Title

Frailty index based on laboratory tests, and frailty index based on clinical judgement: both are simple and useful, and even more useful when used together

Key Points

・ There are several methods for evaluating frailty, including a frailty index calculated from common blood test results and a frailty index based on the assessment of functional abilities such as activities of daily living.

・ Both of these two methods are simple and useful, as each one assesses different aspects of frailty, making them even more effective when used in combination.

・ These frailty indices can be easily automated, and are anticipated for assessing the risk of unfavorable outcomes at hospital admissions or health checkups

Summary

 Frailty is a clinical state of vulnerability with inherent increased risk for adverse outcomes, including functional decline and mortality. Frailty is at least partially reversible and preventable if detected early and intervened appropriately. Therefore, frailty has attracted much attention.

 One widely used method for assessing frailty is the Clinical Frailty Scale (CFS), which is based on functional assessment of activities of daily living. A relatively new method, the Frailty Index-laboratory (FI-lab), which uses laboratory data such as blood test results, is also becoming well known. Each of these two frailty indices may assess different aspects of frailty. Addressing this issue, a research group led by Dr. Hirotaka Nakashima and Prof. Hiroyuki Umegaki of the Department of Geriatrics, Nagoya University Hospital, examined this point using data from a study that enrolled hospitalized older patients (Japan Hospital Associated Complications study: J-HAC study).

 The results indicated a strong correlation between the CFS and activities of daily living as well as cognitive function, whereas they exhibited only a weak correlation with the FI-lab. Furthermore, the correlation between the two frailty indices was weak, and each was independently associated with clinical

outcomes such as death and length of hospital stay. These findings suggest that the CFS and FI-lab capture distinct aspects of frailty.

Additionally, the combined use of the CFS and FI-lab demonstrated effectiveness in predicting clinical outcomes. Whether these frailty indices were summed using complex calculations or a simple average, their performance remained similar.

Both the CFS and FI-lab are easy to use, and FI-lab is particularly well suited for automation. Utilizing these frailty indices may facilitate risk-based interventions.

Research Background

Frailty is a clinical state of vulnerability with inherent increased risk for adverse outcomes, including functional decline and mortality. As the global population ages, the number of frail older people is increasing. Frailty is at least partially reversible and preventable if detected early and intervened appropriately. Therefore, frailty has attracted much attention.

There are some methods to assessing frailty. One widely used method is the Clinical Frailty Scale (CFS). It is based on an evaluation of functions such as activities of daily living and uses a 9-point scale from 1 to 9 (with 9 being the most severe frailty). Another relatively new method is the FI-lab, which calculates the degree of frailty based on laboratory tests such as blood tests. The FI-lab was calculated by dividing the number of abnormal laboratory results by the number of laboratory tests performed. The FI-lab score ranges from 0 to 1 (a higher score indicates more severe frailty). Considering the origins of these frailty indices, each may assess different aspects of frailty. The research group examined this point using data from a study that enrolled hospitalized older patients (Japan Hospital Associated Complications study: J-HAC study).

Research Results

A total of 378 patients were included in the study. The FI-lab was calculated using 23 common blood tests.

The analysis revealed that the CFS correlated strongly with activities of daily living and cognitive function, while the FI-lab showed only weak correlations with these factors. Both the CFS and FI-lab showed only weak correlations with geriatric syndromes and comorbidities. The correlation between the CFS and FI-lab was weak (correlation coefficient $r = 0.28$, $p < 0.001$) (Figure 1). Furthermore, the CFS and FI-lab were independently associated with clinical

outcomes such as death during hospitalization, death within 90 days after admission, discharge home, and length of hospital stay (e.g., risk of death during hospitalization was 1.5 times per point for the CFS, p = 0.017; for FI-lab, 1.91 times per 0.1 point, p < 0.001). These results suggest that the CFS and FI-lab each assesses different aspects of frailty.

 Additionally, the combined use of the CFS and FI-lab demonstrated effectiveness in predicting clinical outcomes (Figure 2). Whether these frailty indices were summed using complex calculations or a simple average[1], their performance remained similar (Figure2).
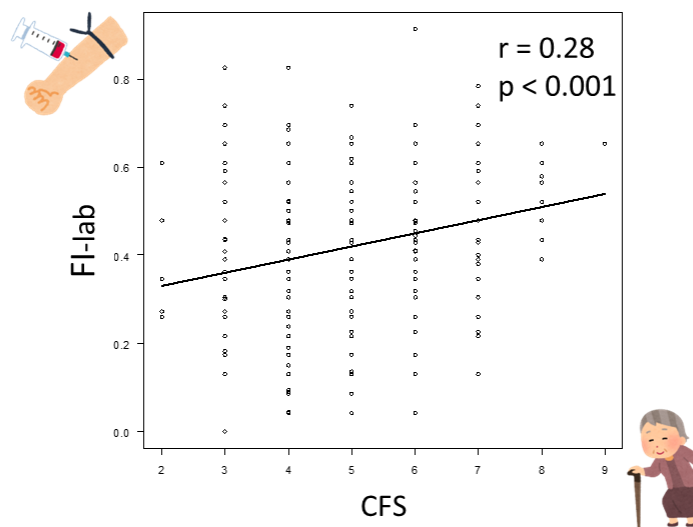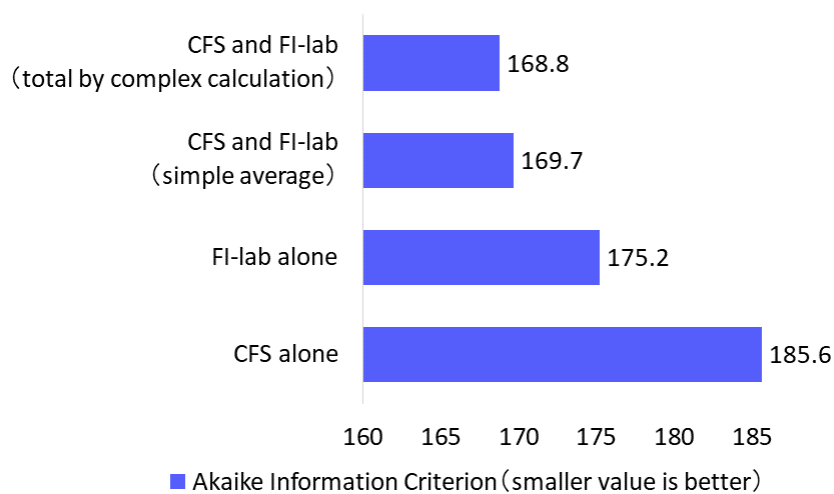
Fig 1: Correlation between CFS and FI-lab

r = 0.28
p < 0.001

FI-lab (y-axis), CFS (x-axis)

Fig 2: Goodness of model fit predicting in-hospital mortality

Model	Akaike Information Criterion
CFS and FI-lab (total by complex calculation)	168.8
CFS and FI-lab (simple average)	169.7
FI-lab alone	175.2
CFS alone	185.6

■Akaike Information Criterion（smaller value is better）

Research Summary and Future Perspective

Both the CFS and FI-lab are easy to use, and especially, the FI-lab is easy to automate. Utilizing these frailty indices on hospital admission and health checkups may facilitate risk-based interventions. Further research and clinical applications on combined use of frailty indicators, such as the CFS and FI-lab, are expected.

Publication

Japanese ver.

https://www.med.nagoya-u.ac.jp/medical_J/research/pdf/Agi_230727.pdf