

Exercise in cancer survivors

The Center for Integrated Rehabilitation of Cancer Patients (CIRE) discusses the role that exercise can play for cancer survivors

The number of cancer survivors worldwide (32.6 million people) is estimated to increase dramatically over the next 20 years, placing a substantial burden on modern society (International Agency for Research on Cancer. GLOBOCAN 2012). Over the past few decades cancer survival rates have steadily improved; however there is an unmet national and international need for a united strategic healthcare policy, focusing on cancer control and evidence-based interventions to support the recovery of cancer patients.

Concurrently, there has been a significant interest in the role of exercise and supportive care following a cancer diagnosis to prevent disruption of the physical, emotional and social capacity that cancer patients face. Due to the burden of cancer and its treatment, rehabilitation challenges vary across cancer diagnoses, age groups, presence of comorbidity and the patient's lifestyle. The purpose of the CIRE programme is to address these diversities through a comprehensive strategy to optimise rehabilitation for patients suffering from a variety of cancer types, with emphasis on exercise and supportive care from time of diagnosis.

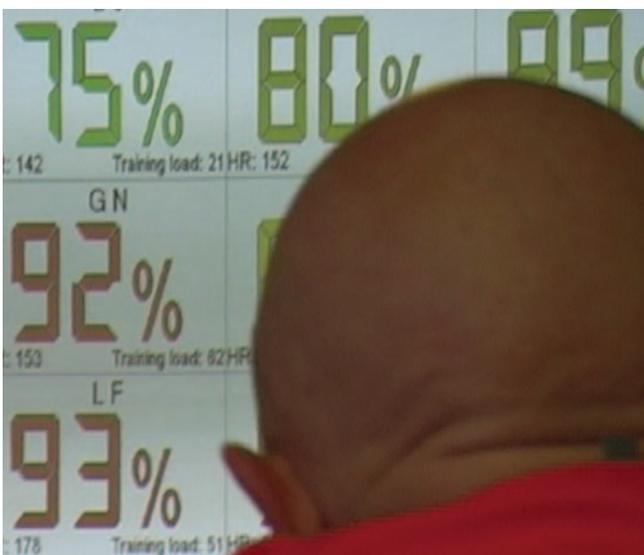
Our main hypothesis is that rehabilitation initiated from the time of diagnosis and during anticancer treatment will improve and maintain the physical, emotional and social capacity of individual cancer patients and thereby optimise participation in daily activities, improve affiliation with the education system and/or workforce and offer support in avoiding social marginalisation.

CIRE concept and research group

The CIRE research programme (2012-2017) is a cross-scientific, cross-sectoral and multidisciplinary collaborative effort which offers new theoretical and clinical strategies in the development and evaluation of rehabilitative interventions along the cancer continuum. In 2012, five institutions with 28 researchers formed the 'Center for Integrated Rehabilitation of Cancer Patients' (CIRE), which has been established with the following institutions: University of Copenhagen, Faculty of Health Sciences, Department of Public Health, University Hospital Center for Health Research (UCSF), Rigshospitalet and Herlev Hospital, University of Copenhagen, Research Center for Prevention & Health and Copenhagen Center for Cancer and Health.

Since 2001, we have studied the impact of exercise and supportive modalities in a heterogeneous group of cancer patients undergoing chemotherapy. Additionally, acknowledging the gap in the literature, we developed multimodal interventions that are tailored for specific and understudied patient groups with various cancer diagnoses. The studied populations represent children and adults undergoing treatment for curable and non-curable diseases. Further, we include marginalised and stigmatised patient groups with specific risk profiles as well as patients challenged by social, educational and labour market conditions.

The CIRE programme consists of clinical intervention studies, public health-related studies and cross-cutting analyses (Table 1). The intervention studies are based on the concept EEX-ACT: 1)



