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## Anti-adipogenic effects on 3T3-L1 pre-adipocytes from functional plant *Pinus densiflora* Sieb. et Zucc. needles

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Obesity is a common disease in worldwide and considered a significant risk factor causing various complications. *Pinus densiflora* Sieb. et Zucc. contains several natural compounds that have various biological activities. However, the health beneficial effects of these compounds have rarely been reported. This study is to evaluate the inhibitory effect of pine needle extract powder (PNEP) on adipocyte differentiation in 3T3-L1 pre-adipocytes. The level of adipogenesis in the 3T3-L1 cells was measured by oil red O staining. As a result of Oil Red O staining, PNEP significantly inhibited adipocyte differentiation by more than 55% in 3T3-L1 pre-adipocytes in a dose-dependent manner. Furthermore, we have confirmed PNEP inhibited adipocyte differentiation by suppressing the expression of the adipogenic transcription factors, fatty acid binding protein (aP2) and sterol regulatory element binding transcription factor-1(SREBP1c) using real-time PCR analysis. These results show that PNEP inhibits adipogenesis by suppressing the expression of adipogenic transcription factors.

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