

Specificities of Various Endopeptidases.

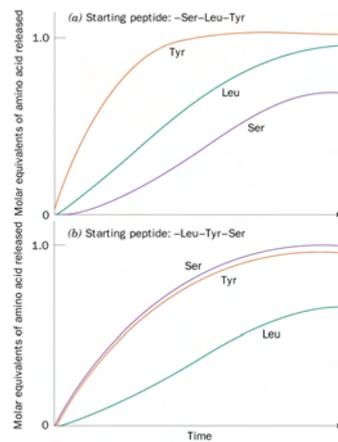
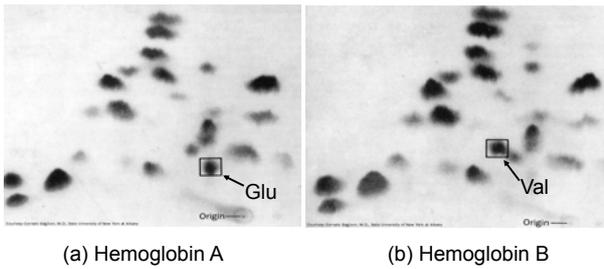
Enzyme	Source	Specificity	Comments
$\begin{array}{c} R_{n+1} \quad O \quad R_n \quad O \\ \quad \quad \quad \\ -NH-CH-C-NH-CH-C- \\ \quad \quad \quad \uparrow \\ \quad \quad \quad \text{peptide bond} \end{array}$			
Trypsin	Bovine pancreas	R_{n+1} = positively charged residues: Arg, Lys; R_n ≠ Pro	Highly specific
Chymotrypsin	Bovine pancreas	R_{n+1} = bulky hydrophobic residues: Phe, Trp, Tyr; R_n ≠ Pro	Cleaves more slowly for R_{n+1} = Asn, His, Met, Leu
Elastase	Bovine pancreas	R_{n+1} = small neutral residues: Ala, Gly, Ser, Val; R_n = Pro	
Thermolysin	<i>Bacillus thermoproteolyticus</i>	R_n = Ile, Met, Phe, Trp, Tyr; Val; R_{n+1} ≠ Pro	Occasionally cleaves at R_n = Ala, Asp, His, Thr; heat stable
Pepsin	Bovine gastric mucosa	R_n = Leu, Phe, Trp, Tyr; R_{n+1} ≠ Pro	Also others; quite nonspecific; pH optimum 2
Endopeptidase Arg-C	Mouse submaxillary gland	R_{n+1} = Arg	May cleave at R_{n+1} = Lys
Endopeptidase Asp-N	<i>Pseudomonas fragi</i>	R_n = Asp	May cleave at R_n = Glu
Endopeptidase Glu-C	<i>Staphylococcus aureus</i>	R_{n+1} = Glu	May cleave at R_{n+1} = Gly
Endopeptidase Lys-C	<i>Lysobacter enzymogenes</i>	R_{n+1} = Lys	May cleave at R_{n+1} = Asn

Specificities of Various Exopeptidases.

Enzyme	Source	Specificity*
Carboxypeptidase A	Bovine pancreas	R_n ≠ Arg, Lys, Pro; R_{n+1} ≠ Pro
Carboxypeptidase B	Bovine pancreas	R_n = Arg, Lys; R_{n+1} ≠ Pro
Carboxypeptidase C	Citrus leaves	All free C-terminal residues; pH optimum = 3.5
Carboxypeptidase Y	Yeast	All free C-terminal residues, but slowly with R_n = Gly
Leucine aminopeptidase	Porcine kidney	R_1 ≠ Pro
Aminopeptidase M	Porcine kidney	All free N-terminal residues

* R_n = the N-terminal residue; R_{n+1} = the C-terminal residue.

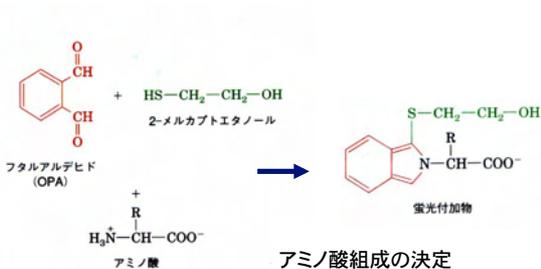
Figure 7-12 Peptide mapping of trypsin-digested protein.



