Synthesis of methyl 2-cyano-3,12-dioxo-18β-olean-1,9(11)-dien-30-oate analogues to determine the active groups of inhibiting cell growth and inducing apoptosis in leukemia cells

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The NMR spectra data of target compounds

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Compound 10a

$^1$H NMR spectra of compound 10a

$^1$H NMR spectra of compound 10a
$^{13}$C NMR spectra of compound 10a

HSQC spectra of compound 10a
Compound 10b

\(^1\)H NMR spectra of compound 10b

\(^1\)H NMR spectra of compound 10b
$^{13}$C NMR spectra of compound 10b

HSQC spectra of compound 10b
Compound 10c

$^1$H NMR spectra of compound 10c

$^1$H NMR spectra of compound 10c
$^{13}$C NMR spectra of compound 10c

HSQC spectra of compound 10c
Compound 10d

$^1$H NMR spectra of compound 10d

$^1$H NMR spectra of compound 10d
$^{13}$C NMR spectra of compound 10d

HSQC spectra of compound 10d
Compound 10e

$^1$H NMR spectra of compound 10e

$^1$H NMR spectra of compound 10e
$^{13}$C NMR spectra of compound 10e

DEPT135 spectra of compound 10e
H-H COSY spectra of compound 10e
HMBC spectra of compound 10e

HSQC spectra of compound 10e
\[ { } \]

\[ ^{13} \text{C NMR spectra of compound 11a} \]

\[ \text{HSQC spectra of compound 11a} \]
Compound 11c

$^1$H NMR spectra of compound 11c

$^1$H NMR spectra of compound 11c
$^{13}$C NMR spectra of compound 11c

HSQC spectra of compound 11c
Compound 11d

\[ ^1H \text{NMR spectra of compound 11d} \]
$^{13}$C NMR spectra of compound 11d

HSQC spectra of compound 11d
Compound 12

$^1\text{H}$ NMR spectra of compound 12

$^1\text{H}$ NMR spectra of compound 12
$^{13}$C NMR spectra of compound **12**

HSQC spectra of compound **12**
Compound 13

\(^1\)H NMR spectra of compound 13

\(^1\)H NMR spectra of compound 13
$^{13}$C NMR spectra of compound 13

HSQC spectra of compound 13
Compound 9a

$^1$H-NMR spectra of compound 9a

$^{13}$C-NMR spectra of compound 9a
Compound 9b

$^{1}H$-NMR spectra of compound 9b

$^{13}C$-NMR spectra of compound 9b
Compound 9c

$^1$H-NMR spectra of compound 9c

$^{13}$C-NMR spectra of compound 9c
Compound 9d

$^1$H-NMR spectra of compound 9d

$^{13}$C-NMR spectra of compound 9d
Compound 5e

\[ \text{H NMR spectra of compound 5e} \]

Compound 7c

\[ \text{H NMR spectra of compound 7c} \]
Compound 7e

$^{13}$C NMR spectra of compound 7c

$^1$H NMR spectra of compound 7e
$^{13}$C NMR spectra of compound 7e

Compound 8c

$^1$H NMR spectra of compound 8c
Compound 8e

$^{13}$C NMR spectra of compound 8c

$^1$H NMR spectra of compound 8e
C NMR spectra of compound 8e