Stereotaxie AG, e.g., Current projects are 'Toxicity and efficacy of stereotactic radiotherapy concurrent to targeted therapy or immunotherapy` as well as `The role of PSMA-PET imaging in radiotherapy of prostata cancer`.

Dr. Eugen Hug, MD, Radiation Oncologist

- Associate Professor and Medical Director at the MedAustron Ion Therapy Center, Austria

The Sixth International Clinical Oncology Congress

Invited International Speakers

Professor Dr. Eugen Hug holds the position of Medical Director and Co-Managing Director at the MedAustron Ion Therapy Center in Wiener Neustadt, Austria. Since the early 90s at Massachusetts General Hospital, he co-pioneered the introduction and expansion of Particle Therapy for various diseases into routine clinical practice. Amongst others, he held senior positions as the Director of the Paul Scherrer Proton Institute in Switzerland, Professor of Proton-Radiation at the University of Zurich, Professor of Radiation Oncology and Professor of Pediatrics at Dartmouth Medical School as well as CMO at ProCure of four proton centers in the USA. His clinical specialization focuses on pediatric malignancies, skull base tumors and sarcomas. He served as President of the Particle Therapy Cooperative Group (PTCOG) and is Co-Founder and Past-President of PTCOG North America. He has authored numerous publications, founded worldwide seminars and teaches extensively on Particle Therapy.

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Dr. Gül Başaran, MD, PhD, Medical Oncologist

- Associate Professor at Acibadem Healthcare Group, Turkey

prof. Dr. Gül Başaran graduated from Istanbul University Cerrahpaşa Faculty of Medicine in 1994. In 1999, she received specialization training at Marmara University Faculty of Medicine, Department of Internal Diseases. In 2003, she received minor training in the field of Medical Oncology at Marmara University Faculty of Medicine.

She worked at Marmara University Faculty of Medicine between 1999 and 2003, and at Universite Libre de Bruxelles, Cancerologie between 2001 and 2003. She is member of several oncology societies such as ESMO and ASCO.

Prof. Dr. Gül Başaran has several publications in international journals and has been serving in the Department of Medical Oncology, Breast Clinic at Altunizade Acıbadem Hospital since 2011.

Prof. Nuran Senel Bese

- Radiation Oncologist

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Invited International Speakers

Speciality: Oncology

Languages: English, French, Turkish

Graduated: 1995: (26 years since graduation)

Education: 1995: Istanbul University, Cerrahpasa Medical School, Department of Radiation Oncology, Istanbul Turkey, January 1995, Specialist Degree

Professional Experience:

October 5, 2006:
Professor in Radiation Oncology Istanbul University, Cerrahpaşa Medical School, Istanbul, Turkey. Consultant in Breast cancer, Gastrointestinal system cancers and Lymphoma unit

Sept 2010:
Acıbadem University, Maslak Hospital Breast Health Unit

May 15, 2006 - August 15, 2006:
Consultant in Applied Radiotherapy and Radiobiology Section International Atomic Energy Agency, Vienna, Austria

November 2000- October 2006:
Associate Professor in Radiation Oncology, Istanbul University, Cerrahpasa Medical School, Istanbul, Turkey.

January 1995- November 2000:
Specialist in Radiation Oncology, Istanbul University, Cerrahpasa Medical School,
Istanbul, Turkey.

September 1990 - January 1995:
Resident in Radiation Oncology, Istanbul University, Cerrahpasa Medical School,
Istanbul, Turkey.

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September - November 1993:
Fellow in Royal Marsden Hospital, Sutton, U.K
August 1989 - August 1990:
Medical Practitioner in Sisli Social Security Hospital, Istanbul, Turkey.
May 1989 - August 1989:
Medical Practitioner in Urfa Social Security Hospital, Urfa -Southern East, Turkey.

Memberships:

American Society of Breast Disease (ASBD)
European Society for Therapeutic Radiology and Oncology (ESTRO)
AROME (Association of Radiation Therapy and Oncology around the Mediterranean area-Executive Board Member-President of the Scientific Committee)
Turkish Radiation Oncology Society
Turkish Gynecologic Oncology Society
Turkish Oncology Group

Dr. Pia Osterlund, MD, PhD, Clinical Oncologist

- Associate Professor at Karolinska Institutet, Finland

The Sixth International Clinical Oncology Congress

Invited International Speakers

Pia Österlund holds MD, PhD and educational degrees from the Medical and University Pedagogy Faculty at University of Helsinki, Finland. She is consultant at Tampere University Hospital, Department of Oncology since September 2016. Before that she worked 20 years at Helsinki University Hospital Cancer Centre of Excellence and still works part-time there as researcher and study physician. She is married and has four children.

Dr Österlund was registered as a medical doctor in 1993 both in Finland and in Great Britain. She became board certified as a clinical oncologist (medical and radiation oncologist) in 2004, having trained at St Luke´s Hospital Guildford Surrey and Helsinki University Cancer Centre of Excellence. She completed her PhD program on "Tolerability of raltitrexed and 5-fluorouracil chemotherapy in colorectal cancer patients" in 2004. Thereafter she worked as and medical oncologist and senior lecturer with part-time research responsibilities. In September 2014 she became docent (associate professor) at the medical faculty at Helsinki University. She currently serves as a supervisor for 4 PhD theses.

She is actively involved in clinical and translational research with molecular targeted therapies. One of the main objectives of her research group is to identify new predictive markers of response to diverse treatments and to identify markers of toxicity and efficacy. She has been principal investigator for national and multinational phase I-III studies. For the past 20 years, she has performed unique clinical studies combining nutritional therapy, microbiology, tumour markers and immunologic studies to understand the mechanisms of toxicity and relieve adverse events during medical treatment of gastrointestinal cancer.

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Dr Österlund is a member of the Educational Board, Global Curriculum Working Group and Consensus guideline committee of the European Society for Medical Oncology (ESMO) and she is previous member of the Young Oncologists Committee and the Membership and National Representatives committee. She is also member of the American Society of Clinical Oncology (ASCO), the European society of digestive oncology (ESDO), the European Society for clinical nutrition and metabolism (ESPEN) and the Nordic biomodulation group. She is actively involved in (inter)national editorial boards and as a referee for distinguished journals and is PI for the Finnish colorectal study group and steering committee member for the Finnish GI-cancer group. She has (co)authored more than 80 peer-reviewed papers and educational books.

Dr. Andrea Necchi, MD, Medical Oncologist

- Associate Professor at Fondazione IRCCS Istituto Nazionale dei Tumori, Italy

Dr Necchi graduated in Medicine with honours at the University of Milan in 2004. From 2005 to 2008 he did his postdoctoral specialisation in Medical Oncology at the same University and a fellowship in Medical Oncology at the Fondazione IRCCS Istituto Nazionale dei Tumori, Milan, Italy, where from 2009 to 2011 he was assistant attending medical oncologist in Urologic Oncology. Dr Necchi achieved the European Certification in Medical Oncology (ESMO) in 2006 and the certification by the Italian Board of Medical Oncology in 2008.

Dr Necchi's research interest focuses on the medical treatment of germ-cell tumours and other genitourinary malignancies, including novel drugs and experimental therapies. He has been Principal Investigator and Co-investigator of several clinical studies.

Since 2011 he has been working for the Urologic Oncology Faculty at the Department of Medical Oncology, Fondazione IRCCS Istituto Nazionale dei Tumori, Milan, Italy.

Since 2013 Dr Necchi has been Treasurer of the EORTC Genitourinary Cancers Group. He is member of the Penile Cancer Guidelines Panel at the European Association of Urology (EAU) and since 2015 he has been member of the ESMO Faculty Group in Genitourinary cancers and Member of the ESMO OncologyPRO Working Group. He is also a member of other scientific societies such as ASCO, the American Urological Association (AUA), the Society of Urologic Oncology (SUO).

Dr Necchi has received several awards such as, in 2010, the Young Researchers Award in Medical Oncology by Fondazione IRCCS Istituto Nazionale dei Tumori, Milano, in 2011 the 1st Gianni Bonadonna Prize for New Drug Development in Oncology by the Michelangelo Foundation, Milan, in 2012 and 2013 the merit

award in Urothelial Cancer and in 2015 in Germ Cell Tumours by the Conquer Cancer Foundation of the American Society of Clinical Oncology (ASCO).

He has been invited speaker to many international congresses, and he is author and co-author of over 90 articles in peer-reviewed journals.

Prof. Enis Özyar

Radiation Oncologist

The Sixth International Clinical Oncology Congress

Invited International Speakers

Enis Ozyar M.D., graduated from Ankara University, Medical School, Ankara, Turkey in 1985 and finished his residency at Hacettepe University, School of Medicine, Department of Radiation Oncology, Ankara in 1993. He worked at the same department between 1993-2008. He obtained his associate professorship degree in 1998 and professorship degree in 2003. He was appointed as Chair and Professor of Radiation Oncology at the Acibadem MAA University, School of Medicine, Department of Radiation Oncology, Istanbul, Turkey in 2008. Dr. Ozyar currently works at flaghship hospital – Acibadem Maslak Hospital – of the Acibadem Health Group (AHG). AHG is the largest private health care group in Turkey and have 8 Radiation Oncology centers equipped with high tech systems such as Mr-Linac, IGRT-IMRT-SRT linac systems, robotic linacs, Gammaknife, brachytherapy and intraoperative radiotherapy. Dr. Ozyar is also working as coordinator of Radiation Oncology Centers of AHG. He is also charing Acibadem RTT school and Health Physics programme of Acibadem MAA University.

His main interest areas are head and neck cancer, prostate cancer, gynecological cancers, sterotactic radiotherapy and MR guided radiotherapy.

Dr. Ozyar published more than 100 manuscripts published in international SCI journals. His h-index is 27.

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Dr. Gokhan Aydin

- 23.07.1981 / İSTANBUL
- e-mail : gokhan.aydin@acibadem.com.tr
- address: Darussafaka Ave, Buyukdere Str, No:40
- Acibadem Maslak Hospital, Radiaotherapy Department Maslak / Sarıyer / İstanbul
- tel: 0212 304 47 05

The Sixth International Clinical Oncology Congress

Invited International Speakers

WORK EXPERINCE:

2009 — **Acibadem Maslak Hospital, İSTANBUL**
Radiation Oncology Department - Medical Physics Expert

- Varian TrueBeam Linear Accelarator
- Varian Trilogy Linear Accelarator
- Varian DHX Linear Accelarator (RapidArc / IMRT)
- ViewRay MR-Idian Linear Accelarator
- CyberKnife Robotic Linear Accelarator
- Varian VariSource HDR Remote Afterloading BrachyTherapy Unit
- LIAC Sordina İntraoperative Radiotherapy Machine
- PTW Dosimetry Systmens
- Sun Nuclear Dosimetry Systems
- Eclipse Treatment Planning Systems
- MultiPlan Treatment Planning Systems
- İplan Treatment Planning System

2008 - 2009 — **Acibadem Bursa Hospital, BURSA**
Radiotherapy Department - Medical Physicst Expert

2004 - 2008 — **Hacettepe University, ANKARA**
Faculty of Medicine – Radiation Oncology – Medical Physics Expert

- CyberKnife Robotic Linear Accelarator
- Elekta Synergy Platform Linear Accelarator
- Philips SL25 Lineer Accelarator
- Varian Acuity Simulator
- Theratronics 780C Cobalt-60 Teletherapy Machine

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- Theratronics 1000T Cobalt-60 Teletherapy Machine
- Microselectron HDR Remote Afterloading BrachyTherapy Unit
- PTW Dosimetry Systmens
- MultiPlan Tedavi Planlama Sistemi
- Precise Planlama Sistemi
- Plato Tedavi Planlama Sistemi
- TheraPlan Tedavi Planlama Sistemi

Program of

The 6th International Clinical Oncology Congress

The 16th Iranian Annual Clinical Oncology Congress

Endorsed by ESTRO

ISRO Iranian Society of Radiation Oncology

ISCO-ESMO Joint Session ESMO

Clinical Oncology Program

Day 1: Wednesday 16th February, 2022 - Main (International) Hall

Time	Topic	Speakers
Chairpersons: • Dr. Saeid Almasi (Radiooncologist) • Dr. Nasrin Amirifard (Radiooncologist) • Dr. Khosro Mojir Sheibani (Radiooncologist) • Dr. Seyyed Yousef Hosseini (Orologist) • Dr. Ali Kazemian (Radiooncologist)		
07:45 - 08:30	Genitourinary Cancers	**Debate:** **Adjuvant Treatment in Node Positive Prostate Cancer after Radical Prostatectomy** • Dr. Anya Jafari (Radiooncologist) • Dr. Masoome Sajjadi (Radiooncologist)
08:30 - 10:00		**Lecture 1:** **Utility of Multi Parametric MRI in Prostate Cancer** • Dr. Reza Kafash Nayeri (Urologist)
		Lecture 2: **Hormone Sensitive Recurrent Prostate Cancer: How Much Systemic Treatment is Necessary** • Dr. Amin Shafizad (Radiooncologist)
		Lecture 3: **State of the Art Radiotherapy for GU Cancers** • Dr. Razvan Galalae (Radiation Oncologist)
10:00 - 10:30	Particle Therapy	**Lecture:** **"The Role of Particle Therapy in Modern Radiation Oncology: The Added Clinical Value"** • Dr. Eugen Hug (Radiation Oncologist)
10:30 - 11:00	Break	

Time	Topic	Speakers
11:00 - 12:30	Head & Neck Cancers	**Panel Discussion** **Case Presentation on Modern Management of Hypopharyx & Larynx Tumors** **Moderator:** • Dr. Pedram Fadavi (Radiooncologist) **Panelist:** (Alphabetical) • Dr. Keyvan Aghazadeh (Surgeon) • Dr. Aslan Ahmadi (Surgeon) • Dr. Mansour Ansari (Radiooncologist) • Dr. Pegah Baba Heydarian (Pathologist) • Dr. Negin Farshchian (Radiooncologist) • Dr. Omid Motamedi (Radiologist)
12:45 - 14:00 **(Seihoon Hall)**	**Satellite Symposium (Amgen) (Colorectal Cancer)** **The Evolving Therapeutic Landscape for mCRC:** **A Case-Scenario Approach to Discuss the Patient and Disease-Specific Factors Critically Important to the Optimal Treatment Selection;** **an Expert Point of View**	
Chairpersons: • Dr. Abdolah Fazlazlizadeh (Radiooncologist) • Dr. Farshad Seyed Nejad (Radiooncologist) • Dr. Simin Hemmati (Radiooncologist) • Dr. Azam Sadat Mousavi (Gyno oncologist) • Dr. Abdolazim Sedighi (Radiooncologist)		
14:00 - 15:00	Gynecological Cancers	**Lecture 1:** **Evidence-based Radiotherapy for GYN Cancers** • Dr. Razvan Galalae (Radiation oncologist)
		Lecture 2: **Management of Incompletely Resected Endometrial Cancer** • Dr. Shadi Zohorinia (Radiooncologist)
15:00 - 16:30	ISCO-ESMO Joint session: Ground-breaking trials of 2021	**Moderator:** • Dr. Maisa Yamrali (Radiooncologist) **Ground-breaking trials of 2021, Breast cancer** • Dr. Gul (atalay) Basaran (Medical oncologist) **Ground-breaking trials of 2021, GI cancers** • Dr. Pia Österlund (Clinical oncologist) **Ground-breaking trials of 2021, GU cancers** • Dr. Andrea Necchi (Medical oncologist)

