表 1 可用于蛋白质分析的质谱仪(Thelen and Miernyk, 2012)
Table 1 Overview of mass spectrometers available for protein analysis (Thelen and Miernyk, 2012)

型号	厂商	分析仪	精度 (PPM)	灵敏度	范围(M/Z)	分辨率 (FWHM)	扫描速度	碎片化	电离
Orbitrap (with LTQ XL or Velos)	Thermo Scientific	Hybrid	<1	Attomole1	50–4 000	>100 000	1 spectra/s	CID, HCD, ETD, PQD	MALDI, HESI, ESI, nano, API, APCI, APCI/APPI
TSQ Vantage	Thermo Scientific	Triple quadrupole	50*	Attomole1	10–1500	7500	5 000 units/s	CID	HESI, APCI/APPI, nano
Velos	Thermo Scientific	Linear ion trap	50*	Attomole1	50–4 000	>25 000	33 333 units/s	CID, ETD, PQD	ESI, APCI, APCI/APPI, nano
LTQ XL	Thermo Scientific	Linear ion trap	50*	Attomole1	50–4 000	>25 000	16 000 units/s	CID, ETD, PQD	ESI, APCI, APCI/APPI, nano
Xevo G2 Qtof	Waters	Quadrupole TOF	<1	Femtomole2	<100 000	>22 500	30 spectra/s	CID	ESI/APCI/ESCi, APCI, APPI/APCI, nano, ASAP, APGC, TRIZAICTM
Xevo TQ-S	Waters	Tandem quadrupole	50*	Attomole1	2–2 048	Not provided	10 000 units/s	CID	ESI/APCI/ESCi, APCI, APPI/APCI, nano, ASAP, APGC, TRIZAICTM
Synapt G2 HDMS	Waters	Quadrupole TOF	<1	Femtomole2	<100 000	40 000	20 spectra/s	CID	ESI/APCI/ESCi, APCI, APPI/APCI, nano, MALDI, ASAP, APGC, TRIZAICTM
SolariX FTMS	Bruker Daltonics	FTMS	<1	Attomole3	<100 000	>1 000 000	Not provided	CID, ETD, ECD, (SORI)-CID	ESI, nano, APCI, APPI
Amazon ETD	Bruker Daltonics	Linear ion trap	50*	Attomole1	50–3 000	20 000	52 000 units/s	CID, ETD/PTR	ESI, APCI, APPI, nano, HPLC-Chip, ESI/MALDI
micrOTOF-Q II	Bruker Daltonics	Quadrupole TOF	<2	Attomole4	50–20 000	20 000	Not provided	CID	ESI, APCI, ESI/APCI, APPI, nano, CE/MS
6 490 Triple Quadrupole	Agilent	Triple quadrupole	50*	Zeptomole5	10–2 000	Not provided	150 MRM/s	CID	HPLC-chip, ESI, APCI, APPI, MMI
6 500 Q-TOF	Agilent	Quadrupole TOF	<2	Femtomol1	20–20 000	40 000	20 spectra/s	CID	ESI, APCI, ESI/APCI, APPI, MALDI, HPLC-Chip
TripleTOF 5 600	ABSciex	Triple TOF	<1	Femtomol1	<40 000	40 000	100 spectra/s	CID	ESI/APCI, Turbo V, nano
Qtrap 5 500	ABSciex	Triple quadruple	100*	Femtomol1	5–1 250	Not provided	12 000 units/s	CID/ETD	APCI, Turbo V, nano, ESI/APCI, photo
		Linear ion trap	100*	Femtomol1	50–1 000	9 200	20 000 units/s		

注: *使用道尔顿为质量精度的仪器都通过 1000 的 m/z 使用转换为 p.p.m 单位; 灵敏度使用(1)利血平; (2) [Glu1]-血纤维蛋白肽 B; (3)泛素; (4) BSA 消化物或; (5)维拉帕米来判定; 所有的数据获取自制造商的官方网站(http://www.thermoscientific.com, http://www.waters.com, http://www.bdal.com, http://www.agilent.com 和 http://www.absciex.com)的仪器说明书或其销售代表提供的参数指标。APGC, 常压气相色谱(atmospheric pressure gas chromatography); APCI, 常压化学电离化(atmospheric pressure chemical ionization); API, 常压电离(atmospheric pressure ionization); APPI, 常压光电离(atmospheric pressure photoionization); ASAP, 常压固体分析探针(atmospheric solids analysis probe); CE/MS, 毛细管电泳质谱(capillary electrophoresis MS); CID, 碰撞诱导解离(collision-induced dissociation); ESCi, 电喷雾常压化学电离(electrospray atmospheric pressure chemical ionization); ESI, 电喷雾离子化(electrospray ionization); FTMS，傅里叶变换质谱(Fourier transform MS); HCD，高能量的 C−陷阱解离(higher-energy C-trap dissociation); HESI, 加热电喷雾电离(heated electrospray ionization); MMI, 多模式电离(multi-mode ionization); MRM, 多反应监测(multiple reaction monitoring); nano, 纳升喷雾(nanospray); photo, 光电离(photoionization); PQD, 脉冲 Q 碰撞诱导解离(pulsed Q collision-induced dissociation); PTR, 质子转移反应(proton transfer reaction); SORI, 持续非共振辐照碰撞诱导解离(sustained off-resonance irradiation)