The hypothetical rate of the carboxypeptidase-catalyzed release of amino acids.

(a) All bonds cleaved at the same rate. (b) Ser slow, Tyr fast, and Leu intermediate.

蛍光付加物の作成



アミノ酸組成の決定

加水分解後、蛍光付加物にして分析

蛍光付加アミノ酸の分析

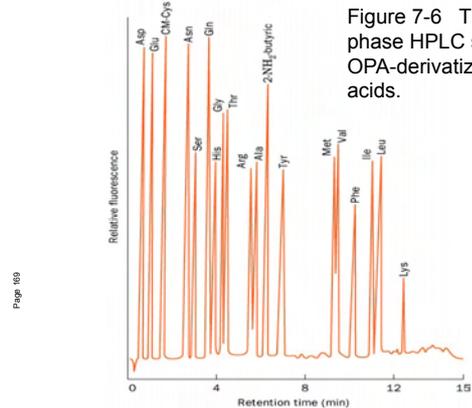


Figure 7-6 The reverse-phase HPLC separation of OPA-derivatized amino acids.

Figure 7-7 The amino acid sequence of a polypeptide chain.

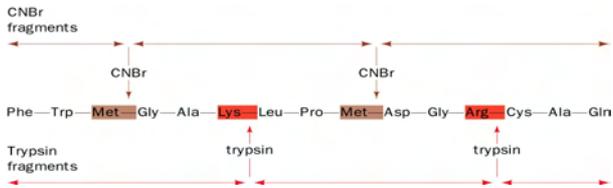
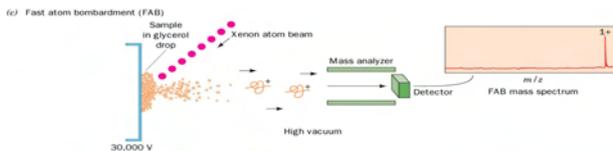


Figure 7-8c The generation of the gas phase ions required for the mass spectrometric analysis of proteins. (c) By fast atom bombardment (FAB).



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Figure 7-8a The generation of the gas phase ions required for the mass spectrometric analysis of proteins. (a) By electrospray ionization (ESI).

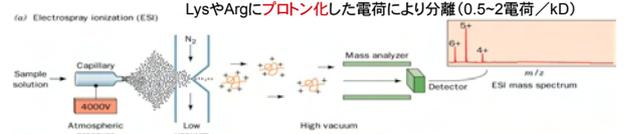


Figure 7-8b The generation of the gas phase ions required for the mass spectrometric analysis of proteins. (b) By matrix-assisted laser desorption/ionization (MALDI).

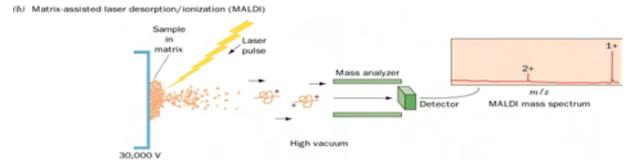
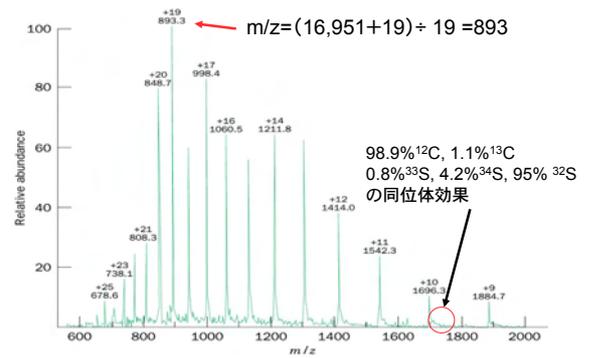
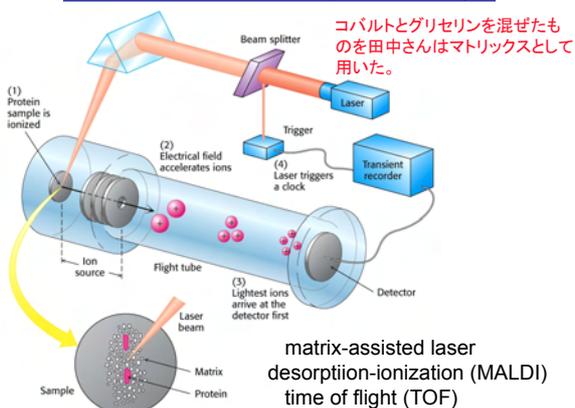