The Sixth International Clinical Oncology Congress

Main Hall

Day 2

Thursday
Feb 17
2022

Day 2: Thursday 17th February, 2022 - Main (International) Hall

Time	Topic	Speakers
Chairpersons: • Dr. Behrouz Pazoki (Radiooncologist) • Dr. Alireza Naseri (Radiooncologist) • Dr. Bahram Mofid (Radiooncologist) • Dr. Nahid Nafisi (Breast Surgeon)		
07:45 - 08:30	Breast Cancer	**Debate:** **Role of Adjuvant Radiotherapy after Complete Response to Neoadjuvant Chemotherapy in Breast Cancer** • Dr. Eghdam Zamiri (Radiooncologist) • Dr. Maliheh Dayani (Radiooncologist)
08:30 - 10:00		**Lecture 1:** **Combined Radiotherapy and Immunotherapy in Breast Cancer: Biological Basis and Clinical Results** • Dr. Pedro C. Lala (Radiation Oncologist)
		Lecture 2: **Recent Breast RT Studies from San Antonio Symposium** Moderator: • Dr. Ahmad R. Mafi (Radiooncologist) Speaker: • Dr. Nuran Senel Bese (Radiation Oncologist)
		APBI in Breast Cancer Treatment • Dr. Pedro C. Lala (Radiation Oncologist)
10:15- 10:45 (Seihoon Hall)	Break	**Satellite Symposium** **Transformed HER Journey: New Updates in Breast Cancer Treatment (Roche)**

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Time	Topic	Speakers
11:00 - 12:30	Health Policy	**Panel Discussion** **Moderator:** • Dr. Payam Azadeh **Panelist:** (Alphabetical) • Dr. Hossein Foudazi • Dr. Hossein Ghanaati • Dr. Hamidreza Jamshidi • Dr. Abbas Kebriyaei Zadeh • Dr. Sajad Mokhber • Dr. Nader Oliayimanesh
12:45 - 14:00 (Seihoon Hall)	**Satellite Symposium (Pierre Fabre) (Breast Cancer)** **Optimizing Early HER2-positive Breast Cancer Treatment**	
Chairpersons: • Dr. Ahmad Mosallaee (Radiooncologist) • Dr. Mir Ahmad Mousavizadeh (Radiooncologist) • Dr. Seyyed Mohammad Hosseini (Radiooncologist) • Dr. Mohamad Hassan Larizadeh (Radiooncologist)		
14:00 - 15:00	Lung Cancer	**Lecture 1:** **Updates on First line Therapy for Limited Stage and Extensive Stage SCLC** • Dr. Maryam Garousi (Radiooncologist)
		Lecture 2: **Evolving Immuno-oncology Treatment Paradigm in NSCLC** • Dr. Reyhane Bayani (Radiooncologist)
15:00 - 16:30		**Panel Discussion** **Case Presentation on Synchronous Oligo-metastases in NSCLC** **Moderator:** • Dr. Mohammad Shadmehr (Thorax Surgeon) **Panelist:** (Alphabetical) • Dr. Amir Aledavood (Radiooncologist) • Dr. Mehrdad Bakhshayesh Karam (Radiooncologist) • Dr. Abtin Doroodi Nia (Nuclear Medicine Specialist) • Dr. Maryam Mabani (Hemathology Oncologist) • Dr. Mona Malekzadeh (Radiooncologist) • Dr. Mihan PourAbdollah (Pathologist) • Dr. Kambiz Sheikhi (Thorax Surgeon)

The Sixth International Clinical Oncology Congress

Main Hall

Day 3

Friday
Feb 18
2022

Day 3: Friday 18th February, 2022 - Main (International) Hall

Time	Topic	Speakers
Chairpersons: • Dr. Mohamad Reza Ghavam Nasiri (Radiooncologist) • Dr. Hossein Madani (Radiooncologist) • Dr. Shapour Omidvari (Radiooncologist) • Dr. Dariush Moslemi (Radiooncologist)		
07:45 - 08:30	GI Cancers	**Debate:** **Neo-adjuvant Chemotherapy or Chemoradiation for Type1/2 GEJ Cancers** • Dr. Aynaz Soorati (Radiooncologist) • Dr. Hamid Saeedi Saedi (Radiooncologist)
08:30 - 09:00		**Lecture 1:** **MR-LINAC Based Radiotherapy** Speaker: • Dr. Enis Ozyar (Radiation Oncologist)
09:00 - 10:00	Pediatric Cancers	**Panel Discussion** **Approach to Childhood Cancers according to WHO and GICC Initiative Case Presentation on Medulloblastoma** Moderator: • Dr. Bahar Moini (Radiooncologist) Panelist: (Alphabetical) • Dr. Mitra Ghalibafian (Radiooncologist) • Dr. Zohreh Habibi (Pediatric NeuroSurgeon) • Dr. Shaghayegh Hasas Yegane (Radiooncologist) • Dr. Helen Nayeri (Radiologist) • Dr. Alireza Sadeghi Pour (Pathologist) • Dr. Mandana Tasbihi (Pediatric Hematologist)
10:00 - 10:30	Break	
10:30 - 11:00		**Lecture:** **Oligoprogression in Oligometastatic Prostate Cancer** Moderator: • Dr. Farshid Farhan (Radiooncologist) Speaker: • Dr. Filippo Alongi (Radiation Oncologist)

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Time	Topic	Speakers
11:00 - 12:30	ISCO-ESTRO Joint session: Introduction to SBRT	**Moderator:** • Dr. Sara Samiee (Radiooncologist) **Definition of SBRT** • Dr. Matthias Guckenberger (Radiation Oncologist) **Evidence-based Indications for SBRT in Current International Guidelines** • Dr. Matthias Guckenberger (Radiation Oncologist) **Toxicity of SBRT alone and in Combination with Systemic Therapy** • Dr. Stephanie Kroeze (Radiation Oncologist)
12:45 - 14:00 (Seihoon Hall)	**Satellite Symposium (Merck) (H&N Cancers)** **New Options to Maximize Treatment Outcomes in Recurrent/Metastatic SCC of Head and Neck**	

Oncology Nursing Program

Day 1: Wednesday 16th February, 2022 - Tooska Hall

Time	Topic	Speakers
08:00 - 08:15	Recitation of Quran	
08:15 - 08:30	**Opening & Welcome Remarks**	• Dr. Maryam Rassouli (Professor at SBMU)
08:30 - 08:50	**Oncology Nursing in Iran & Running Programs of Deputy of Nursing**	• Dr. Abbas Ebadi (Deputy of Nursing)
08:50 - 09:10	**Role of NGOs in Cancer Control Programs**	• Dr. Reza Sadeghi
09:10 - 09:30	**Integrative Oncology and Barriers of Nursing Research in this area**	• Dr. Maryam Rassouli
09:30 - 09:50	**Psychological and Spiritual Aspects of Cancer Care**	• Dr. Azam Shirin Abadi Farahani
09:50 - 10:10	**Ethical Challenges in Cancer Care**	• Dr. Abbas Abbaszadeh
10:10 - 10:30	**Challenges of Cancer Care in Covid-19 Pandemic**	• Dr. Hadis Ashrafizadeh
10:30 - 11:00	Coffee Break	
11:00 - 12:45	**Fundamentals of Palliative Care in Cancer (Panel Discussion) WHO working group**	
	Question and answer	
12:45 - 14:00	Lunch	
14:00 - 16:00	**Rehabilitation in Cancer (Workshop)**	• Dr. Marzieh Babaei • Dr. Arash Babaaei • Dr. Samaneh Ghahremanpour • Leila Angouto Ashnazi

Day 2: Thursday 17th February, 2022 - Tooska Hall

Time	Topic	Speakers
08:00 - 08:10	Review of Day One	
08:10 - 08:30	**Nursing Care in New Treatment Approaches (Target and immune-therapy**	• Dr. Salman Barasteh
08:30 - 08:50	**Caring Needs of Women Caregiver's of Patients with Cancer**	• Dr. Maryam Ehsani
08:50 - 09:10	**Symptom Management**	• Dr. Leila Khanali Mojen
09:10 - 09:30	**Challenges of survivorship in Cancer**	• Dr. Azam Eshaghian
09:30 - 09:50	**Pediatric Palliative Care**	• Dr. Peyman Eshghi
09:50 - 10:10	**Hospice Care**	• Dr. Samira Beyranvand
10:10 - 10:30	**Interdisciplinary Palliative Care**	• Dr. Alireza Irajpour
10:30 - 11:00	Coffee Break	
11:00 - 12:30	**New Areas in Oncology Nursing (Panel Discussion)**	• Dr. Babak Abdolkarimi • Dr. Tahereh Toolabi • Dr. Leili Borimnezhad • Dr. Nasrin Elahi • Dr. Azadeh Amiri • Dr. Leila Valizadeh • Dr. Kimia Karami • Dr. Nayereh Salmani
12:30 - 12:45	**Question and Answer**	
12:45 - 14:00	Lunch	
14:00 - 16:00	**Oncology Emergencies (Workshop)**	• Dr. Maryam Karami

Clinical Radiobiology & Medical Physics Program

Day 1: Wednesday 16th February, 2022 - Hegmataneh Hall

The Sixth International Clinical Oncology Congress

Hegmataneh Hall

Day 1

Wednesday
Feb 16
2022

Time	Topic	Speakers
Session 1		
08:00 - 08:30	**Radiobiological and Radio Genomic Approaches toward Precision and Personalized Radiotherapy**	• Dr. Hossein Mozdarani
08:30 - 09:00	**Image Guidance in Radiation Therapy – Current Practice and Imaging Dose**	• Dr. Parham Alaie
09:00 - 09:30	**Radiotherapy Status in Iran**	• Dr. Mohammad Reza Barzegar Tahamtan
09:30 - 10:00	**Radiobiology of Treatment Interruption in Radiation Therapy and Treatment Management**	• Dr. Sara Samie
10:00 - 10:30	**The Radiobiological Aspects of Hypofractionation, SRS , and SBRT Techniques**	• Dr. Mohsen Bakhshandeh
Session 2		
11:00 - 11:30	**Particle Therapy: Treatment Methods and Techniques**	• Dr. Markus Stock
11:30 - 12:00	**Accident Prevention in Radiation Therapy**	• Dr. Ahmad Mostaar
12:00 - 12:30	**Tomotherapy: Patient QA Aspect**	• Aliasghar Rohani
12:30 - 13:00	**A Review of Mitochondria's Pivotal Role in Cancer Metabolism**	• Dr. Farzad Taghizadeh-Hesari

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Day 2: Thursday 17th February, 2022 - Hegmataneh Hall

Time	Topic	Speakers
Session 1		
08:00 - 08:30	**Radiobiology of Grid and Hypofractionated Radiotherapy**	• Dr. Fathemeh Pakniyat
08:30 - 09:00	**Helical Tomotherapy: An Example of Brain Tumor Treatment Planning**	• Dr. Seyed Rabie Mahdavi
09:00 - 09:30	**A Review of the Advanced Treatment Techniques: SIMT and Small Fields SBRT; Dosimetry, Deliverability, and Verification Methods**	• Dr. Esmaeil Parsaie
09:30 - 10:00	**Stereotactic Radiosurgery (SRS) Treatment: Technique and Experiences**	• Dr. Gokhan Aydin
10:00 - 10:30	**Gating System in Radiation Therapy**	• Dr. Markus Stock
Session 2		
11:00 - 11:30	**MR-Linac: Workflow and Plan QA**	• Dr. Gokhan Aydin
11:30 - 11:50	**MRI Only Treatment Planning in Radiation Therapy Using Machine Learning Algorithms**	• Dr. Niloofar Yousefi Motaghaed
11:50 - 12:30	**MRI Simulator Experience in a Radiotherapy Department**	• Dr. Mohammad Reza Alinaghizadeh
12:30 - 13:00	**SRS: Linac and Gamma Knife**	• Dr. Atousa Montaseri

Radiation Technologist's Program

Day 1: Wednesday 16th February, 2022 - Hegmataneh Hall

Time	Topic	Speakers
14:00 - 14:30	**A Review on "Toward Safer Radiotherapy"**	• Mr Hasan Nosrati
14:30 - 15:00	**Practical Tips for More Accurate Targeting in IGRT**	• Eng. Mohammad Mehdi Khani
15:00 - 15:30	**Radiotherapy in Corona Pandemic Era**	• Miss Saedeh Hashemi

Day 2: Thursday 17th February, 2022 - Hegmataneh Hall

Time	Topic	Speakers
14:00 - 14:30	**Management of Unscheduled Radiotherapy Treatment Interruptions: A Guideline Review**	• Mr Hamed Alizadeh
14:30 - 15:00	**A Review on Immobilization Guidelines for Head and Neck Patients**	• Mr Mohammad Kazem Farmani
15:00 - 15:30	**A Report from One of the First IMRT Experiences in Iran: An RTT Perspective**	• Miss Nafiseh Hasoomi

Index
Alphabetical

Name	Hall	Day	Time
Abbaszadeh Abbas	Tooska	Day 1	09:50
Abdolkarimi Babak	Tooska	Day 2	11:00
Aghazadeh Keyvan	Main	Day 1	11:00
Ahmadi Aslan	Main	Day 1	11:00
Alaie Parham	Hegmataneh	Day 1	08:30
Aledavood Amir	Main	Day 2	15:00
Alinaghizadeh Mohammad Reza	Hegmataneh	Day 2	11:50
Alizadeh Hamed	Hegmataneh	Day 2	14:00
Almasi Saeid	Main	Day 1	07:45
Alongi Filippo	Main	Day 3	10:30
Amiri Azadeh	Tooska	Day 2	11:00
Amirifard Nasrin	Main	Day 1	07:45
Angouto Ashnazi Leila	Tooska	Day 1	14:00
Ansari Mansour	Main	Day 1	11:00
Ashrafizadeh Hadis	Tooska	Day 1	10:10
Aydin Gokhan	Hegmataneh	Day 2	09:30
	Hegmataneh	Day 2	11:00
Azadeh Payam	Main	Day 2	11:00
Babaei Marzieh	Tooska	Day 1	14:00
Babaaei Arash	Tooska	Day 1	14:00
Baba Heydarian Pegah	Main	Day 1	11:00
Bakhshandeh Mohsen	Hegmataneh	Day 1	10:00
Bakhshayesh Karam Mehrdad	Main	Day 2	15:00
Barasteh Salman	Tooska	Day 2	08:10
Barzegar Tahamtan Mohammad Reza	Hegmataneh	Day 1	09:00
Basaran Gul (atalay)	Main	Day 1	15:00
Bayani Reyhane	Main	Day 2	14:00
Beyranvand Samira	Tooska	Day 2	09:50
Borimnezhad Leili	Tooska	Day 2	11:00
Dayani Maliheh	Main	Day 2	07:45
Doroodi Nia Abtin	Main	Day 2	15:00
Ebadi Abbas	Tooska	Day 1	08:30
Ehsani Maryam	Tooska	Day 2	08:30
Elahi Nasrin	Tooska	Day 2	11:00
Eshaghian Azam	Tooska	Day 2	09:10
Eshghi Peyman	Tooska	Day 2	09:30
Fadavi Pedram	Main	Day 1	11:00
Farhan Farshid	Main	Day 3	10:30
Farmani Mohammad Kazem	Hegmataneh	Day 2	14:30
Farshchian Negin	Main	Day 1	11:00
Fazlazlizadeh Abdolah	Main	Day 1	14:00
Foudazi Hossein	Main	Day 2	11:00
Galalae Razvan	Main	Day 1	08:30
	Main	Day 1	14:00
Garousi Maryam	Main	Day 2	14:00
Ghalibafian Mitra	Main	Day 3	09:00