CLINICAL INTERVENTION STUDIES	<p>Self-esteem in children and young adults during and after cancer treatment – ‘RESPECT’^{1,2}</p> <p>Pre-operative and early initiated rehabilitation in patients with operable lung cancer – ‘PROLUCA’³</p> <p>‘Four critical moments’ – within rehabilitation in patients with operable lung cancer⁴</p> <p>An exercise intervention in inoperable lung cancer patients undergoing chemotherapy – ‘EXHALE’⁵</p> <p>Diagnosed with cancer – ‘A window of opportunity’ to change sedentary lifestyles in patients with breast or colon cancer undergoing chemotherapy – ‘SEDENTARY’⁶</p> <p>The effect of recreational football training in men with prostate cancer receiving Androgen Deprivation Therapy – ‘FC-Prostate’⁷</p> <p>Protract Progressive Resistance training and patients with testicular cancer undergoing chemotherapy – ‘PROTRACT’⁸</p> <p>Patient Activation through Counseling and Exercise – Acute Leukemia – ‘PACE-AL’⁹</p> <p>Neuro-Oncology Rehabilitation: Rehabilitation of patients with high-grade glioblastoma and their relatives – ‘NEON-REHAB’¹⁰</p>
PUBLIC HEALTH RELATED STUDIES	<p>Inequality in cancer rehabilitation¹¹</p> <p>Factors that affect cancer survivors’ labour market affiliation¹²</p> <p>Cancer rehabilitation: Organising integrated care in the healthcare system¹³</p>
CROSS-CUTTING ANALYSES	<p>Cross-cutting analyses: clinical and physiological outcomes</p> <p>Cross-cutting analyses: self-reported psychosocial outcomes</p> <p>Meta-synthesis: qualitative data – patients experiences with participation</p>

Table 1 CIRE studies 2012-2017

early initiation of an intervention from time of diagnosis and during cancer treatment; 2) Exercise in combination with supportive modalities; and 3) patient ACTivation in their own healthcare in the transition from the clinical setting to the community.

As a novel approach, the RESPECT study combines exercise for school-aged children during intensive cancer treatment with supportive in-hospital bi-weekly visits from classmates, or ‘ambassadors’. The children and their parents report that the presence of these ambassadors motivates the children to participate in the physical, educational and social activities by bringing a semblance of normality into the hospital setting.

Investigating exercise and supportive care

Our initiatives will identify rehabilitation needs, conduct exercise and supportive interventions and combine quantitative and qualitative research methods to understand the functional, emotional, social, and physiological mechanisms involved in the cancer experience. Emphasis is placed on the individual and societal consequences of cancer and its treatment to identify and overcome barriers within the healthcare system and in the society. The potential of exercise to relieve and manage early and late side effects has prompted a growing interest in adopting exercise and supportive care in clinical oncology practice.

Five clinical intervention studies have completed inclusion of patients, while four randomised controlled studies are still ongoing. So far, 38 articles have been published in scientific journals.

Cross-cutting perspectives

This programme provides a unique opportunity to follow patients during the cancer treatment trajectory, investigate treatment tolerance, risk of relapse and risk for developing late effects in a cohort of patients across a broad range of cancer diagnoses. We anticipate acquiring knowledge related to short and long term clinical and societal outcomes including reduction of treatment-related side effects, physiological deterioration, hospital admission days, co-morbidity and survival.





Identification of the cross-cutting endpoints in the nine clinical intervention studies will form the basis for conducting meta-analyses (quantitative) and meta-syntheses (qualitative). The cross-cutting analyses will investigate the association between changes in physical and functional capacity, quality of life and clinical endpoints (i.e. therapy completion rates, symptom burden and comorbidity), which have not been previously reported in longitudinal studies.

Rethinking rehabilitation

The CIRE programme challenges the efficacy of the established rehabilitation services in Denmark by providing new theoretical, organisational and clinical strategies along the cancer continuum. This shifting paradigm transforms the traditional view on cancer patients as being in a declining state which is detrimental to the perception that cancer patients possess important individual, social and environmental resources that can be facilitated, activated and enhanced during cancer treatment. Further, we provide evidence-based knowledge on how cancer patients recover by integrating exercise and supportive care from time of diagnosis within an interdisciplinary and cross-organisational context. This is of relevance for national and international healthcare policy.

The health professionals' knowledge, competences and attitudes toward cancer patients participating in exercise-based rehabilitation, and their ability to manage the challenges of cancer, are key elements for successful patient adherence and sustainable implementation in the clinical context. In our experience, interventions should be carried out and implemented by multidisciplinary clinical teams with research skills that are comprised of nurses, physiotherapists, physicians and exercise

physiologists specialised in cancer diseases, treatment, exercise physiology and symptom management.

