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Diamond Magnetometry: A Versatile Tool for Virology and Medicine

HORIZON 2020

Diamond Magnetometry: A Versatile Tool for Virology and Medicine

Rendicontazione

Informazioni relative al progetto Finanziato da MagnetoVirology EXCELLENT SCIENCE - Marie Skłodowska-Curie ID dell'accordo di sovvenzione: 838494 Actions **Costo totale** Sito web del progetto 🔼 € 187 572,48 DOI Contributo UE 10.3030/838494 🔼 € 187 572,48 Coordinato da Progetto concluso il 30 Novembre 2020 ACADEMISCH ZIEKENHUIS GRONINGEN Data della firma CE Netherlands 11 Aprile 2019 Data di avvio Data di completamento 1 Luglio 2019 30 Giugno 2021

Periodic Reporting for period 1 - MagnetoVirology (Diamond Magnetometry: A Versatile Tool for Virology and Medicine)

Periodo di rendicontazione: 2019-07-01 al 2021-06-30

Sintesi del contesto e degli obiettivi generali del progetto

Free radicals in cells have a very complicated role in viral infections. While some researchers point toward their usefulness in mediating viral infections, others conclude the exact opposite and claim that there are detrimental effects. Their exact role seems to depend on the cell/animal type as well as the type of viruses. However free radicals are difficult to measure for the state of the art since they are short lived and reactive. Here we used diamond magnetometry for the first time to address this issues. This method offers unparalleled sensitivity, resolution, and the possibility of real-time long-duration measurements. More specifically, we used relaxometry which allows detection of radicals in single living cells.

Furthermore, we investigated the potential of diamond magnetometry in clinical diagnostics and drug development by demonstrating the FR detection in synovial fluid of arthritis patients. These measurements laid the ground stone for further studies to exploit this new technique to further understand viral infection as well as in the clinic.

Lavoro eseguito dall'inizio del progetto fino alla fine del periodo coperto dalla relazione e principali risultati finora ottenuti

The aim of the project was to demonstrate that diamond magnetometry is useful for detecting free radical generation in viral infections. As a model system we followed baby hamster kidney-21 cells upon Semliki Forest virus infection. We were able to show free radical generation on a single cell level at a subcellular resolution during the course of infection. Additionally, we were able to perform such measurements with diamond sensor particles which are conjugated to the viral surface. As a next step we aim to exploit this further by investigating if this method can be used to assess the severity of lung virus infections (with or without certain pre-existing conditions as age or COPD (smokers disease)). Further, we performed the first measurements in clinical samples. WE were able to differentiate between samples from patients with arthritis from different causes.

Progressi oltre lo stato dell'arte e potenziale impatto previsto (incluso l'impatto socioeconomico e le implicazioni sociali più ampie del progetto fino ad ora)

While diamond magnetometry is already established in physics, it is very new to the biomedical fields. Only last year, our group has demonstrated the first detection of free radicals in living cells. Here we have shown this technique to be useful in virology for the first time. We also demonstrate the first measurements of clinical samples (synovial fluid) that have been performed so far which are promising for diagnostic purposes.



Graphical summary of free radical detection during viral infection

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Permalink: https://cordis.europa.eu/project/id/838494/reporting/it

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