Name	Hall	Day	Time
Ghahremanpour Samaneh	Tooska	Day 1	14:00
Ghanaati Hossein	Main	Day 2	11:00
Ghavam Nasiri Mohamad Reza	Main	Day 3	07:45
Guckenberger Matthias	Main	Day 3	11:00
Habibi Zohreh	Main	Day 3	09:00
Hasas Yegane Shaghayegh	Main	Day 3	09:00
Hashemi Saedeh	Hegmataneh	Day 1	15:00
Hasoomi Nafiseh	Hegmataneh	Day 2	15:00
Hemmati Simin	Main	Day 1	14:00
Hosseini Seyyed Mohammad	Main	Day 2	14:00
Hosseini Seyyed Yousef	Main	Day 1	07:45
Hug Eugen	Main	Day 1	10:00
Irajpour Alireza	Tooska	Day 2	10:10
Jafari Anya	Main	Day 1	07:45
Jamshidi Hamidreza	Main	Day 2	11:00
Kafash Nayeri Reza	Main	Day 1	08:30
Karami Kimia	Tooska	Day 2	11:00
Karami Maryam	Tooska	Day 2	14:00
Kazemian Ali	Main	Day 1	07:45
Kebriyaei Zadeh Abbas	Main	Day 2	11:00
Khanali Mojen Leila	Tooska	Day 2	08:50
Kroeze Stephanie	Main	Day 3	11:00
Lala Pedro C.	Main	Day 2	08:30
Larizadeh Mohamad Hassan	Main	Day 2	14:00
Mabani Maryam	Main	Day 2	15:00
Madani Hossein	Main	Day 3	07:45
Mafi Ahmad R.	Main	Day 2	08:30
Mahdavi Seyed Rabie	Hegmataneh	Day 2	08:30
Malekzadeh Mona	Main	Day 2	15:00
Mehdi Khani Mohammad	Hegmataneh	Day 1	14:30
Mofid Bahram	Main	Day 2	07:45
Moini Bahar	Main	Day 3	09:00
Mojir Sheibani Khosro	Main	Day 1	07:45
Mokhber Sajad	Main	Day 2	11:00
Montaseri Atousa	Hegmataneh	Day 2	12:30
Mosallaee Ahmad	Main	Day 2	14:00
Moslemi Dariush	Main	Day 3	07:45
Mostaar Ahmad	Hegmataneh	Day 1	11:30
Motamedi Omid	Main	Day 1	11:00
Mousavi Azam Sadat	Main	Day 1	14:00
Mousavizadeh Mir Ahmad	Main	Day 2	14:00
Mozdarani Hossein	Hegmataneh	Day 1	08:00
Nafisi Nahid	Main	Day 2	07:45
Naseri Alireza	Main	Day 2	07:45
Nayeri Helen	Main	Day 3	09:00
Necchi Andrea	Main	Day 1	15:00
Nosrati Hasan	Hegmataneh	Day 1	14:00
Oliayimanesh Nader	Main	Day 2	11:00
Omidvari Shapour	Main	Day 3	07:45
Österlund Pia	Main	Day 1	15:00
Ozyar Enis	Main	Day 3	08:30
Pakniyat Fathemeh	Hegmataneh	Day 2	08:00

Name	Hall	Day	Time
Parsaie Esmaeil	Hegmataneh	Day 2	09:00
Pazoki Behrouz	Main	Day 2	07:45
PourAbdollah Mihan	Main	Day 2	15:00
Rassouli Maryam	Tooska	Day 1	08:15
	Tooska	Day 1	09:10
Rohani Aliasghar	Hegmataneh	Day 1	12:00
Sadeghi Pour Alireza	Main	Day 3	09:00
Sadeghi Reza	Tooska	Day 1	08:50
Saeedi Saedi Hamid	Main	Day 3	07:45
Sajjadi Masoome	Main	Day 1	07:45
Salmani Nayereh	Tooska	Day 2	11:00
Samiee Sara	Main	Day 3	11:00
Samie Sara	Hegmataneh	Day 1	09:30
Sedighi Abdolazim	Main	Day 1	14:00
Senel Bese Nuran	Main	Day 2	08:30
Seyed Nejad Farshad	Main	Day 1	14:00
Shadmehr Mohammad	Main	Day 2	15:00
Shafizad Amin	Main	Day 1	08:30
Sheikhi Kambiz	Main	Day 2	15:00
Shirin Abadi Farahani Azam	Tooska	Day 1	09:30
Soorati Aynaz	Main	Day 3	07:45
Stock Markus	Hegmataneh	Day 1	11:00
	Hegmataneh	Day 2	10:00
Taghizadeh-Hesari Farzad	Hegmataneh	Day 1	12:30
Tasbihi Mandana	Main	Day 3	09:00
Toolabi Tahereh	Tooska	Day 2	11:00
Valizadeh Leila	Tooska	Day 2	11:00
Yamrali Maisa	Main	Day 1	15:00
Yousefi Motaghaed Niloofar	Hegmataneh	Day 2	11:30
Zamiri Eghdam	Main	Day 2	07:45
Zohorinia Shadi	Main	Day 1	14:00


Pooster Presentation
A9 نانو دارو
B5
B6
B7
A8
A7 بهیار صنعت سپاهان
A6 تیناگراس
A5 رسول‌زاده
A4 سبحان
Break
A24 دارویی کیمیا
A23 دارویی کیمیا
A22 نانوالوند
A21 نانو الوند
Hall B
A10 پویش دارو
A11 آسترازنکا
A12 MSD
A13 امجن
B4 ایده گستر
B3 مشاورین طب سینا
B2 نوارتیس
B1 ساندوز
B8 واران پرتو درمان
B9 بهبود سرما
B10 مطلب کیش
B11 واریان فارمد
B12 همافارمد
B13 فاران شیمی
Hall C
Break
B14 Merck
A20 سیناژن
A19 سیناژن
A18 اکتور
A17 اکتور
A14 عبیدی
A15 عبیدی
A16 پیرفابر
B17
B16
B15 مطلب کیش
A3 سبحان
A2 اکویدا
A1 الکتا
سالن کنفرانس
Registration
مدیریت نمایشگاه
دفتر نمایشگاه
کافی شاپ
ورود بازدیدکنندگان
صدور کارت
پلیس
رادیو
انبار

Abstracts & Posters of

The 6th International Clinical Oncology Congress

The 16th Iranian Annual Clinical Oncology Congress

Endorsed by ESTRO

ISRO Iranian Society of Radiation Oncology

ISCO-ESMO Joint Session ESMO

Systematic Review on Comparing the Effectiveness of Fractionated Proton Therapy and Stereotactic Radiosurgery (SRS) for Treatment of Schwannoma

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4. Cancer Research Centre, Shahid Beheshti University of Medical Science, Tehran, IR Iran

Background:

Till now, the most effective treatment for progressive cranial nerve schwannomas has been complete surgical resection. Based on recent data, stereotactic radiosurgery (SRS) seems to be a superior modality regarding the risk of cranial nerve damage in schwannomas smaller than 3 cm with excellent local control rates in comparison with surgical resection, and it is mentioned in the European Association of Neuro-Oncology (EANO) guidelines as a valid modality. There is lack of systematic reviews for these issues in literatures. Here we have reviewed the data that have compared the effectiveness and toxicity of fractionated PBRT and SRS for cranial nerve schwannomas.

Methods:

We reviewed published studies between November 1992 and December 2021 in PubMed using these keywords: schwannoma, hearing disorders, SRS, proton therapy and management. The report was based on the outcomes including linear accelerators (Linac), Gamma Knife SRS and proton therapy.

Results: This review included 20 studies comprising a total of 560 patients. Tumor control rates after SRS was 92.3% (range 90.1–94.5; $p < 0.001$). Clinical worsening rate was 10.7% (range 7.6–13.8, $p < 0.001$). For gamma knife, a control rate of 98% after a median follow-up of 5.8 years was reported. Meta-analysis indicated median 43% of schwannomas had progressed in a follow-up period of 3.2 years. 95 patients had been treated with fractionated proton, with local control rates of 92%-95% for the follow-up period of 6 months.

Hearing preservation was maintained in 44–64% of the patients. Stereotactic radiosurgery for CNS is associated with high tumor control rates and favorable clinical outcomes. It is better to aware the patients about the risk of tumor progression and potential clinical worsening.

Eligibility evaluation was performed independently in an unblended manner by 2 reviewers (F.F. and R.A.), on the basis of the inclusion criteria. Proton Therapy for cranial nerve schwannoma proved to be effective. No schwannoma progression was observed, and therefore, 100% effectiveness can be documented for the follow-up period of 3.5 years in median. These success rates for proton beam radiotherapy are promising.

Discussion:

literature demonstrates the data that proved rates for hearing preservation and local control for both fractionated RT and single fraction SRS, and the dose of single fraction SRS was significantly affected hearing preservation.

Beside, according to many studies, single fraction SRS is suitable for smaller lesions, while FSRT may be used independently of tumor size and should be used in larger tumors (with contact to the brainstem).

There are many parameters that can influence the probability of functional hearing preservation after SRS, making evaluation of treatment effect alone difficult. Prognostic factors for hearing preservation after treatment include

pretreatment limited hearing loss that is typically, targets up to 3.0 cm in maximal diameter are suitable for management with SRS.

Keywords: Fractionation, Proton Therapy, SRS, Schwannoma

Evaluation of Effective Factors in the Incidence and Mortality of Cancer Patients with COVID-19

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2. Medical Sciences, Isfahan, Iran, Student Research Committee, Isfahan University Ofimagingedical Master Student of m

Introduction:

Unfortunately, the globe is currently dealing with a fresh coronavirus outbreak, which began in Wuhan, China, in December 2019. Most patients experience fever, dry cough, and shortness of breath as symptoms. COVID-19 can produce extrapulmonary symptoms as well as digestive difficulties in people who do not have respiratory symptoms. It can cause diarrhea, vomiting, and anorexia. Coughing, sneezing, breathing, and talking disseminate the SARS-CoV-2 virus, mostly by droplets. Cancer is the world's second leading cause of death. According to global estimates, breast cancer (2.26 million cases) and lung cancer (2.21 million cases) were the most prevalent types of cancer reported in 2020. In the COVID-19 outbreak, cancer patients were regarded as a particularly vulnerable group, with a greater fatality rate than the general population. Cancer patients appear to be twice as likely as the general population to contract SARS-CoV-2.

Method:

This abstract is a review and is based on published studies up to September 2021. To collect articles, search the PubMed, Scopus, Goggle Scholar, EMBASE, Elsevier, Web of Sciences, Springer Link, ScienceDirect, and Scifinder databases using the keywords MeSH: "SARSCoV2" or "SARS2" or "2019-nCoV" or "New Corona" virus 2019 " or " mortality " or " malignant " or " solid cancer " or " leukemia "was searched and published in various languages.

Results:

The severity of the coronavirus effect on cancer patients is determined by the type of cancer, recent chemotherapy, radiation therapy, or surgical sessions, and the presence of underlying disorders (diabetes, cardiovascular disease, and metabolic syndrome). Evidence suggests that cancer patients who have undergone surgery and developed COVID-19 have a significantly higher risk of serious clinical events than those who have not. Infection with COVID-19 was associated with a higher rate of malignancy and consequences in acute cases (50.0%) than in non-acute cases (15.6%). In fact, the 30-day increase in Covid-19 mortality is associated with a variety of clinical prognostic factors, including age, male gender, smoking status (ex-smoker), cancer status, and treatment with hydroxychloroquine plus azithromycin.

Conclusions:

Cancer patients have a higher rate of COVID-19 (SARS-COV-2) infection than the general population. Hospitalization and mortality rates of Covid-19 cancer patients under the
influence of factors such as underlying disease, age, gender, race, type of cancer, history Smoking and surgery The severity of the effect of the coronavirus on cancer patients is determined by the type of cancer, chemotherapy, radiation therapy, or recent surgical sessions, and the presence of underlying disorders such as diabetes, cardiovascular disease, and metabolic syndrome. Patients with leukemia were also twice as likely to die from COVID-19 as solid cancer patients.

Keywords: COVID-19 , SARSCoV2, Solid Cancer, Mortality, Leukaemia

Presenting of a Novel Approach in Kilovoltage X-ray Imaging Dose Calculation for Image-Guided Radiotherapy

Heidarloo Nematollah, Aghamiri Seyed Mahmoud Reza

Shahid Beheshti University

Bachground:

Commercial treatment planning systems use model-based dose calculation algorithms and water energy deposition kernels to calculate the three-dimensional dose distribution of mega-voltage radiotherapy. These algorithms have limitations in calculating the dose of kilo-voltages radiotherapy beams and the absorbed dose in anatomical structures with high density and atomic numbers such as bone with 300% error. Due to the growing trend of image guidance approaches in modern methods of radiation therapy and delivery of significant doses to healthy tissues of patients (especially children), a need is viewed for imaging dose management during radiation therapy and imaging dose calculation in case of exceeding the allowable dose threshold.

Research Aim:

This dissertation aims to introduce, extract and determine the characteristics of energy-specific energy deposition kernels for kilo-voltages photon beams below 150 keV, and utilize those in model-based dose calculation algorithms to achieve three-dimensional dose distribution of kV imaging beam applied in radiation therapy with image guidance.

Research Method:

EDKnrc Monte Carlo code was used to extract material-specific energy deposition kernels. Tissues in the human body were employed to extract material-specific energy deposition kernels. To determine the properties of kernels, kernel evaluation parameters such as energy fraction and effective kernel distances were utilized. These algorithms were generalized to apply energy deposition kernels to model-based computational algorithms. The characterization of the radiation source of the Elekta XVI system was performed using practical measurements and Monte Carlo calculations. Comparison and evaluation of the results of Monte Carlo calculations and practical measurements were conducted using gamma analysis. Using material-specific energy deposition kernels and convolution/superposition-based algorithm, the three-dimensional dose distribution of kV imaging beams was

estimated in the homogeneous phantom and the real patient. The three-dimensional dose distribution obtained from the Monte Carlo method was employed to validate the results of the proposed approach of dose calculation in the homogeneous phantom and the real patient. The medium energy deposition kernel was used to obtain the three-dimensional dose of multi-energy beams of kV imaging with the model-based analytical algorithm.

Finding:

Material-specific energy deposition kernels and water energy deposition kernels with different spatial resolutions were figured out for single energy bands of 20 to 150 keV with 10 keV steps. There was a good fit between the extracted kernels and the previously diffused kernels for water. Also, the study on the spatial resolution of water energy deposition kernels showed a favorable fit between the kernels with different spatial resolutions. Additionally, there was a good fit between depth dose curves, transverse dose profiles, and HVL from simulation and practical measurement. According to the validation of the simulated model of Elekta XVI system, the energy spectrum and energy flow profile was obtained using the validated model of the kV radiation source. Comparison of the results of the convolution/superposition-based algorithm using material-specific energy deposition kernels with practical measurement in a homogeneous phantom depicted an error of less than 3%. Comparison of the three-dimensional dose distributions of the algorithm and the Monte Carlo method in the real patient using gamma analysis indicated a favorable fit with a pass rate above 95% of the gamma index with a percentage difference of 3% and a distance fit of 3mm.

Conclusion:

Material-specific energy deposition kernels were introduced and characterized in the energy range of kV imaging beams (20 to 150 kVp). The proposed approach to the use of material-specific energy deposition kernels in model-based algorithms is accurate enough to calculate the dose of kilo-volt beams.

