Brucine (2,3-Dimethoxystrychnidin-10-one) is an alkaloid, structurally related to strychnine, but less toxic. Figure 1 shows the $^1$H NMR spectrum of a 250 mM Brucine sample in CDCl$_3$, measured in a single scan taking 10 seconds to acquire.

Figure 1: $^1$H NMR spectrum of a 250 mM Brucine sample in CDCl$_3$ measured on a Spinsolve 60 MHz system in a single scan.

$^{13}$C Spectrum

Figure 3 shows the $^{13}$C NMR spectrum of 250 mM Brucine in CDCl$_3$ acquired using NOE polarization transfer from $^1$H to $^{13}$C and $^1$H decoupling. The 1D Carbon experiment using NOE is sensitive to all $^{13}$C nuclei in the sample. It clearly resolves all the expected resonances.

Figure 3: $^{13}$C NMR spectrum of a 250 mM Brucine sample in CDCl$_3$ measured on a Spinsolve 60 MHz system in 205 minutes.
2D COSY

The 2D COSY experiment allows one to identify coupled $^1$H nuclei as they generate cross peaks out of the diagonal of the 2D data set. In Figure 2 a large number of cross peaks can be nicely observed. For example, the protons at position 6 and 11 (light green) couple with each other. Furthermore, proton 19 couples with proton 10 (light blue), 12 (orange) and 20 (pink). In addition, the couplings between protons 8 and 9 (dark blue) as well as the couplings of protons 8 and 9 with protons 14 and 15 (dark green) can be nicely observed.

Figure 2: $^1$H 2D COSY experiment of a 250 mM Brucine sample in CDCl$_3$ acquired in 17 minutes on a Spinsolve 60 MHz system.

2D HSQC-ME

The HSQC is a powerful sequence widely used to correlate $^1$H with the one-bond coupled $^{13}$C nuclei. The Spinsolve is equipped with a multiplicity edited version (HSQC-ME) of this method. It provides the editing power of the DEPT-135 sequence, which is useful to differentiate the signals of $\text{CH}_2$ groups (blue) from $\text{CH}$ and $\text{CH}_3$ groups (red). Figure 4 shows the HSQC-ME spectrum of a 250 mM Brucine in CDCl$_3$ acquired in 8 minutes.

Figure 4: HSQC-ME spectrum of a 250 mM Brucine sample in CDCl$_3$ showing the correlation between the $^1$H (horizontal) and $^{13}$C (vertical) signals.
To obtain long-range $^1$H-$^{13}$C correlations through two or three bond couplings, the Heteronuclear Multiple Bond Correlation (HMBC) experiment can be used. Figure 5 shows the HMBC spectrum of a 250 mM Brucine sample measured in 34 minutes on our Spinsolve 60 MHz. As an example, the long-range correlations of proton 8 with carbons 17 (light green), 9 (dark green), 7 (dark blue), 5 (light blue), 2 (orange) and 3 (pink) are marked with circles. The experiment shows the correlation with quaternary carbons, too.