**University of Leicester**

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| **Project Reference** | BRC Studentships |

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**Section 2 – *Project Information***

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| **Project Title** | Collecting and utilising accelerometer data from patients in early phase cancer trials to assess physical activity and fatigue ​  |
| **Project Highlights:** | 1. | Experience on how to use accelerometers and process accelerometer data into meaningful outputs |
| 2. | Develop methods to improve understanding of treatment-induced fatigue by using accelerometer-assessed physical activity data to continuously monitor effects of fatigue prior to and during treatment |
| 3. | Produce novel data on 24 hour/day physical behaviours in cancer patients |
| **Project Summary**  |
| **Background:** ​Physical activity has beneficial effects on fatigue, quality of life, well-being, sleep, and functioning for cancer patients1-3. However, cancer patients are less active than cancer-free groups4, mainly due to fatigue; a common debilitating side effect of cancer treatments resulting in decreased quality of life, treatment acceptability and adherence. Understanding treatment-induced fatigue is a crucial component of side effect monitoring. Current monitoring of fatigue is via a numerical rating scale. However, continual patient monitoring cannot be undertaken using this method, and patient’s perception of fatigue differs greatly between individuals and is highly subjective and subject to bias. Wearable accelerometers have the potential to assess fatigue through continuous remote monitoring of movement. This has potential to offer a practice-changing approach to assessment and monitoring of debilitating treatment-related side effects that are key indicators for go/no-go decisions in early phase trials.In addition, accelerometers provide an accurate assessment of physical behaviours (physical activity, sedentary behaviour and sleep), in contrast to the poor validity of self-reported physical activity in cancer patients. Our group are world leaders in assessing physical activity remotely using small wearable accelerometers that capture detailed information on behaviour (physical activity volume, intensity and pattern, and sleep) 24 hours/day for days, weeks and months, with little burden on the wearer.   ​ **Research Plan**: ​ Participants in early phase cancer trials will wear an accelerometer continuously for ~6 weeks (prior to treatment and until the end of the first treatment cycle) and self-report fatigue levels. A sub-sample will perform an incremental shuttle walk test to determine exercise capacity and thus the intensity of physical activity relative to maximum fitness. Data will be used to:1. determine feasibility of collecting accelerometer data in this population
2. explore the temporal relationship between self-reported fatigue and physical activity
3. explore the extent to which accelerometer-assessed metrics predict fatigue and which metric/s provide the best prediction
4. describe the volume, intensity and pattern of physical activity in patients prior to and during treatment.​

**Expected outcomes and impac**t: The project will produce novel data on 24 hour/day physical behaviours in a population with cancer, as well as development of methods to continuously assess fatigue remotely. This has potential to offer a practice-changing approach to assessment and monitoring of debilitating treatment-related side effects that are key indicators for go/no-go decisions in early phase cancer research trials.​  |
| **References**1. Mishra SI, Scherer RW, Geigle PM, Berlanstein DR, Topaloglu O, Gotay CC, et al. Exercise interventions on health-related quality of life for cancer survivors. Cochrane Database Syst Rev 2012
2. Garcia DO, Thomson CA. Physical activity and cancer survivorship. Nutr Clin Pract 2014 Dec;29(6):768-779
3. Smits A, Smits E, Lopes A, Das N, Hughes G, Talaat A, et al. Body mass index, physical activity and quality of life of ovarian cancer survivors: time to get moving? Gynecol Oncol 2015 Oct;139(1):148-154.
4. Laura McDonald‡, Mustafa Oguz‡, Robert Carroll, Pratik Thakkar, Fei Yang, Nafeesa Dhalwani, Andrew Cox, Evie Merinopoulou, Bill Malcolm, Faisal Mehmud & Sreeram Ramagopalan. Comparison of accelerometer-derived physical activity levels between individuals with and without cancer: a UK Biobank study. Future Oncology. 15 (33) 2019.
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