Keywords: Kilovoltage Dose Calculation, Model-based Dose Calculation Algorithm, Material-spesific Energy Deposition Kernel, Low Energy X Ray, Ionometry Dosimetry, EGSnrc MC Code, IGRT, Elekta XVI Unit.

A Deep Learning Method for Segmentation of Nasopharyngeal Cancer in Radiotherapy Planning CT Image Based

Abedi Iraj[1], Zamanian Maryam[1]*

1. Department of Medical Physics, School of Medicine Isfahan University of Medical Sciences, Isfahan, Iran.

Background:

Image contouring and segmentation of tumor and organ at risk (OAR) tissues are the most important part of patients' treatment planning.
The presence of sensitive organs and tissues in the radiation field multiplies the importance of this issue.
The aim of this study was to evaluate the effectiveness of U-Net network (Convolutional Neural Networks), which is one of the most common networks in image segmentation, for nasopharyngeal cancer (NPC).

Methods:

In this systematic review, the articles that were published in English databases from 2015 to 2022 were used. Search keywords included: nasopharyngeal cancer, segmentation, deep learning AND CT.
In studied articles DSC (Dice similarity coefficient) and Hausdorff distances (HD) were examined.

Results:

Five articles were found with 1272 patients. Neural networks function after training was done by comparing the results of the neural network and the clinical state. Indices to evaluate the accuracy of the DSC (Dice similarity coefficient) method were calculated as an average of 67.9% for the tumor area and 68.2% for organs at risk. The value of the index was also Respective Hausdorff distances (HD) of 30.10 and 13.81 mm calculated.

Conclusions:

This method potentially can benefit adaptive radiotherapy and improve accuracy, consistency, and efficiency of target segmentation of nasopharyngeal cancer images.

Keywords: Nasopharyngeal Carcinoma, Convolutional Neural Network, Image Segmentation, Computed Tomography Images

Estimating Photoneutron-induced Effective Dose Arising from High Energy Linear Accelerator During Brain 3D-conformal Radiation Therapy

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Background:

High energy photons (>= 8 MeV) interact with linac head components and lead to the emission of neutrons, due to the occurrence of giant dipole resonance (n, γ) between photons and the nuclei of High-Z materials in the linac head. In this respect, the drawback of high energy radiotherapy outcome is photoneutron unwanted dose to healthy organs and tissues near and far away from the target volume. Although several studies have been conducted to measure or calculate photoneutron dose equivalents, less attention has been paid to determine photoneutron dose equivalents during brain radiation therapy. This study aimed to determine the whole-body photoneutron dose equivalents in brain high-energy conventional radiation therapy treatment (3D-CRT). Besides, the effective dose was estimated according to the National Council of Radiation Protection and Measurements (NCRP).

Methods:

photoneutron ambient dose equivalents (H*(10)) were conducted using the NRD REM neutron rem-meter at different distances from the central beam axis of 18-MV Siemens-Oncor 5099 linac (field size: 10×10 cm2). Then, the measured ambient dose equivalents were corrected for tissue depth to determine neutron dose equivalent for each organ. Afterwards, the effective dose (photoneutron related) was estimated using tissue weighting (WT) factors (from NCRP 116 report) and the photoneutron equivalent dose for each organ.

Results:

Regarding the measured values of photoneutron ambient dose equivalent, the photoneutron dose equivalent decreases slowly by increasing the distance from the central beam axis. The average phtoneutron dose equivalents was about 0.15 mSv/Gy, ranging from 0.01 to 0.62 mSv/Gy, respectively. Here, the maximum photoneutron dose equivalent, among whole body organs, was related to the thyroid gland (0.62 mSv/Gy), breast (0.62 mSv/Gy), skin (0.56 mSv/Gy), and gonads (0.46 mSv/Gy). The photoneutron effective dose was obtained as 0.20 mSv/Gy.

Conclusion:

Although gonads are far away from the treatment field during brain radiotherapy, they receive significant doses due to neutron contamination. Therefore, it is suggested that the gonads be protected against radiation.

Keywords: Neutron Contamination; Ambient Dose Equivalent; Effective Dose; Brain Tumor; 3D-CRT; High Energy

Evaluation of Bone-marrow Micrometastasis Effects on Disease Course in Patients with Esophageal Cancer

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Background and Objectives:

Esophageal cancer is a type of invasive malignancy and at the time of diagnosis, it accompanies a high risk of blood vessels and lymph nodes involvement.
The presence of metastasis in this malignancy can strongly influence the prognosis of the disease, but some patients, despite not having detectable metastasis in primary surgery, have shown recurrence due to the presence of micro-metastasis.
Bone marrow specimens IHC evaluation and anti-cytokeratin18 antibody staining, which were obtained from rib resection of patients with esophageal cancer show up to 90% of cases have malignant cells.
In this study we are going to evaluate the association between bone marrow micro-metastasis and histopathological and clinical behaviors of the tumor by comparing patients with or without bone marrow micro-metastasis, followed by a comparison between neoadjuvant chemotherapy and surgery versus surgery alone in the prognosis of these patients.

Method:

In this study, the published literature on the association between bone marrow micro-metastasis and the

pathological behavior of the tumor and the application of neoadjuvant chemotherapy for the micro-metastasis's control, were reviewed. the results and relevant parameters involved in this subject were evaluated. We used published literature on PubMed, Medline, Web of Science, EMBASE, and Google Scholar for the study.

Results:

we evaluated 14 studies, which 6 of them were excluded from the study due to lingual problems (they were written in other languages rather than English) and irrelativity to the main subject. 8 studies were included in which, there was a significant relationship between the presence of bone marrow micro-metastatic cells and the tumor grade, and stage N of the tumor; Nevertheless, there was no significant relationship between age, sex, tumor length and micro-metastasis. Also, the ten-year survival rate was 20% in patients who only received surgery and 28% in patients received neoadjuvant chemotherapy followed by surgery, which was due to the micro-metastasis reduction by neoadjuvant chemotherapy.

Conclusion:

Due to the important role of bone marrow micro-metastasis, in determining the prognosis of this malignancy and also its significant association with the tumor grade and the stage N of the tumor, further studies with IHC or H&E staining and also neoadjuvant chemotherapy are recommended.

Keywords: Micro-metastasis, Esophageal Cancer, Neoadjvant Therapy

Evaluation of Cardiac and LAD Dose Reduction in Patients with Left Breast Cancer with Different Multileaf Collimators

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Introduction:

The heart and all related structures are very sensitive to radiation especially in patients with left-sided breast cancer. The mean heart dose may not be a useful indicator of left anterior descending coronary artery (LAD) and left ventricular damage, therefore the heart components should be contoured separately. This study investigated the effect of different collimators (CO1 and CO2) with two multi-leaf collimators (MLCs) width on the dose of heart and LAD.

Methods:

In this study, forty-five patients with left breast cancer were selected. Initially, treatment plannings were developed in two ways: first with considering LAD as a normal tissue, and second without that consideration. The resemblance treatment plannings were made using CO1and CO2 collimators while PTV received 95% of the prescribed dose to target volume. Two type of collimators (CO1and CO2) with different leaf width (6.8 mm and 10 mm) were used to shield the LAD. Finally, the normal tissue dose such as the heart, LAD and ipsilateral Lung were evaluated.

Results:

In comparison, average mean dose to the heart by using MLCs with leaf widths of 6.8 mm (CO1) was reduced significantly from 6 Gy to 5 Gy($p<0.05$). Additionally, average mean LAD dose decline was significant (36 Gy to 33Gy ($p<0.05$)), and differences in the ipsilateral lung dose were also significant (24 Gy to 23 Gy ($p<0.05$)).
Conclusion: Many of the side effects of radiation therapy can be significantly reduced with using MLCs with smaller leaf width, especially for smaller volume tissues.

Keywords: Left Breast Cancer, Heart, LAD, Normal Tissue, Multi Leaf Collimator

Evaluating the Dosimetric Effect of Applicator Misplacement on Skin Dose in Gynecological Brachytherapy: A Patient and Phantom Study

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Aim:

Skin doses are usually not important in gynecological (GYN) brachytherapy. However, these doses can be correlated with the setup and delivery errors. This study aimed to evaluate the dosimetric effect of applicator misplacement on skin dose measurements for patients undergoing GYN brachytherapy.

Methods:

The skin doses were measured using TLDs attached in different locations on patients' skin in pelvic regions (anterior, left, and right) for 20 patients, as well as on a phantom. The skin measured doses were compared with TPS calculations to find TPS accuracy. In the phantom study, different applicator shifts were applied, and the surface doses were measured accordingly to find the effect of applicator misplacement on the surface dose.

Results:

The mean absolute dose differences between the TPS and TLDs results for anterior, left, and right points on the patients' skin were 3.14±1.03, 6.25±1.88, and 6.20±1.97 %, respectively. Applicator misplacements of 0.5, 2, and 4 cm (average of three locations) resulted in 9, 36, and 61% dose errors in phantom surface, respectively.

Conclusions:

The skin dose differences between the TPS calculations and measurements are higher in the left and right regions, which relates to the higher uncertainty dose calculation in these regions. Furthermore, applicator misplacements can result in high skin dose variations; therefore, evaluating skin doses values can be considered as an appropriate quality assurance method for future research.

Keywords: Brachytherapy, Gynecologic Cancers, TLD Dosimetry, Skin Dose, TPS Accuracy

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Radio-protective Effect of Melatonin in Radiation Dermatitis of Breast Cancer Patients; Randomized, Placebo-Controlled Clinical Trial

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Objective:

Breast cancer (BC) is the most common cancer among women and radiotherapy is one of the most effective treatments for it. However, some complications of BC radiotherapy including acute radio-dermatitis can cause treatment interruption and prolongation of the overall treatment time, which in turn, can affect the patient's quality of life. Ionizing radiation causes tissue damage by releasing free radicals leading to oxidative stress and cell dysfunction or cell death as a consequence. In vivo and in vitro studies have documented that melatonin is a strong free radical scavenger that reduces oxidative stress. Hence, it may provide protective effects against the damage of ionizing radiation in clinical cancer treatment. The aim of this study was to investigate the efficacy of melatonin as radio-protective agent in alleviating acute radiation dermatitis with a randomized, double-blind, placebo-controlled clinical trial.

Materials & Methods:

BC patients included 50 females (age > 20 years) with stage 1-3 breast cancer. All women received 50 Gy whole breast radiation therapy. Patients were randomly allocated to melatonin (receiving 20-mg melatonin) (25 women) or placebo (25 women) during radiotherapy and 2 weeks following the last fraction. Exclusion criteria were diabetes mellitus, uncontrolled hypertension, and prior diagnosis of asthma, fragrance allergy or severe prior allergic reaction. Women with known connective tissue disorder or prior chest or breast radiation were also excluded and chemotherapy had to be completed 4 weeks prior to study entry. The study was approved by the ethics committee (IR.SBU.REC.1400.128). All patients provided written informed consent before enrolment in the trial. Patients were examined and completed a detailed questionnaire weekly during radiation treatment.

Results and Conclusion:

Since we are still collecting and analyzing data, the definite results have not been provided. if melatonin protects against radiation injury, many patients could be candidates for melatonin treatment, resulting in a better quality of life.

Keywords: Melatonin-dermatitis, Antioxidant, Clinical Trial, Radio-protector

Radiobiological and Radiogenomic Approaches Toward Precision and Personalized Radiotherapy

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Radiotherapy (RT) a pivotal clinical modality in cancer treatment, causes unintended damages of normal-tissue in the treated area, leading to short and long-term local or general complications even up to secondary cancer, and early mortality. Considering the marked variability in response to RT and the associated toxicity and side-effects, it is of utmost importance to optimize the best RT plan for each individual, a process called personalized RT. The toxicity reactions of normal tissues to ionizing radiation (IR) are a major limitation in efficiency of radiotherapy. Unfortunately, predictive biomarkers allowing selection of treatments for individual patients are not clinically in use yet to prevent these side effects. Therefore, biomarkers that predict tumor control probability and normal tissue complication probability would advance the care of individual patients. IR kills cells through induction of various types of DNA damages, with DNA double-strand breaks (DSB) being the most important lesion. DNA damages are repaired by cells efficiently but if left unrepaired will cause genome instability, chromosomal aberrations and cell death. Markers of DSB repair defects including altered expression of genes involved in DNA repair pathways might serve as ideal predictive biomarkers. The predictive power of assays that measure classic aspects of radiobiology for example, G0 or G2 chromosomal aberration test, comet assay, RILA assay and gamma-H2AX for assessment of unrepaired DNA double strand breaks also warrants further exploration. These methods, with their limitations are not being implemented in routine clinical use because of technical limitation to achieve tumour tissue from radiotherapy patients. Liquid biopsies as an attractive approach allow analysis of circulating tumor DNA and circulating tumor cells. Moreover, non-invasive genotyping of tumors being treated with RT for which no or minimal tissue is available.

Advances in genomics accelerated research by integrating the individual characteristics of patients with genomics biomarkers. In comparison with conventional treatment, the concept of precision RT sets out a tailored therapeutic patient-tailored plan, according to the genotypic and phenotypic data of individual patients. The era of radiogenomics in precision RT is an emerging approach to support diagnosis, RT decisions, and prognostication in oncology. Radiomics and radiogenomics are promising to providing valuable information for patient care throughout the course of the disease, given that this information might be obtainable with imaging. Therefore, integrating clinical, biological, imaging, and treatment-specific data for more accurate prediction of tumor control probabilities or risk of radiation-induced side effects are high-dimensional problems whose solutions could have widespread benefits to a diverse patient population

Keywords: Radiotherapy, Radiation Toxicity, Biomarkers, Radiogenomics, Precision Radiotherapy

Clinical Radiobiology Principal and Impact of Stereotactic Radiosurgery (SRS) on Overall Survival in the Central Nervous Meningioma

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Introduction:

Stereotactic radiosurgery (SRS) is an important treatment technique for CNS lesions. Although DNA damage has been thought to be the principal form of radiation-induced damage, recent studies have suggested that vascular endothelial damage might be more important in the setting of higher dose-per-fractions, such as those used in SRS. Based on the studies after high-dose hypo-fraction (SRS), there is significant vascular damage, which plays an important role in the indirect death of tumor cells. For SRS delivered over a short time, cell death due to vascular damage seems to be significantly amplified by the immune response to hypoxia.. We briefly discussed the clinical outcome of SRS of meningioma.

Method & Material:

We reviewed studies published between November 2008 and December 2021 on PubMed. We searched the following keywords: meningioma, radiobiology, stereotactic Radiosurgery, tumor control, and survival. Tumor control, hearing disorders and symptomatic improvement rates were assessed.

Results:

Despite the modality differences among GK, CK, and linac-based SRS, reported outcomes including, clinical stabilization, tumor control, and toxicity do not support the superiority of one technique over another (all display equivalent 5-year tumor control of about 90–95%, with skull base meningioma). Kondziolka et al reported tumor control of 93% at 5 years and 87% at 10 and 15 years for GK SRS using a median marginal dose of 13 Gy. A meta-analysis of 2734 patients with meningioma was carried out by Pannullo et al. has shown a tumor control of 89% in GK or linac SRS. In the few studies, the reported tumor control of 90–95% at 5 years was observed on CK SRS. Patients treated with a “high dose” regimen (12.5 Gy) showed better local control than those patients treated with a “low dose” (10 Gy) regimen (Wulf et al). Based on the study carried out by Andrew.F et al. tumor control was (93.5%) at a follow-up of 58 months. Progression-free survival rate (PFS) after SRS was 98.7% at 1 year, 96.4% at 3 years, 93.7% at 5 years, and 86.4% at 10 years Overall, 114 of the 245 patients (46.5%) reported improvement of CN function.

