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The genetic susceptibility linking preterm birth and periodontal disease – a review

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ABSTRACT

Introduction: Preterm birth (PTB) is a major clinical and public health challenge, being the main determinant of neonatal mortality and the second most common cause of death in children younger than 5 years old [1]. This condition is also responsible for 75% of neonatal morbidity which often extends to later life, resulting physical, psychological and economic costs [2]. Although some risk factors for PTB have already been described, its aetiology is still uncertain [3]. Several inflammatory diseases have been associated to PTB, including periodontal disease (PD), ranking the 6th position among the most prevalent diseases worldwide [4]. Despite the links that have been proposed, the relationship between PTB and PD is not fully understood. Nevertheless, both conditions were associated with a genetic predisposition and relevant variants were found in genes associated with the inflammatory system. The present study aims to shed light on the inflammatory network underlying PTB and PD occurrence.

Materials and methods: A literature review was conducted in B-on, Pubmed and Science Direct databases using the search terms: "preterm birth"; "periodontal disease"; "genetic variants" and "inflammation". Only peer reviewed papers in English, published between 2000 and 2019 were included. Studies using animal cell lines, animal experiments and in silico research were excluded. Six genes associated to PTB and PD were found. After, STRING biological database was used to predict protein-protein interaction for each of the genes found previously.

Results: Figure 1 shows the STRING networks for IL1A and MMP9, two of the most common genes which variants are associated both with PTB and PD. Afterwards, a search on the literature for the genes in the 1st sphere of the network was conducted to find any correlation with PTB and PD. In the end 90 variants in 40 different genes were identified associated to these conditions.

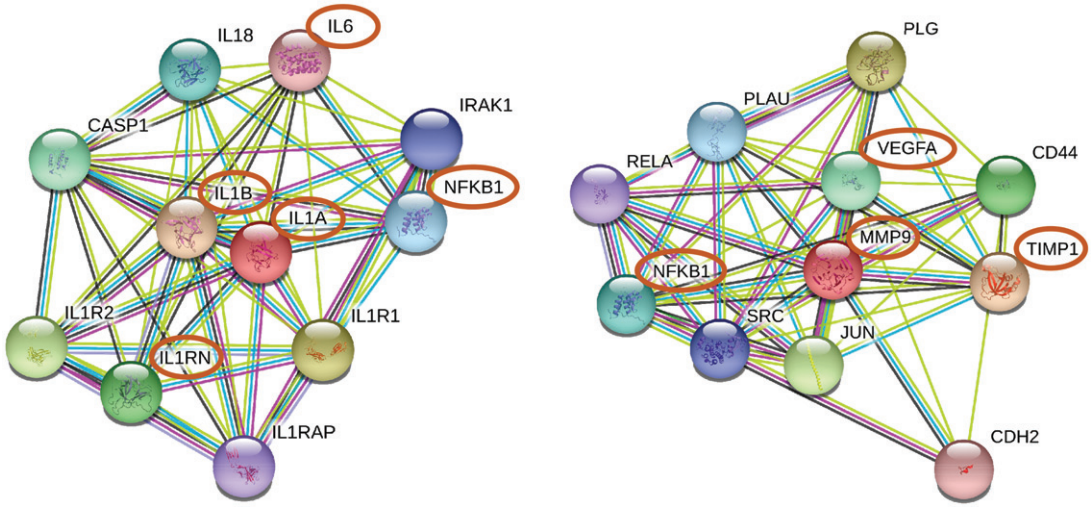

Figure 1. Example of protein networks of two key proteins involved in PTB and PD.

Discussion and Conclusions: This novel bibliography research procedure, combining STRING search for protein-protein interaction with a regular search on scientific literature databases, allow to acquire a comprehensive vision of all inflammatory related genes that have been associated to PTB and PD till this very moment.

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A review on tumor treating fields, a novel modality in cancer treatment

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ABSTRACT

Introduction: Glioblastoma Multiforme (GBM) is one of the deadliest tumours that appears in the brain and it is characterised by its aggressiveness and by a very short overall survival (OS) [1]. Despite all the efforts that have been put into trying to improve treatment outcomes, GBM patients' prognosis is still very poor. In the last couple of years, a new technique was developed to target tumoral cells. Tumour Treating Fields (TTFields) are intermediate-frequency (100–300 kHz) alternating electric fields (1–3 V/cm at the tumour bed) that can affect cells mitosis during metaphase and cytokinesis. Results from clinical trials [2,3] showed that this technique can lead to an increased OS both in newly diagnosed and recurrent patients. Our aim is to address the main findings regarding this therapy and discuss future challenges based on a literature review of the papers published since this technique was first reported in 2004 to the present date.
Materials and methods: This literature review was performed considering only publications made in journals with impact factor in the areas of interest (biomedical engineering and oncology). Appropriate keywords (TTFields, alternating electric field therapy, glioblastoma) were used to filter the results and select the relevant publications in Pubmed and Web of Science until May 2019. The total number of papers analysed was 29.
Results: Results from clinical trials showed that a minimum daily usage of 18 h can improve the OS, while other studies showed that switching the direction of the applied field between two perpendicular orientations alternately increases the number of cells that are affected by this technique. Up until now, only skin dermatitis was reported as a side-effect due to the usage of a hydrogel between the scalp and the electrodes. Computational studies allowed to predict the electric field in the brain during therapy and subsequent studies proved that the uncertainty regarding biological tissues parameters (e.g.: electrical conductivity) might have a significant impact on these predictions. Furthermore, the best electrodes positioning on the scalp and the impact of removing a part of the skull to enhance the electric field magnitude in the tumour are some important topics that are being discussed.
Discussion and conclusions: Despite the quick developments since it was first reported, TTFields investigation is still at its beginning. Some current research includes the thermal impact of this therapy and the study of its applicability in other types of cancer such as non-small cell lung cancer (NSCLC) and pancreatic and ovarian cancers. Nonetheless, this technique proved to be a very useful therapy in the treatment of GBM and all the results obtained so far point out to TTFields being an excellent fourth modality to fight cancer.

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