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Detection of Alzheimer's Protein Biomarker Clusterin using novel Graphene Biosensors

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Worldwide prevalence of dementia is estimated to rise from the current 50 million people affected to 152 million by 2050, costing healthcare systems ~2% of the global GDP to diagnose, treat and care for patients [1]. Although there are over 130 different types of dementias, Alzheimer's disease (AD) accounts for 60-70% of all cases. Methods for early diagnosis of AD could significantly impact disease detection, progression monitoring and therapeutics. For these applications we are currently developing novel graphene sensors that can detect protein biomarker concentration changes in serum/plasma samples (compared to samples from healthy patients) with high sensitivity and specificity [2-4]. The aim of this talk is to present a brief overview of graphene electronic properties and why they may be important for applications in protein biomarker detection. The talk will then detail our approach for ultra-sensitive detection of proteins to ~10fg/mL level, fabrication of the graphene sensors, latest results on Clusterin (and hCG cancer biomarker [5]) and future directions of the research in terms of molecular dynamics simulations and multiplexing of the graphene sensors for point-of-care applications in the near future.

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