Conclusions:

Recent radiobiological evidences indicate that the mechanism of radiation damage from SRS/SBRT is different from 3DCRT. This mechanism of DNA damage leads to post-mitotic cell death, endothelial apoptosis, ischemia and

reperfusion injury. According to the European Association of Neuro-Oncology, SRS is the recommended treatment for small meningiomas.

Keywords: Stereotactic Radiosurgery, Radiobiology, Meningioma, Cancer

Absorbed Dose Assessment of Movable Lung Tumor by Novel Dynamic Thorax Phantom for Radiotherapy Application

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Abstract:

One of the challenges of radiation therapy is to accurately deliver the radiation dose to the tumor tissue with the least amount of damage to the surrounding healthy tissue. Because the movement of the tumor inside the lung tissue is uncontrollable due to respiration, the patient's respiratory movement has many effects on the radiation dose to the tumor tissue as well as to the surrounding healthy tissue. This study aims to evaluate the effects of respiratory motions on the absorbed dose of lung tumor tissue via design, programming, and implementation of dynamic thorax phantom. Based on this, a tumor cylinder was located in a motorized dynamic phantom consisting of two lungs made of Plexiglas. Respiratory motility was measured in both non-tumor and tumor-bearing modes per range of 5 and 20 mm during radiotherapy. For two tumor sizes with diameters of 1 and 3 cm, film dosimetry was performed via the EBT3 film. Results indicate that for lateral movements, in the range of 5 to 20 mm, the dose absorbed in the boundary around the tumor is reduced by 5-6% and 3-4%, Relative to the fixed state, respectively. Meanwhile, in the penumbra area, the absorbed dose by tumor is increased to 7% for 5 mm movement. In the vertical mode, for both tumor sizes, 5% difference is observed in the 20 mm movement, compared to the fixed position. The findings of this study indicate that the invented dynamic phantom can be effective in measuring the amount of radiation absorbed for different tumor sizes and can be utilized for evaluating the respiratory-gated radiation techniques in future research.

Keywords: Dynamic Thorax Phantom, Radiotherapy, Lung tumor, EBT3 film, Dosimetry

Comparing Simultaneous Integrated Boost VMAT and 9-Field IMRT in the Treatment of Nasopharyngeal Cancer

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Background:

Nasopharyngeal carcinoma (NPC) is a common malignancy in Asia particularly in IRAN. Comparisons of outcomes of volumetric-modulated arc therapy (VMAT) and intensity-modulated radiotherapy (IMRT) is still ongoing. This study focuses at comparing oncologic outcomes of SIB-VMAT and SIB-IMRT in the treatment of NPC.

Methods:

Twelve patients with various stages of NPC were enrolled in this prospective study to compare SIB-VMAT and SIB-IMRT. Target and normal tissue were contoured. SIB intensity-modulated radiotherapy (IMRT) plans, one-arc SIB- VMAT plans, and two-arc SIB VMAT plans were generated with identical objective functions for 12 patients with NPC of various stages. isodose distributions and dose-volume histograms were evaluated. dosimetric and biological quality indices of clinical target volume (CTV) and organs at risk (OARs) were calculated to study the optimization capability of these 3 modalities in the treatment of patients with NPC. The optimization time, delivery time, required monitor units (MUs), and delivery accuracy were also compared to investigate the feasibility of these 3 modalities.

Results:

There was no significant difference in target coverage (TC) between SIB-IMRT and two-arc SIB-VMA. However, both had higher TC than one-arc VMAT plans. IMRT demonstrated the best protection of the spinal cord, whereas two-arc VMAT showed the minimum Dmax to OARs. No other significant differences were observed among these 3 modalities on CTV coverage and OAR sparing. The delivery and MU efficiency of one-arc and two-arc SIB-VMAT were greatly improved compared with SIB-IMRT. The optimization time of one-arc and two-arc SIB-VMAT plans were 5 and 10 times greater than that of SIB-IMRT, respectively. The delivery accuracy of SIB-VMAT was not affected by the increased freedom.

Conclusion:

The result of this study indicate IMRT might be a better option for the treatment of NPC because patients who underwent IMRT may benefit from increased overall survival. For patients with NPC, one- arc SIB- VMAT might not be able to achieve sufficient TC, whereas two- arc SIB- VMAT was able to achieve reasonable TC. No significant advantage on OAR protection was demonstrated by VMAT compared with IMRT. SIB- VMAT has significantly shorter delivery times, but SIB-IMRT may still be the first treatment choice for patients with NPC.

Abbreviations:

NPC= nasopharyngeal carcinoma, VMAT= volumetric-modulated arc therapy, CI= confidence interval,
SIB= simultaneous integrated boost, IMRT= intensity-modulated radiotherapy,

Keywords: Nasopharyngeal Cancer, IMRT, VMAT, Organs at Risk, Delivery Accuracy

Dose of Organs at Risk in Patients with Left-sided Breast Cancer in 3-dimensional Conformal Radiotherapy

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Background and Objectives:

The goal of radiotherapy (RT) is to deliver a lethal dose to cancer cells while normal cells are exposed to minimal radiation. However, RT in patients with breast cancer exposes organs at risk (OARs), such as the heart and lungs, to unnecessary radiation. In this study, we report the dose reached the heart and lungs in 181 women with left-sided breast cancer treated with 3-dimensional conformal radiotherapy(3D-CRT) in Kermanshah City, the period from October 2017 till June 2019.

Methods:

181 patients with left-sided breast cancer that had received 3D-CRT after breast-conserving surgery (BCS) or mastectomy, during the period from October 2017 till June 2019, were examined. Treatment plans had been performed with ISOgray software. Dosimetric parameters of heart, total lung, left lung, and clinical target volume(CTV) were obtained using dose-volume histogram(DVH) for each patient.

Results:

Mean dose(±SD) of heart, left lung, total lung, and CTV were (6.29 ± 4.77), (13.34 ± 4.93), (6.90 ±3.97), and (47.29 ± 7.33) Gy, respectively. The received heart volumes were 17.65% (± 10.69) for V5, 13.58% (± 9.53) for V10, 10.1% (± 8.38) for V20 , 8.58% (± 7.59) for V25, 7.39% (± 7.10) for V30, and 5.13% (± 5.82) for V40; and the received left lung volumes were 42.63% (± 12.87) for V5, 33.41% (± 11.61) for V10, 26.43% (± 10.51) for V20, 24.19%(± 10.04) for V25, 21.9% (±9.53) for V30, and 15.81%(±8.36) for V40; and the received total lung volumes were 21.01% (± 7.48) for V5, 16.6% (± 4.55) for V10, 12.94% (± 5.58) for V20, 11.67%(± 5.1) for V25, 10.4%(±4.82) for V30, and 7.46%(±4.21) for V40.

Conclusions:

Despite advances in RT techniques, some unnecessary radiation still reaches OARs in RT for breast cancer.

Keywords: Breast Cancer, Radiotherapy, Heart Dose, Lung Dose, Dose Reduction, Cardiovascular Disease

Patient Setup Errors Impaction on Dosimetric Parameters in Four-field and Field in Field Radiotherapy Treatment Planning Methods in Prostate Cancer: a Comparison Study

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Background and Objectives:

Prostate cancer is one of the most frequent tumors affecting men in the world. Radiation therapy has been widely used in treating prostate cancer. During a full fractionated treatment course, patient positioning or setup errors bring several uncertainties to the treatment. The purpose of this work is to determine dose delivery errors that could be caused by patient's setup errors for prostate cancer treated with four-field and field in field (FIF) techniques.

Methods:

The treatment plans of 10 patients with history of prostate irradiation were retrospectively selected for evaluation. The physical effects of dose variations were evaluated by shifting the isocenters 2.5 mm to the right–left (RL), along the superior–inferior (SI), or along the anterior–posterior (AP). A CTV (clinical target volume)-to-PTV (planning target volume) margin ranging from 15mm in RL and SI and 5–10 mm in AP direction was changed to all patients. Dose-volume histograms of the PTV, rectum, and bladder were generated, and the conformity index (CI), homogeneity index (HI), V30 Gy, V25 Gy and V15 Gy were determined and compared for four-field and field in field techniques.

Results:

The D95 of the PTV for an ''isocenter shift plan'' with AP direction decreased by approximately 4.5% for the four-field and by 0.07%, for FIF techniques; However, V30 Gy, V25 Gy and V15 Gy of rectum and bladder increased for FIF technique but there wasn't Significant differences for four-field technique ($p>0.05$). Increasing a CTV-PTV margin decreased the D95 by 4% (four-field) and 1.4%, (FIF). The HIs for the four-field case were higher than the corresponding values obtained for the FIF case. There were not significant differences for CIs between the two techniques ($p>0.05$).

Conclusions:

Our results revealed that the physical properties of the four-field case were more sensitive to setup errors than those in the FIF case. This finding implies that physical indices measured in treatment planning system can detect a variety of errors that arise in prostate radiotherapy applied using either the four-field or FIF technique.

Keywords: four-field, Field in Field, prostate cancer, setup errors

A Review on Techniques of Metal Applicator Artifact Reduction in Cervical Cancer Brachytherapy

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Background and Objectives:

Magnetic resonance imaging (MRI) is applied for cervical cancer brachytherapy treatment planning. Metal tandem, ovoid intracavitary applicators and fiducial markers used in standard MRI. These devices introduce artifacts which affect diagnostic quality of image and may be confused with a pathologic lesion. Besides, they may impact the accuracy of the brachytherapy treatment and the evaluation of tumor response by misrepresenting the size and location of the metal implant and distorting the surrounding anatomy and tissue. Therefore, a review of methods to reduce these artifacts has been done.

Material and Methods:

We systematically searched three major indexing data base named PubMed, Science Direct and Google Scholar for articles have been published since December 2021 by using the following keywords: metal artifact reduction, MRI, brachytherapy and cervical cancer.

Results:

overall 31 Studies addressing the metal artifact reduction in MRI-based cervical cancer intracavitary brachytherapy were reviewed. There are several approaches to controlling these susceptibility artifacts. These methods may incorporate: 1) slice-selective excitation pulse with a large bandwidth commonly known as the metal artifact reduction sequences (MARS); 2) view angle tilting (VAT) to correct in-plane distortion by applying a gradient in the slice-direction during readout; and 3) slice encoding for metal artifact correction (SEMAC) with z-shimming to correct through-plane image distortion.

Conclusion:

Artifact removal from MRI of cervix cancer is a pre-processing step for detecting any abnormalities of MRI in cervix and is beneficial for accurate brachytherapy to patients treated with metal implants.

Keywords: Brachytherapy, Cervical Cancer, MRI, Metal Applicator Artifacts Reduction

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Assessment of Factors Affecting the Skin Dose in Breast Cancer Radiotherapy: A Monte Carlo Study

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Introduction:

Accurate assessment of skin dose in radiotherapy is essential. Due to the lack of electron equilibrium on the surface, the analytical algorithms of treatment planning systems are unable to calculate an accurate skin dose. Since extrapolation chambers were not typically available, Monte Carlo simulation has been developed as a golden method for skin dose calculation. The skin dose depends on many factors such as beam energy, field size, breast shape, beam modifying devices, obliquity, and distance from source to skin. The aim of this study was to achieve an optimal treatment plan for intact breast tangential radiotherapy by evaluating the effect of various factors on skin dose.

Methods:

The BEAMnrc and DOSXYZnrc user codes were used to simulate the 6 MV photon beam of Siemens Primus linear accelerator and calculate skin dose in the CIRS tomographic phantom which irradiated with tangential radiation fields. The model was validated and the effect of treatment parameters, including obliquity, skin to surface distance (SSD), and the wedge angle, on the surface dose of the CIRS phantom was investigated.

Results:

By increasing the gantry angle from 50° to 55°, the mean skin doses inside the field increased by %0.55. The in-field breast skin dose decreased by %1.5, by varying the SSD from 100 cm to 105 cm. Using a physical wedge with an angle of 45 degrees causes the maximum reduction of the skin dose in the field relative to the isocenter dose.

Conclusion:

Knowing the effect of various factors of the treatment plan on the skin dose can be effective in designing the optimal treatment plan with minimal skin complications.

Keywords: Skin Dose, Monte Carlo Simulation, Radiation Therapy, Breast Cancer

Immunotherapy Aspect of Effectiveness of Whole-Body Hyperthermia Plus Radiotherapy in Clinic vs. Radiotherapy Alone

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Introduction:

Current studies have shown the benefit of combined WBHT with RT for bony metastases. The combined treatment is safe and effective in increasing pain relief and treatment response in bony metastatic patients.

Materials & Methods:

52 Patients with bone metastatic were treated in 2 groups: (RT alone (32 cases) and RT+HT (20 cases)) at Shohadaye Tajrish university hospital.
Clinical response was defined according to the updated international consensus on palliative RT endpoints. The primary endpoint was complete response (CR) within 8 weeks after treatment.

Results:

Totally based on this study, based on the study data, 12 patients in HT+RT group (60%) and 68% patients among 32 cases in RT alone group was indicated no pain relief. While the RT alone group was shown the worse in pain relief. Totally 32 patients was expired that 13 case was expired during the treatment. They could not count in 2 months follow up. The flow-cytometry assay results showed that the mean HSP70 value after HT+RT group was significantly increased (P-value<0.005).

Conclusions:

HT is known to cause direct cytotoxicity and also acts as a radio sensitizer, the mechanisms of action of HT appear to be complementary to the effects of RT with regard to inhibition of potentially lethal damage and sub lethal damage repair, cell cycle sensitivity, and effects of hypoxia and nutrient deprivation. Mau-Shin Chi et al, had reported benefit of combined HT with RT for bony metastases. The combined treatment is safe and effective in increasing pain relief and response rate, and prolonging treatment response duration in bony metastatic patients.

Keywords: Hyperthermia, Immunotherapy, Cancer, Radiotherapy

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Unmet Needs of Iranian Mothers of Children with Cancer and Identification of Related Factors: A Descriptive-correlational Study

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Background & Aims:

Diagnosis of cancer in children is one of the most challenging experiences for the parents and is a crisis for the whole family. Carers' responsibilities lead to imbalances in roles, functions, and emotions that will have adverse consequences for the lives of all family members. Therefore, this study aimed to identify the significant unmet needs of mothers of children with cancer.

Methods:

This descriptive cross-sectional study was conducted in Tehran in 2019-2020 on 215 mothers of children with cancer referred to hospitals affiliated with medical universities. The study population was selected through convenience sampling method and according to the inclusion criteria, which included parents' awareness of the definite diagnosis of the child's cancer, fluency in the Persian language, six months from the diagnosis of the child's disease, no history of psychiatric disorders, and full consent to participate in the study. The FIN questionnaire consisting of two subscales, FIN-Import and FIN-Fulfillment, with 40 items, was used to collect data. For data analysis, SPSS-24 software, descriptive tests, and correlation and regression indices at a significant level of P-value <0.05 were used.

Results:

The mean age of mothers participating in the study was 34.77 ± 7.91 years, and the mean age of children with cancer was 9.77 ± 14.37 years. The mean scores of FIN-Import and FIN-Fulfillment were 92.88 ± 7.97 and 70.82 ± 17.89, respectively. The phrase "To know the facts concerning my child's prognosis" with 23% and the phrase "Be told about people who could help with problems" with 22.8% were the most common unmet needs reported by parents.

Conclusion:

The present study indicated that mothers of children with cancer have many unmet needs. Finding these needs and planning to manage them can improve their health.

