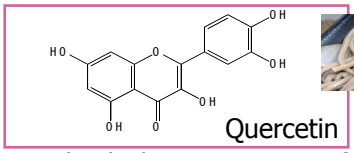
Application of qNMR. Part 3: Quantification of quercetin in Tartary buckwheat

NMR spectroscopy can count the number of atoms in molecules, and so purity of the sample can be quantitatively determined from the ratio of signal intensities of a standard material and a target material. Quantitative NMR (qNMR) has wide applicability because it does not require a target matrial of known purity as standard. This application note introduces an example of qNMR analysis for quercetin, a functional component of Tartary buckwheat.



Tartary buckwheat, containing functional flavonoid rutin as a main component, gets attention as a healthy food. Rutin, however, is not detected in Tartary buckwheat noodle because of coexisting rutin-degrading enzyme. Instead, another flavonoid quercetin is detected.

Purpose: Purity of quercetin in extraction liquid of Tartary buckwheat is quantitatively determined by HPLC and qNMR.

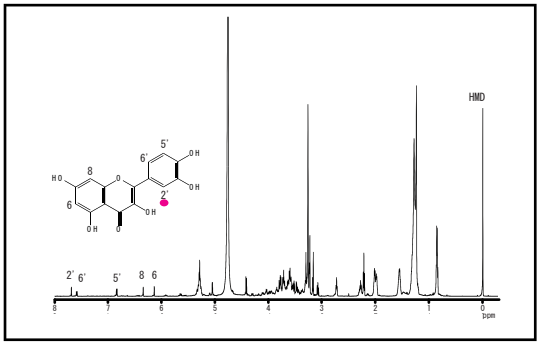


Fig. 1 qNMR spectrum of Tartary buckwheat (Spectrometer: JNM-ECA600)

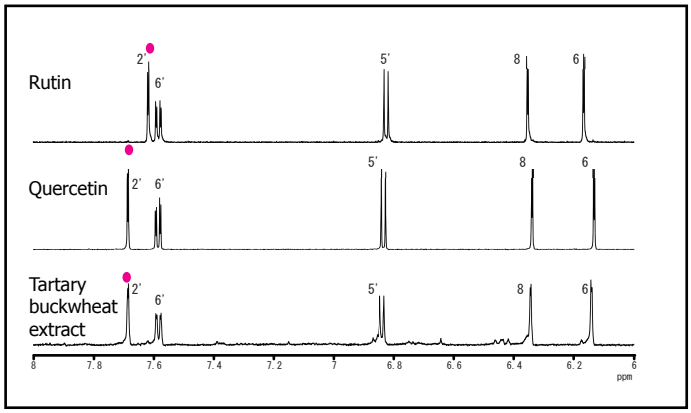


Fig. 2 qNMR spectra of commercial reagents of rutin and quercetin and Tartary buckwheat extract.

Table Measurement conditions

Parameter of JNM-ECA600	
Observed nucleus	^{1}H
Observed range	-5 to 15 ppm
Data points	32K
Digital filter	On (8 times)
Recycle delay	60 s
Flip angle	90°
Scans	8 scan
Temperature	25℃
Spinning	Off

The NMR signals of 6, 8, 5′, 6′-protons for Tartary buckwheat may be attributed to rutin and other flavonoid glycosides, and so the signal of 2-proton is used for analysis.

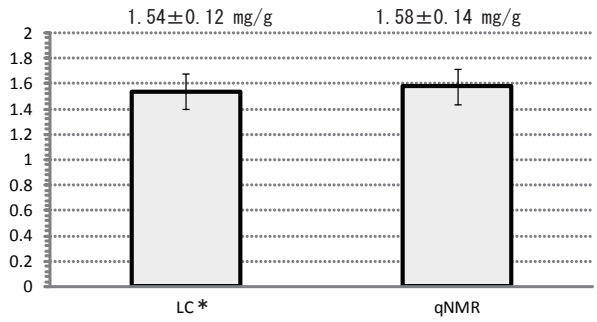


Fig. 3 Purities of quercetin in Tartary buckwheat
* Corrected with the purity determined by qNMR.

Conclusion
1. Purity of quercetin in Tartary buckwheat was determined by qNMR.
2. Purity determined by LC almost agrees with that by qNMR.

Though qNMR is a useful analysis when a target sample of known purity is not available, its sensitivity is lower than chromatography. However, the combination of these may lead to quantitative analysis with high reliability.

Ref. : N.Sugimoto, A.Tada, T. Suematsu et al. , *Jpn. J. Food Chem.Safety*, 17(3),179-184 (2010).

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