The fact that the organisational structure of clinical departments differs may act as a barrier to the implementation of new practices of early rehabilitation. As a result, interventions should be adjusted to suit the individual department's organisational structure to facilitate the subsequent dissemination process.

We plan to maintain the present CIRE research network in the future and continue to invite other research groups with various profiles and approaches who are engaged in cancer survivorship. Likewise, we will collaborate with additional clinical departments that develop and test exercise interventions in different diagnostic groups.

To conclude, the ultimate goal of the CIRE programme is to generate knowledge to support the future development of national and international clinical practice guidelines for rehabilitation of cancer patients, with recommendations for tackling the challenges of everyday life with cancer, and improving the outlook for all cancer survivors regardless of age, gender, diagnosis, prognosis and life perspective.

Acknowledgement

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Selected protocol publications

- 1 Thorsteinnsson T, Helms AS, Adamsen L, *et al.* Study protocol: Rehabilitation including social and physical activity and education in children and teenagers with cancer (RESPECT). *BMC Cancer*. 2013;13:544-2407-13-544.
- 2 Helms AS, Schmiegelow K, Brok J, *et al.* Facilitation of school re-entry and peer acceptance of children with cancer: A review and meta-analysis of intervention studies. *Eur J Cancer Care (Engl)*. 2014.



- 3 Sommer MS, Trier K, Vibe-Petersen J, et al. Perioperative rehabilitation in operation for lung cancer (PROLUCA) - rationale and design. *BMC Cancer*. 2014;14:404-2407-14-404.
- 4 Missel M, Pedersen JH, Hendriksen C, Tewes M, Christensen KB, Adamsen L. A longitudinal exploration of 'four critical moments' during treatment trajectory in patients with operable lung cancer and the feasibility of an exercise intervention: A research protocol. *J Adv Nurs*. 2014;70(8):1915-1925.
- 5 Quist M, Langer SW, Rorth M, Christensen KB, Adamsen L. "EXHALE": Exercise as a strategy for rehabilitation in advanced stage lung cancer patients: A randomized clinical trial comparing the effects of 12 weeks supervised exercise intervention versus usual care for advanced stage lung cancer patients. *BMC Cancer*. 2013;13:477-2407-13-477.
- 6 Moller T, Lillelund C, Andersen C, et al. At cancer diagnosis: A 'window of opportunity' for behavioural change towards physical activity. A randomised feasibility study in patients with colon and breast cancer. *BMJ Open*. 2013;3(11):e003556-2013-003556.
- 7 Uth J, Schmidt JF, Christensen JF, et al. Effects of recreational soccer in men with prostate cancer undergoing androgen deprivation therapy: Study protocol for the 'FC prostate' randomized controlled trial. *BMC Cancer*. 2013;13:595-2407-13-595.
- 8 Christensen JF, Andersen JL, Adamsen L, et al. Progressive resistance training and cancer testis (PROTRACT) - efficacy of resistance training on muscle function, morphology and inflammatory profile in testicular cancer patients undergoing chemotherapy: Design of a randomized controlled trial. *BMC Cancer*. 2011;11:326-2407-11-326.
- 9 Jarden M, Moller T, Kjeldsen L, et al. Patient activation through counseling and exercise-acute leukemia (PACE-AL)--a randomized controlled trial. *BMC Cancer*. 2013;13:446-2407-13-446.
- 10 Piil K, Jarden M, Jakobsen J, Christensen KB, Juhler M. A longitudinal, qualitative and quantitative exploration of daily life and need for rehabilitation among patients with high-grade gliomas and their caregivers. *BMJ Open*. 2013;3(7):10.1136/bmjopen-2013-003183. Print 2013.
- 11 Diderichsen F, Andersen I, Manuel C, et al. Health inequality--determinants and policies. *Scand J Public Health*. 2012;40(8 Suppl):12-105.
- 12 Carlsen K, Harling H, Pedersen J, Christensen KB, Osler M. The transition between work, sickness absence and pension in a cohort of danish colorectal cancer survivors. *BMJ Open*. 2013;3(2):10.1136/bmjopen-2012-002259. Print 2013.
- 13 Kristiansen M, Adamsen L, Hendriksen C. Readiness for cancer rehabilitation in Denmark: Protocol for a cross-sectional mixed methods study. *BMJ Open*. 2013;3(11):e003775-2013-003775.

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