Keywords: Cancer, Care, Child/Children, Parents/Family, Caregivers, Unmet Needs

Presenting a Simple Monte Carlo Model to Estimate Skin Dose in Intact Breast Radiotherapy

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Introduction:

Breast cancer radiotherapy is associated with serious skin complications that cause some patients to refuse the treatment process. Therefore, an accurate assessment of skin dose can help specialists reduce complications during breast radiotherapy. The analytical algorithms of treatment planning systems are limited in calculating the surface dose, where electron equilibrium is not established. Monte Carlo (MC) simulation may be a suitable method for calculating the skin dose when experimental dosimetry is not possible. This study aimed to evaluate a simple MC model to estimate skin dose in intact breast tangential radiotherapy according to the experimental measurements.

Methods:

The model of the 6 MV photon of a Siemens Primus linac with EGSnrc code was developed and validated. The tangential fields in breast radiotherapy were simulated using this model, and skin dose was calculated in different areas of the CIRS phantom. Then, the calculated and measured skin doses, using GafChromic film dosimetry, were compared under similar simulation conditions.

Results:

The calculated beam model was validated by comparing the calculated and measured percentage depth dose and lateral profiles. The gamma index (3% / 0.3 mm) was ≤ 1 for optimal values of electron energy and FWHM (6.7 MeV and 3.0 mm). The percentages of difference between calculated and measured skin dose for the supraclavicular, apex, and fold areas inside the field and for out-of-field points on the contralateral breast were 9.33% (DMeas:680 mSv/Gy Vs. DCal:750 mSv/Gy), 11.26% (DMeas:630 mSv/Gy Vs. DCal:710 mSv/Gy), 18% (DMeas:410 mSv/Gy Vs. DCal:500 mSv/Gy), and 20% (DMeas:16 mSv/Gy Vs. DCal:20 mSv/Gy), respectively.

Conclusion:

Several limitations make surface dosimetry challenging in the radiotherapy of breast cancer. The computational Monte Carlo framework developed in this study, including the Primus linear accelerator head model with patient's treatment plan specifications and patient's tomographic phantom, can be used to estimate the skin dose in radiation therapy for each patient.

Keywords: Skin Dose, Monte Carlo Simulation, Radiation Therapy, Breast Cancer

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Clinical Dose-volume Constraints for Late Bowel Toxicity Following Pelvic Radiotherapy

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Background and Objective:

Pelvic radiotherapy (RT) increases overall survival and reduces local recurrence at a price of some adverse effects. These adverse effects involve bowel, bladder and bone problems as well as sexual dysfunction. Generally, bowel symptoms have the greatest impact on quality of life of these patients. Studies have reported that 50% of the patients who receive pelvic RT show chronic bowel symptoms; and the damage induced by radiation can affect all parts of the bowel in these patients. The aim of this study was to determine the clinical dose-volume constraints for late bowel toxicity after pelvic RT.

Methods:

In this article we reviewed the more recently published works which have focused on determining clinical dose-volume limits for late bowel toxicity following pelvic radiotherapy. The papers were searched in PubMed, Scopus and Sciencedirect databases with the relevant keywords including Late bowel toxicity, Pelvic radiotherapy, Dose-volume constraints.

Results:

The Quantitative Analyses of Normal Tissue Effects in the Clinic (QUANTEC) has proposed two limitations to reduce late bowel toxicity including V45 <195 cc for peritoneal cavity, and V15 <120 cc for small bowel loops. It has been reported that V55 (%) is an important predictor of RT-induced duodenal complications. Studies have shown that if we keep V15 < 250 cc, V30 < 100 cc, and V40 < 90 cc, the toxicity of the Large bowel is reduced from 26.7% to 5.4%. Also, based on the former studies, among all the bowel parts, the anal canal is the most important organ at risk (OAR) for late bowel toxicity. It has been proved that reducing mean dose of anal canal to <40 Gy significantly reduces bowel toxicity. Dose-volume constraints of V40 < 340 cc and V15 < 275 cc have been suggested to reduce the toxicity of small bowel in these patients.

Conclusion:

Studies have shown that V15, V30, V40, V45, V55 parameters are the most important predictors of late bowel toxicity due to Pelvic RT. Bowel side-effects should be considered during treatment planning in patients receiving pelvic RT.

Keywords: Late Bowel Toxicity, Pelvic Radiotherapy, Dose-volume Constraints

Trastuzumab-induced Cardiac Complications in Patients with HER2-positive Breast Cancer

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Background and Objectives:

Overexpression of the Human epidermal growth factor receptor 2 (HER2) is seen in 15 to 20% of breast cancer patients. Administration of Trastuzumab (as a targeted biological drug) against the HER2 reduces mortality and recurrence in HER2-positive breast cancer. It has been reported that Trastuzumab improves overall survival in patients with HER2-positive BC, however, it increases the risk of heart problems in these patients. We reviewed published original articles between 2015 and 2021 in the field of Trastuzumab-induced cardiac complications in patients with HER2-positive breast cancer.

Methods:

Original articles published between 2015 and 2021 were selected through searching PubMed, Scopus, and Sciencedirect databases. Some relevant keywords including Breast cancer, Trastuzumab, HER2-positive, Heart, Cardiac complications, Cardiac toxicity, and Cardiovascular diseases were used.

Results:

Studies have shown that Trastuzumab-induced cardiac complications occur in about 10% of breast cancer patients. Trastuzumab-related heart disease presented as asymptomatic reduction in left ventricular ejection fraction (LVEF) or symptomatic heart failure. The standard treatment duration of 12 months of Trastuzumab has been recommended in the patients with HER2+ breast cancer; however, the shorter treatment period (6 months) has been associated with a significant reduction (about 60%) in the risk of cardiac toxicity. In addition, the presence of valvular heart diseases may be a possible predictor of Trastuzumab-induced cardiac complications in HER2-positive breast cancer patients.

Conclusion:

The present study demonstrates the importance of regular monitoring of heart function in HER2-positive breast cancer patients who recieve Trastuzumab treatment. Finally, a shorter treatment period (6 months) may be recommended to reduce the risk of cardiac complications especially in patients with valvular heart diseases.

Keywords: Breast Cancer, Trastuzumab, HER2-positive, Heart, Cardiac Complications, Cardiac Toxicity, Cardiovascular Diseases

Design and Construction of an Anthropomorphic Phantom with Movable Uterus for CT and US Images Registration in Simulation of Intracavity Brachytherapy

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Purpose:

Today, due to the spread of various diseases, especially cancer, it is necessary to speed up the process of treatment by maintaining accuracy.
Physicists and physicians use a body simulation tool called a phantom to reduce various errors in the treatment environment. This tool can be used for daily or scheduled testing of how the diagnostic or treatment system work and, in the end, to ensure the quality of operations.
Since brachytherapy is one of the most effective cancer treatments, phantoms need to be used to minimize this treatment error.
In this study, making a female pelvic phantom, which includes the components of uterus and rectum, etc., is shown. This phantom can be used for therapeutic and diagnostic purposes.

Materials and Methods:

The phantom consists of components such as the uterus, cervix, vaginal canal, and rectal canal.
The three-dimensional print was used to make the uterus' exact shape, and all the dimensions of the uterus were cut according to the exact anatomical dimensions.
Appropriate compounds for the construction of the uterus in this phantom were selected to be used in any imaging modality, including CT and ultrasound.
Finally, for equating the phantom property with the body, the whole phantom chamber is filled with water that is fully available and inexpensive. It can even fill the inside of this phantom with gel and use it for dosimetry purposes.

Results:

One of the purposes of making this phantom was to make the uterus in such a way that by placing the applicator in it, all the displacements that occur in the brachytherapy process can be simulated, and for this purpose.
On the other hand, it was necessary to do the CT and ultrasound imaging of this phantom.
After constructing the phantom and imaging it, the resulting image results showed perfect contrast at all phantom components' borders in both imaging modalities.

Conclusions:

This study showed that unlike other previous studies to make a phantom of the uterus, a more straightforward method with more available materials can make a phantom.

Due to the ease of the phantom construction method in this study, each treatment center can build a uterine phantom and use it in the treatment, diagnosis, dosimetry, and imaging processes.

Keywords: Gynecological, Brachytherapy, Cervix, Phantom, CT, Ultrasound, Equivalent to Tissue

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Evaluation of the Effect of Bladder Volume on Dosimetry of Pelvic Organ at Risk in Cervical Cancer

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Background and Objectives:

Cervical cancer is one of the most common malignancies among women. One of the main methods of treatment is the use of external beam radiation therapy. Variable bladder filling during pelvic radiotherapy leads to displacement and modification in the position of target and organs at risk (OARs), which may affect the treatment outcome. This study aimed to investigate the effect of bladder volume on the dosimetry of pelvic OARs in external beam radiation therapy.

Methods:

25 patients with locally advanced stage (IB2-IVA) cervical cancer were selected. Two CT images were taken. 1 with an empty bladder followed by 1 with a full bladder. The CT images were transferred to the treatment planning system. Target and OARs were contoured in both images and a treatment plan was performed. The delivered doses to target and OARs were measured using dose-volume curves (DVH).

Results:

The mean dose of the bowel bag in the empty and full bladder were 35.06±4.13Gy, 31.59±3.86Gy, respectively. Also, the V45 of the bowel bag in the empty bladder was 364.27±154.39 cc and in the full bladder was 240.84±129.66 cc. The mean dose of the rectal in the empty and full bladder were 49.50±1.95Gy and 49.18±1.03Gy, respectively. V50 of the rectal was 52.82±21.84 (%) in the empty bladder and 45.49 ± 29.55) % (in the full bladder. The mean dose of the sigmoid in the empty and full bladder were 50.51± 0.86Gy and 50.63±1.95Gy, respectively. The mean dose of the bowel bag, V45 of the bowel bag, and V50 of the rectum had significantly decreased in the full bladder status. However, the mean dose of the rectum and the sigmoid were not significantly different between the full and empty bladder.

Conclusions:

The results showed that the bladder volume significantly affected the delivered dose to the bowel bag and rectum. The average bowel bag V45 and rectal V50 in the full bladder were significantly decreased. The bladder distention technique is an effective method to improve the dosimetric parameters of pelvic OARs.

Keywords: Organ at Risk, External Radiation Therapy, Cervical Cancer, Bladder Volume, Dosimetry

Evaluation of the Types and Frequency of Unstable Chromosomal Aberrations Induced in Lymphocytes of Breast Cancer Patients before and after Radiotherapy

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Background:

Breast cancer (BC) patients suffer from early and late effects of radiotherapy. Higher radiosensitivity is reported for BC patients compared to other cancers probably due to their genome instability. However, there is not yet an appropriate biomarker to predict or follow radiosensitivity of these patients during or after radiotherapy. The aim of this study was to monitor chromosomal aberrations induced before and during radiotherapy in peripheral blood lymphocytes of BC patients.

Materials and Methods:

Normal healthy individuals and invasive ductal breast cancer patients were enrolled in this study. Blood sample was obtained from normal healthy women and breast cancer patients before and after radiotherapy. After blood sampling standard lymphocyte microculture was initiated in 4.5 ml RPMI-1640 supplemented with fetal calf serum and antibiotics. Lymphocytes were exposed to 0.1 ml phytoheamagglutinin to trigger cell division. Two hours prior to harvesting colcemid was added to the cultures to arrest cells at metaphase. Cells were harvested 50 hours after culture initiation. Cells were exposed to hypotonic solution (0.075 M KCl) for 20 minutes then fixed in Carnoys fixative (Methanol: acetic acid; 3:1). Slides were prepared from fixed cells and stained in 5% Giemsa stain. Hundred well spread mitoses were scored under a light microscope with a magnification of x1000 for presence of various chromosome types aberrations. Data were statistically analyzed and $p<0.05$ was considered as significant difference.

Results:

Results indicate higher frequency of chromosome type aberrations in lymphocytes of un-irradiated breast cancer patients compared to healthy normal individuals; although there was no significant difference between data of the two groups ($p>0.05$). High frequency of chromosomal breaks and dicentrics were observed in lymphocytes of BC patients significantly different from un-irradiated group ($p<0.01$). The increase in the frequency of chromosome breaks and dicentrics was increased with increasing radiation dose but the increase was not as high as expected at higher doses.

Conclusion:

Genome instability and formation of chromosomal aberrations during and after radiotherapy of BC patients might be the cause of adverse effects experienced by BC patients. Genome instability and DNA repair deficiency may contribute to high background and radiation induced chromosomal aberrations in lymphocytes of BC patients. However, there is also possibility of radioadaptation of cells during the course of radiotherapy. Results imply that dicentric chromosomes might be valuable cytogenetic biomarker to follow up response of BC patients to radiotherapy.

Keywords: Breast Cancer, Radiotherapy, Lymphocytes, Chromosomal Aberration, Biomarker.

Accurate Monte Carlo Simulation of Respiratory-Gated Accelerated Partial Breast Irradiation with Passively Scattered Proton Beam

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Background:

By sparing normal breast tissue, accelerated partial breast irradiation (APBI) is gaining increasing interest for breast

cancer (BC) treatment. Furthermore, proton therapy is widely used for BC treatment offering highly conformal radiation therapy. Breast is subject to intrafractional target motion caused by respiration. Hence, beam gating has been proposed to address the problem. Moreover, Monte Carlo simulation enables accurate dose calculation in proton therapy.

Objectives:

This study aims at (1) modeling a double scattering proton nozzle, (2) voxel dosimetry for APBI with proton beams using GATE, and (3) respiratory gating of the proton beam to manage intrafractional target motion in left-sided BC.

Methods:

GATE MC simulator were performed to model a passively scattered proton therapy using the digital 4D XCAT phantom. Treatment was planned considering two equally weighted beam directions for a medially located tumor with a varying diameter of 1, 2, and 3 cm. PTV was considered as a 5 mm expansion of the CTV. Moreover, range uncertainty was also taken into account as additional proximal and distal margins. Sparing factor (SF) was then calculated as the ratio of non-gated irrdiated volume to that of gated one, for each OAR. The treatment was performed for the full-inhalation phase in the supine position. Furthermore, the GATE model was validated against the experiments.

Results:

The difference between the simulated pristine Bragg peak depths and the published experiments was less than 7% demonstrating accurate modeling of the nozzle. An SF of higher than unity was obtained for all plans. The results also showed that beam gating leads to an SF of 1.81, 1.73, 1.15, and 1.27 for skin, normal breast, heart, and lung, respectively, for 2 cm tumor size. The SF depends on the target size. The more the target size, the lower the SF. Furthermore, the findings confirm that target coverage is not affected by the beam gating as in all cases the PTV is covered by the 95% isodose.

Conclusions:

Beam gating can be the method of choice for target motion management in proton APBI and outperforms non-gated treatments for medially seated targets in the supine position.

Keywords: XCAT, GATE, Proton Therapy, Respiratory Gating, Breast Cancer

Evaluation of Clinicopathological Features of Pregnancy-associated Breast Cancer in Oncologic Institutes of Mashhad University of Medical Sciences from 2011 to 2018

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Introduction:

Breast cancer is the most common cancer of pregnant women and during breastfeeding period. Pregnancy-associated breast cancer (PABC) is defined as breast cancer that is diagnosed during pregnancy or 1 year after child delivery and includes 0.2-3.8% of all cases of breast cancer.

Objectives:

The aim of this study was to evaluate clinicopathological features of PABC in order to make the diagnosis earlier. Materials & Methods: In this cross-sectional study patients with PABC (37 patients according to sample size) who had admitted in oncologic institutes of Mashhad university of medical sciences between 2011 to 2018 were evaluated.

