

Diagnosis of lymphatic diseases by using Platelet Factor 4 as a biomarker

Stanford and Northwestern scientists have discovered that Platelet Factor 4 (PF4) is a biomarker for lymphatic diseases, such as lipedema and lymphedema, and can reliably differentiate them from obesity, which is a common misdiagnosis. Diagnostic tools for lymphatic diseases are relatively limited or non-existent, therefore, PF4 can be used as a convenient diagnosis tool and provide a mechanism to streamline and expedite the treatment of patients.

Lymphatic vasculature disorders affect millions of patients worldwide and can be a disfiguring, disabling, and occasionally, life-threatening clinical condition that is commonly mistaken as obesity. Additionally, new evidence suggests that asymptomatic defective lymphatic vessels could be responsible for certain forms of inflammatory bowel disease/Crohn's disease, glaucoma, obesity, cardiovascular and neurological pathology. Currently, diagnosis of lymphatic diseases either relies on cumbersome, painful, expensive imaging techniques that only detect symptomatic cases or are absent altogether. Consequently, a simple, effective, and specific diagnosis tool for lymphatic diseases is urgently needed.

PF4 was found to be present at elevated levels in both young (lean) and old (obese) mice that have a genetic lymphatic vascular defect. Interestingly, elevated PF4 was not detected in an obese mouse model with a healthy lymphatic vasculature. Furthermore, elevated PF4 was found in three groups of human patients that were suffering from different types of lymphatic disorders. Importantly, there was no significant difference of PF4 levels between obese and lean patients within the healthy and diseased group, suggesting that PF4 can differentiate lymphatic disorders from obesity. As a result, PF4 has the potential to be used as a biomarker for lymphatic diseases and accelerate diagnosis which can lead to potential early-

stage treatment of patients.

Stage of Development

Research - *in-vivo* data

Technology Reference:

Stanford: S20-322

Northwestern: NU2020-158

Applications

- Development of a diagnostic tool for lymphatic disorders
- Facilitate the diagnosis of difficult to identify lymphatic diseases such as lipedema
- Increase likelihood of early-stage diagnosis and treatment of lymphatic defects

Advantages

- Provides a simple, scalable and potentially cheap diagnostic tool
- Addresses the need for a diagnostic method in a large patient population with limited or absent methods of diagnosis
- Capable of diagnosing asymptomatic patients and facilitating early-stage treatment

Publications

- Ma, W., Gil, H. J., Escobedo, N., Benito-Martín, A., Ximénez-Embún, P., Muñoz, J., Peinado, H., Rockson, S. G., & Oliver, G. (2020). [Platelet factor 4 is a biomarker for lymphatic-promoted disorders](#). JCI Insight, 5(13).

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