Results:

In study of 37 patients, the mean age was 33.86 years and mean size of tumor was 4.58 cm. 37.8% had positive family history of cancer. Mean age of menarche, marriage and first pregnancy was 13.5, 22.85 and 26 years respectively. In most patients, the first presentation was palpable mass and final diagnosis was invasive ductal carcinoma. 13.5% of patients were metastatic from the beginning, 40.5% became metastatic later. local recurrence occurred in 13.5% of cases. The percentage of positive ER, PR and HER2 were 72.9%, 59.5% and 45.9% respectively. The mean survival was 84.25 months and disease-free survival (DFS) was 51 months. The five-year overall survival (OS) and disease-free five-year overall survival was 84.3% and 48.4% respectively.

Conclusion:

In this study, mean age of patients were above 30 years and patients did not have poor prognosis (mean survival was 84.25 months). Overall, due to physiologic condition and delayed pregnancy in recent years, it is necessary to do regular screening in reproductive period of women to diagnose this cancer in early stage.

Keywords: Breast Cancer, Overall Survival; Pregnancy, Prognosis

Investigating the Association between HPV and Colorectal Cancer

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Background and Objectives:

Colorectal cancer is the third most common malignancy worldwide and the fourth leading cause of cancer-related mortality. Its incidence is about 5000 per year in Iran. The average 5-year survival rate for patients with this malignancy is 64.4%. human papilloma virus (HPV) is a DNA virus which infects the epithelial cells of basal layer, and the integration of viral DNA into the cellular genome leads to the overexpression of E6 and E7 oncogenes. This eventually leads decreasing in Rb and P53 genes' activity and is thus associated with muco-epithelial cancers. Due to the high prevalence of both HPV infections and colorectal cancer, the aim of this study is to investigate the possible role of HPV in development of this malignancy.

Methods:

In this study, the published literature on the possible role of HPV in colorectal cancer in Iran and worldwide were reviewed and the results and the relevant parameters were evaluated and compared. We searched PubMed Medline, Web of Science, EMBASE, and Google Scholar databases.

Results:

To determine the possible link between HPV and colorectal cancer, it is necessary to be able to detect viral genomes only from cancerous or precancerous lesions, but not in healthy tissues. Some studies have demonstrated that 14-84% of the colorectal cancer malignancy were HPV-DNA positive, while others have not found any relationship between HPV and colorectal cancer. In a previous Turkish study, 81.2% of cancerous tissues contained HPV genome, but in studies that have been performed in Iran, despite the lack of HPV genome in healthy tissue samples and the presence of HPV genome in some malignant samples, there was not a significant relationship between the presence/role of the HPV DNA and the incidence of cancerous or precancerous colorectal lesions.

Conclusion:

In Iran, despite the lack of the HPV genome in healthy samples and the presence of it in some malignant samples, no significant association between HPV and the incidence of colorectal cancer has been found. Although, concerning the above-mentioned points, further studies are needed in this regard.

Keywords: Colorectal Cancer, Human papilloma Virus, Risk Factor

IMRT Out-of-Field Dose Distribution Evaluation of Prostate Cancer Patients in Eclips TPS by the Delta4+ Phantom and Correlation with Treatment Planning Modulation

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Aim:

The main goal of this study was to assess the accuracy of out-of-field dose distribution calculation by the Anisotropic Analytical Algorithm (AAA), version 13.0.26, in Eclipse TPS, (Varian Medical Systems, Palo Alto, Ca, USA) for sliding window IMRT delivery technique in prostate cancer patients and correlation with modulation of treatment planning optimization in dynamic IMRT.

Materials and Methods:

To assess the accuracy of dose calculation predicted by the TPS in normal tissue and OARs located out of radiation field areas, including DVH and mean dose of the rectum, bladder, right and left head of the femur, absolute organ dose value, and dose distribution was measured using the Delta4+ IMRT phantom. Prostate IMRT plans with nine coplanar were calculated with the AAA Eclipse treatment planning system.

Results:

The study quantified the accuracy of out-of-field dose by the Eclipse TPS (V.13.0.26) for dynamic IMRT technique. The TPS calculation error was 18.09% on average. The mean percentage of dose deviation for the femoral heads was 95.7 while for the organ closer to the target (rectum) was 79.81.

Conclusions:

Near the field edge, the value of IMRT depends on conformity and modulation which reduces the volume of OAR receiving a high dose, with increasing distance from field edge due to increasing modulation consequently increasing the MU led to increasing doses at large distance from the field edge. Therefore, in these areas, IMRT will not beneficial because AAA algorithm (used in Eclipse TPS) has proved poor dose calculation in these areas and the underestimation would vary with the distance from the field edges. TPSs are not usually commissioned for out-of-field dose calculation and calculation accuracy by TPSs is affected by several parameters including type and location of OARs, rectum, bladder and femoral head, and Target volume, type of treatment modality, type of TPS, number of fields, the difference in conformity and modulation between treatment techniques (IMRT vs 3DCRT) as a significant underestimation was found for the AAA algorithm. (P-value > 0.05). In conclusion, estimation the out of field dose distribution, using the current data and this significant underestimation of the out-of-field dose could be led to estimate the risk of secondary cancer in clinical practice.

Keywords: IMRT, Prostate Cancer -out-of-field Dose, Dose Calculation Accuracy, TPS

IMRT Out-of-Field Dose Distribution Evaluation of Prostate Cancer Patients in Eclips TPS by the Delta4+ Phantom and Correlation with Treatment Planning Modulation

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Aim:

The main goal of this study was to assessment of accuracy of out-of-field dose distribution calculation by the Anisotropic Analytical Algorithm (AAA), version 13.0.26, in Eclipse TPS, (Varian Medical Systems, Palo Alto, Ca, USA) for sliding window IMRT delivery technique in prostate cancer patients and correlation with modulation of treatment planning optimization in dynamic IMRT.

Materials and Methods:

To assess the accuracy of dose calculation predicted by the TPS in normal tissue and OARs located out of radiation field areas, including DVH and mean dose of the rectum, bladder, right and left head of the femur, absolute organ dose value, and dose distribution was measured using the Delta4+ IMRT phantom. Prostate IMRT plans with nine coplanar were calculated with the AAA Eclipse treatment planning system.

Results:

The study quantified the accuracy of out-of-field dose by the Eclipse TPS (V.13.0.26) for dynamic IMRT technique. The TPS calculation error was 18.09% on average. The mean percentage of dose deviation for the femoral heads was 95.7 while for the organ closer to the target (rectum) was 79.81.

Conclusions:

Near the field edge, the value of IMRT depends on conformity and modulation which reduces the volume of OAR receiving a high dose, with increasing distance from field edge due to increasing modulation consequently increasing the MU led to increasing doses at large distance from the field edge. Therefor in these areas, IMRT will not beneficial because AAA algorithm (used in Eclipse TPS) has proved poor dose calculation in these areas and the underestimation would vary with the distance from the field edges. TPSs are not usually commissioned for out-of-field dose calculation and calculation accuracy by TPSs is affected by several parameters including type and location of OARs, rectum, bladder and femoral head, and Target volume, type of treatment modality, type of TPS, number of fields, the difference in conformity and modulation between treatment techniques (IMRT vs 3DCRT) as a significant underestimation was found for the AAA algorithm. (P-value > 0.05). In conclusion, estimation the out of field dose distribution, using the current data and this significant underestimation of the out-of-field dose could be led to estimate the risk of secondary cancer in clinical practice.

Keywords: IMRT, Prostate Cancer -out-of-field Dose, Dose Calculation Accuracy, TPS

Unsupervised Synthetic CT for MRI Based 3D Conformal Radiation Therapy

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Background:

To enable beam modeling based on magnetic resonance imaging (MRI), synthetic CT (sCT) images should be predicted. Considering the application of MR-only radiotherapy (RT) and adaptive RT, sCT should be generated within seconds.

Objectives:

This study aims to develop and verify the unsupervised sCT generation method in 3D Conformal RT (3DCRT) planning.

Material and Methods:

CT and T2-weighted MR images were acquired from 60 brain cancer patients. Voxel sizes were unified to 0.5 × 0.5 × 0.5 millimeters via resampling. Twelve patients were randomly selected as a test set and the remaining 48 patients were augmented and used as the training set. A cycle generative adversarial network (GAN) was trained in an unsupervised manner using 2D transaxial slices. Dosimetry analysis was performed on Core-Plan 3.5.05 with correction-based ETAR method and grid size of 3 × 3 × 3 mm. Gamma analysis at 3%, 3 mm and 2%, 2 mm with 10% dose threshold were performed. The mean dose differences of some dosimetric key points for planning target volumes (PTVs) and organ at risks (OARs) were calculated on the test set. The significance levels of dose differences between real CT and sCT images were evaluated using Wilcoxon signed-rank two-sided test.

Results:

The average required time for synthesizing the sCT volume of each test patient was 5.6 (s). The proposed Cycle GAN produced an average mean absolute error (MAE) of 50.87 ± 18.85 HU. The peak signal-to-noise ratio (PSNR) was 30.145 ± 3.34 (dB). The structural similarity index metric (SSIM) of 0.88 ± 0.06 on test data was achieved. Gamma pass rate of 3%, 3 mm and 2% and 2 mm acceptance criteria were 99.21 % ± 1.0% and 97% ± 2.76%, respectively. The dose differences for dose volume histograms (DVH) points were within 1%. The p-values of DVH metrics were considered insignificant.

Conclusions:

A promising unsupervised CycleGAN model was developed to handle unpaired training data set. Dosimetric analysis showed highly accurate sCT images were generated via proposed Cycle GAN from conventional MRI images.

Keywords: Brain Tumor, Unsupervised Deep Learning, Cycle GAN, MR-only Radiotherapy, Magnetic Resonance Imaging, Cancer, Dose Calculations, 3D Conformal Radiation Therapy

The Unfulfilled Psychosocial Needs of the Adolescent Siblings of Patients with Cancer: A Descriptive Analytical Study

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Introduction:

The affliction of a child by cancer is a stressful experience which causes different challenges and creates new needs for all family members, particularly adolescent siblings. However, the psychosocial needs (PSNs) of the adolescent siblings of these patients may remain unfulfilled.

Aim:

The aim of the study was to assess the PSNs of the adolescent siblings of patients with cancer in Iran.

Methods:

This descriptive analytical study was conducted in 2019 in seven teaching hospitals in Tehran, Iran. Participants were 188 adolescent siblings of patients with cancer. Sampling was performed consecutively. Data were collected using a demographic and clinical characteristics questionnaire and the Sibling Cancer Needs Instrument. The latter is a valid and reliable 45-item tool. The SPSS software (v. 21.0) was used for data analysis through descriptive Statistics (mean (SD) and frequency measures. To investigate the relationship between demographic variables and the mean score of PSNs subscales, first, the correlation was determined, and afterward, the significant variables were analyzed at the level of less than 0.01 using univariate regression.

Results:

In total, 180 adolescent siblings completed the study. Their mean age was 15.66±2.55 years and the total mean score of their PSNs was 121.15±32.73 (in the possible range of 45–180). Around 80.6% of participants had 45 unfulfilled PSNs. The most common unfulfilled needs of participants were related to the information about sibling's cancer dimension (INFO) (mean: 2.94±0.79) and the less common unfulfilled needs were related to the practical assistance dimension (UFAM) (mean: 2.38±0.93).

Conclusion:

The adolescent siblings of patients with cancer have different unfulfilled PSNs, particularly respecting information about their siblings' cancer and support for emotional coping. Family members and healthcare providers should provide these adolescents with strong informational support and fulfill their needs in order to promote their health and their emotional coping.

Keywords: Cancer, Psychosocial Needs, Sibling, Iran

Cherenkov Luminescence Imaging of 90Y and TiO2 Nanoparticles-loaded Glass Microspheres

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Background:

Transarterial Radioembolization (TARE) with 90Y-loaded glass microspheres is a locoregional treatment option in the treatment of primary and secondary liver cancers. Post-treatment imaging is usually employed to check the possibility of extrahepatic uptake and the quantification of delivered dose in TARE. 90Y is a pure beta emitter and the post-treatment imaging by nuclear medicine modalities is a major challenge. Recently, Cherenkov Luminescence Imaging (CLI) have used as a new technique for 90Y imaging. Although, this new technique is simple and resolves some limitations with the current nuclear medicine systems, the short penetration range and low light yield limits its application.

Objectives:

This work aimed to investigate the possibility of using glass microspheres loaded with 90Y and TiO2 Nanoparticles (NPs) to overcome the resections of CLI.

Methods:

The Monte Carlo codes (GATE and GEANT4) were used to simulate the post-TARE CLI. 0, 1.2, 2.4, and 4.8 molars of TiO2 NPs are incorporated into the glass microspheres. The glass microspheres distributed uniformly in the tumor-induced in the liver of MOBY mouse phantom. The quality of acquired Cherenkov luminescence images was evaluated by calculating intensity and Coefficient of Variance (CV).

Results:

The in silico results showed that intensity values of Cherenkov luminescence images increased significantly as the TiO2 NPs concentration increased in the glass microspheres. The CV values decreased as the TiO2 NPs concentration increased in the glass microspheres. The maximum CV reduction was observed at the TiO2 NPs concentration of 4.8 M ($\approx$ 8%).

Conclusions:

Our study has provided evidence that TiO2 NPs into the glass microspheres improves the quality of Cherenkov luminescence images by increasing the light yield.

Keywords: Transarterial Radioembolization, Cherenkov Luminescence Imaging, Nanoparticles, Monte Carlo

Ultrasound-guided Breast Cancer Chemoradiation Therapy with Smart Sono-sensitive Nanodroplets

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Abstract:

The cancer therapeutic index can be synergistically enhanced by chemoradiotherapy method, especially under ultrasound-guidance. Chemoradiotherapy with controlled-release nanocarriers such as sono-sensitive nanodroplets enhances the antitumor activity of chemotherapeutic agents and reduces normal tissue side effects. The sono-sensitive nanocarriers can release drugs upon ultrasound exposure as a result of the acoustic droplet vaporization (ADV) phenomenon. In this study, folic acid functionalized methotrexate-loaded perfluorohexane nanodroplets with alginate shell (FA-MTX/PFH@alginate NDs) were synthesized, characterized, and their potentials for smart ultrasound-controlled drug delivery was investigated. Ultrasound waves dramatically increased the release of methotrexate from nanodroplets (p-value<0.05). Also, ultrasound echogenicity of NDs was evaluated using an ultrasound imaging system. The cell viabilities and also surviving fractions for treated samples with NDs and ultrasound were significantly decreased in comparison to non-sonicated control groups (p-value<0.05). However, this reduction is much more significant for ultrasound in combination with X-ray irradiation. The sensitization enhancement ratio (SER) for sonicated cells that were treated with MTX-NDs was higher than that of non-sonicated cells (1.65 vs 1.29). This can be attributed to more cellular uptake owing to overexpression of folate receptors on the cancer cells surface, ADV phenomenon, and induction of apoptosis. FA-functionalized MTX/PFH@alginate nanodroplets have a great theranostic performance for drug delivery and ultrasound imaging which can improve chemoradiotherapy efficiency.

Keywords: Ultrasound, Chemoradiotherapy, Methotrexate, Perfluorohexane Nanodroplets, Breast Cancer

Comparison of Two Radiotherapy Techniques on Patients with Reconstructed Left Breast Cancer

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Introduction:

Reconstruction by silicone implants after mastectomy in breast cancer patients who need adjuvant radiotherapy to prevent local recurrence is a challenge in radiation planning, particularly on the left side. We evaluated 3D conformal radiotherapy (3DCRT) and Tomotherapy techniques plans for these patients in PTV coverage, dose homogeneity, the organ at risk doses, and the surrounded normal tissue exposure.

Methods & Materials:

Twenty left breast cancer patients who were candidates for adjuvant radiotherapy with silicone gel prostheses, were selected. Suitable fixation devices such as breast board and headrest were used during CT simulation and daily treatment. Two types of radiation plan, Conformal and tomotherapy, were performed for each patient. We utilized the Monaco treatment planning system (version 5.51.11) and Accuray precision planning system (version 2.0.1.1) in this study. The average mean dose of opposite side breast (right-sided one), heart, LAD, Opposite side lung, Prosthesis were compared between two planning techniques.

Results:

Dose to heart, opposite side breast and lung by tomotherapy technique were significantly lower than 3D conformal one.

	Average Mean RT breast dose (Gy)	Average Mean Heart dose (Gy)	Average Mean RT lung dose (Gy)	Average Mean implant dose (Gy)	Average Mean LAD dose (Gy)	Average of the PTV(D95%)
3D-Conformal	0.64	4.44	3.84	50.7	39.96	94.94%
Tomotherapy	18	18.75	9.79	27.29	16.59	92.98%

Conclusions:

Among left breast cancer patients, the prostheses are in the path of the heart and the breast bed and as a result creates a gap between the heart and PTV. Therefore, tomotherapy might not be appropriate in all of these patients.

Keywords: Left Breast Cancer, Heart, 3D-Conformal, Tomotherapy, Breast Prostheses

Investigation of Beam Modeling Algorithm on Patient-specific IMRT Quality Assurance

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Background and Objectives:

Dosimetric accuracy in the treatment delivery of intensity modulated radiation is the main part of quality assurance program. One of the important steps in complex modulated radiation therapy is verifying treatment plans in a phantom geometry with a process referred to as pretreatment patient-specific quality assurance (QA). In small fields because of physical challenging dosimetric characteristics may be inappropriately modeled by treatment planning system (TPS) and transferred to treatment delivery. This study investigates how imprecise beam modeling of small fields in TPSs affects the small segment patient-specific IMRT QA. To achieve this purpose, the capability of two dose calculation algorithms used in two different commercial TPSs was assessed and the impact of imprecise extrapolation of small fields parameters on IMRT QA was studied.

Methods:

All experimental measurements made by Siemens Artiste linear accelerator in different field sizes. Behaviors of two different dose calculation algorithms in small segments were analyzed using a matrix of 2D diode array, MapCHECK2 (Sun Nuclear Corporation of Melbourne) in terms of patient-specific IMRT QA. Planar dose comparison between both TPSs and 2D array in fields involve small segments was performed and percentage of point that passing the acceptable gamma criteria calculated. The gamma criteria of 3% dose difference and 3mm distance-to-agreement (DTA) with 10% dose threshold was applied.

Results:

It is demonstrated that the collapsed cone convolution/superposition algorithm (CCCS) used in Prowess TPS, can accurately model the small non-equilibrium IMRT segments relative to full scatter convolution (FSC) algorithm used in TiGRT TPS. Gamma analysis of calculated and measured dose distributions showed that despite the good results of gamma index pass rate in small segments designed by Prowess, those obtained by TiGRT, has significant difference in average segment size below 3×3 cm2 that refer to imprecise beam modeling of small fields by FSC.

Conclusions:

On the basis of the studies carried out, it can be concluded that there is a direct relationship between dose calculation algorithm, beam modeling of small field and patient-specific QA.

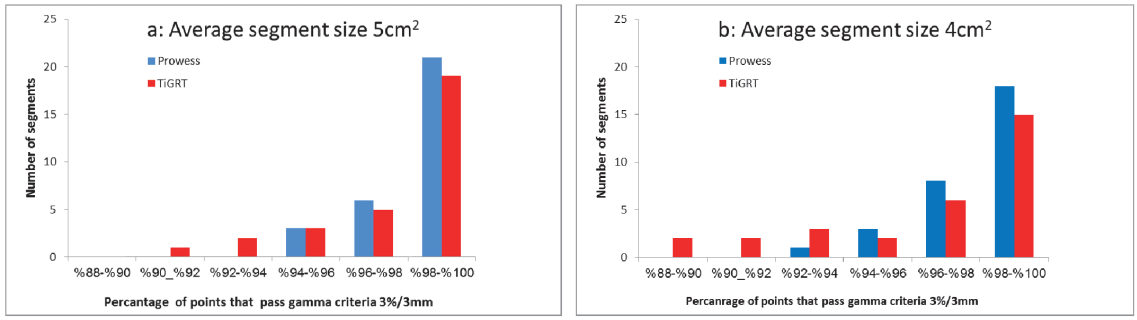
Table 1. Gamma analysis pass rate 3mm/3% and dose threshold 10% for small segment IMRT plans for head and neck cancers designed by Prowess TPS. Each plan has 5-7beam with 9 segments per beam

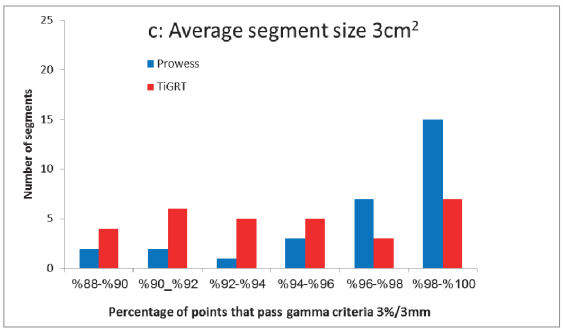
average segment size (cm2)	Plan1	Plan2	Plan3	Plan4	Plan5	average	SD
5	98.82	98.77	98.54	97.16	96.89	98.03	0.83
4	97.91	98.11	97.42	99.15	98.75	98.26	0.61
3	98.15	96.6	98.15	96.95	97.31	97.43	0.62
2	96.5	97.5	95.5	95.65	96.74	96.37	0.73
1	96.27	96.55	95.17	95.19	96.27	95.89	0.58

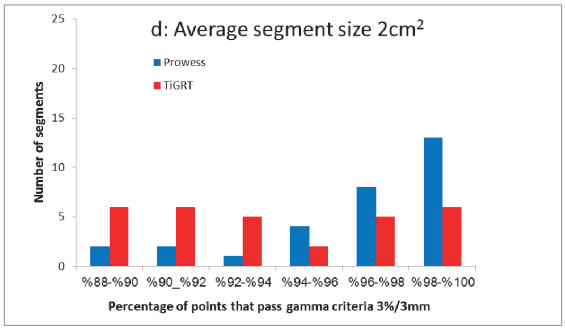
Table2. Gamma analysis pass rate 3mm/3% and dose threshold 10% for small segment IMRT plans for head and neck cancers designed by TiGRT TPS. Each plan has 5-7beams with 9 segments per beam

average segment size (cm2)	Plan1	Plan2	Plan3	Plan4	Plan5	average	SD
5	98.5	98.62	98.33	96.76	96.80	97.80	0.83
4	97.3	98.15	97.08	96.46	96.75	97.148	0.57
3	96.15	96.6	95.15	96.95	92.31	95.432	1.67
2	94.25	93.22	92.78	91.87	90.25	92.474	1.35
1	90.51	89.12	88.10	90.51	91.35	89.91	1.15

Figure1.Gamma analysis comparison of all segment size between 2 and 5 cm2 designed by two different TPSs







Synthetic Computed Tomography Generation Using Machine Learning Algorithm

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Purpose:

Recently the synthesized Computerized Tomography from Magnetic Resonance Imaging has been used for external radiotherapy treatment planning. The present study aims to create Pseudo-CT images from MRI images to calculate the dose distribution for facilitating the treatment planning process with regards to image enhancement.

Methods:

following image pre-processing, an adaptive neuro-fuzzy algorithm was utilized for pseudo-CT image generation. The histogram matched procedure and intensities normalization were used among all patients with regard to one standard image. Also, a head mask was achieved from each MRI/CT image to separate the background region in MR images and mask out a stereotactic head frame from CT images to have the more accurate pseudo-CT images. At last, all patient's images were registered to have peer-to-peer images. This would help us to decrease the overestimation the error from predicted CT images. The model was trained to predict the pseudo-CT images from the set of intensity and texture features of MR images from 15 arbitrarily selected patients without any effect on their treatment process of them.

Results:

The performance of the algorithm was investigated based on the statistical measurements, dose-volume histogram along gamma analysis with Rayplan and Verisoft software. The accuracy of the HU value of pseudo-CT and real CT of each subject was evaluated by calculating the mean absolute error (MAE), the structural similarity index (SSIM) between the two images to improve measurements such as mean-square error (MSE) and peak signal-to-noise ratio measurement (PSNR). The higher quality images with more similarity of the synthetic pseudo-CT and the referenced CT images should correlate the lower the MAE value, and a higher PSNR. The obtained MAE, PSNR, and SSIM values were 45,35, and 0.98, and also, the relative dose difference between the planning target volume region and best gamma pass rate were 0.5% and 97.2%. for 3%/3mm respectively. The proposed algorithm keeps

the quality of the image at an acceptable level of statistical and dosimetry measurements. The results show a significant increase in the visual quality of the images.

Conclusion:

The proposed method provides a satisfactory average error rate for the generation of Pseudo-CT data in the different parts of the brain region from an MRI series.

Keywords: Pseudo Computerized Tomography (pCT), Magnetic Resonance Imaging (MRI), Treatment Planning System (TPS)

Evaluation of the Clinical and Pathologic Characteristics and Routine Treatment of Patients with Prostate Cancer in Six Referral Centers in Iran: A Pilot Non-interventional, Multicenter Study

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Objectives:

Prostate cancer is the second most common malignancy among Iranian men after stomach cancer. In order to understand the nature of the disease and to plan and develop a population-based cancer registry, it is essential to recognize the clinical and pathologic characteristics of the tumors as well as treatment results. The present study aimed to evaluate the clinical and pathologic characteristics of prostate cancer and in addition, to evaluate the routine practice including treatment outline and results of treatment in six referral centers in Iran.

Material and Methods:

This pilot prospective observational study recruited patients with prostate cancer between April 2015 and October 2015 from 6 referral centers in Iran. Participating physician included consecutive patients according to inclusion criteria. Demographic, clinicopathologic and treatment data were collected by the physicians using an electronic Case Report Form (eCRF). The patients were followed for 18 months and during this period; four visits were scheduled for each patients to collect the data.

Results:

Total number of 102 patients from six centers in five different cities of Iran were included in the study. Sixty-seven (65.7%) of the patients were diagnosed by needle biopsy as the first diagnostic method, 23 (22.5%) by radical prostatectomy and 12 (11.8%) by open prostatectomy. Median of OS and PFS were 18.2 (9.2-20.5) and 18.2 (6.8 – 20.4) months, respectively. Forty patients (39.2%) underwent surgery, 58 (56.8%) underwent radiotherapy and 13 (12.7%) received chemotherapy. Twenty-nine (28.4%) patients experienced adverse events over the follow up study period. Eight deaths were reported that were unrelated to treatment adverse effects.

Conclusions:

This pilot registry could serve as a valuable tool for development a comprehensive nationwide registry for patients with prostate cancer in Iran.

Keywords: Prostate Cancer, Registry, Treatment, Epidemiology

The Impact of COVID-19 on Cancer Recurrence: A Narrative Review

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Abstract:

Severe acute respiratory syndrome coronavirus 2 continues to be a worldwide healthcare problem. While our knowledge of the interaction of cancer and its management with COVID-19 mortality is gradually evolving, there are still many unanswered questions regarding the impact of COVID-19 on cancer and its prognosis. Several factors activated during COVID-19 have been implicated in tumorigenesis and the development of metastasis.
Inflammation, hypoxia, reduced levels of angiotensin converting enzyme 2, elevated levels of Interleukin 6 and some other cytokines that are hallmarks of COVID-19 are capable of inducing tumor relapse and metastasis.
On the other hand, there are reports that COVID-19 has been associated with cancer cure. Understanding the interaction between COVID-19 and tumor cells is essential for evaluating the potential long-term risks of COVID-19 in cancer patients, and for scheduling necessary preventive and therapeutic interventions.
In this review, we briefly overviewed the potential impacts that COVID-19 might have in tumorigenesis and cancer relapse, as well as the role that COVID-19 might play in cancer remission and cure.

Conclusion:

The interaction between COVID-19 and cancer is complex. While many experts have suggested a higher chance of disease recurrence in cancer patients who develop COVID-19, there are reports and proposed mechanisms that argue against this. Further research is needed to improve our understanding of the biology of SARS-CoV-2 virus, its correlation with cancer prognosis.

Keywords: Cancer, COVID-19, Recurrence, Metastasis, Remission, Cure, Inflammation, Dormant Cancer Cells, Neutrophil Extracellular Traps, Interleukins, Angiotensin Converting Enzyme

Translational snout movement accuracy and rotational accuracy of passive elements for the MedAustron gantry.

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Introduction:

The snout is a mechanical solution to position passive elements (such as range shifter) and ripple filter RiFi via a translational movement along the beamline closer to the Isocenter. Due to the reduced air gap between the patient and the passive elements lateral scattering of the proton beam is reduced and the lateral dose gradient in the patient improved. The aim of this work is to determine the translational and angular position accuracy of the snout and the passive elements for a set of representative gantry positions.

Material & Methods:

The snout position depends mainly on 2 factors. The translational shift of the snout relative to the Isocenter (IC) and the angle of the gantry. A variety of possible combinations are illustrated in Figure 1 below. The snout contains a range shifter and a ripple filter. For the measurements, a Leica AT 402 laser tracker (LT) was used to determine the position in relation to the gantry angle and the translational displacement. For this purpose, a LT reflector was placed at the four corner points on the snout (see Figure 2), the range shifter and the ripple filter. A plane is then fitted into the 4 measured points of each component (Snout, RS and RiFi). The distance to the isocenter is then evaluated for the resulting plane. The angular accuracy of the constructed plane for the PE and the snout is assessed in the rotating gantry coordinate system (see Fig. 1) for rotations around the Y and X axis. As the Z axis points towards the beamline the rotation around this axis can be neglected. The measurements were taken at the gantry angles 0, 30, 60, 90, 120, 150, and 180 as well as for the three snout positions: retracted (372 mm), half extracted (217 mm) and fully extracted (62 mm).

Results:

The translation accuracy for the Snout position 62 mm, 217 mm and 372 mm is shown in Diagram 1 and is given as the translational deviation of the snout for different gantry angles. The largest deviation compared to the nominal position is +0.54mm for the retracted Snout and gantry angle 180. All translational deviations of the snout, range shifter and ripple filter are well within the specifications of +/-1.00 mm. The tilt of the elements and their resulting angular deviation can be seen in Diagram 2 for the rotation around the X axis as well as in Diagram 3 for the rotation around the Y axis The maximum acceptable angle deviation at all gantry angles and for the rotation around the X axis and the Y axis is +/-1.00. For both, the rotation around the X axis with a maximum deviation of 0.16 for the RS at Gantry 180 and the rotation around the Y axis with a maximum deviation of 0.47 for the RiFi at Gantry 30 the measurement data lies within the acceptable range. In order to be able to show a better deviation spread in the diagrams, only a fractional value of the acceptance range was displayed in each diagram.

Conclusion:

The results show that all evaluated parameters are within the specifications of +/-1.00 mm for the translational position and +/-1.00 for the deviation of the angle. This shows that a stable positioning of the snout and of the passive elements on the gantry can be achieved and allow isocentric irradiation.

AUTHOR INDEX