Figure 7-9 The ESI-MS spectrum of the 16,951-D horse heart protein apomyoglobin.



MALDI-TOF mass spectrometry



matrix-assisted laser desorption-ionization (MALDI) time of flight (TOF)

MALDI-TOF mass spectrum of insulin and β -lactoglobulin

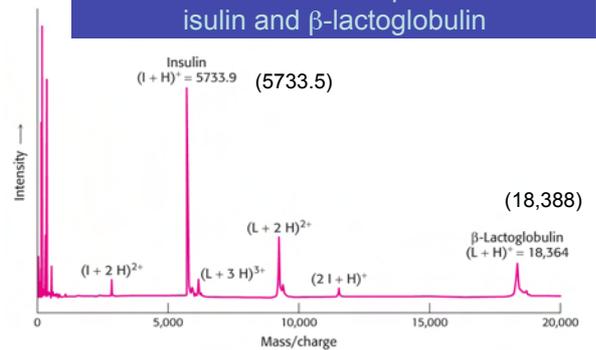


Figure 7-10 The use of a tandem mass spectrometer (MS/MS) in amino acid sequencing.

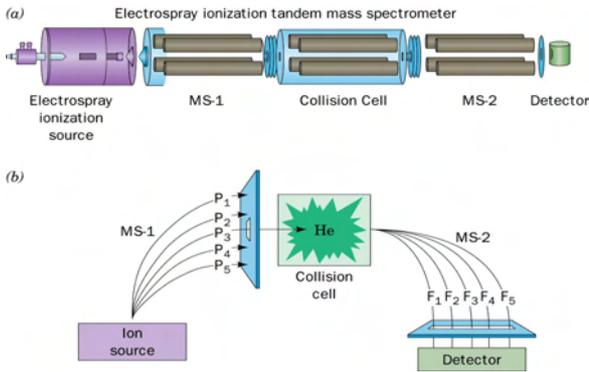
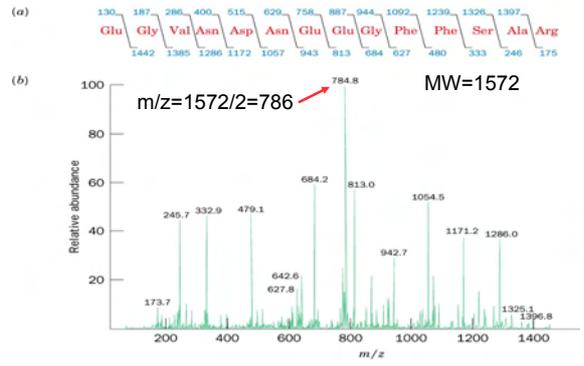


Figure 7-11 The tandem mass spectrum of the doubly charged ion of the 14-residue human [Glu¹]fibrinopeptide B ($m/z = 786$).



1) β-ラクタム系抗生物質

ペプチドグリカン生成を阻害。(1) ペニシリン系抗生物質、(2) セフェム系抗生物質 (セファロスポリン系、セファマイシン系)、(3) オキサセフェム系抗生物質、(4) モノバクタム系抗生物質、(5) ガルバネム系抗生物質

2) ホスホマイシン系抗生物質

単純な化学構造式を持つ抗生物質であり、ペプチドグリカン生成を初期段階で阻害し、殺菌作用を發揮します。

3) マクロライド系抗生物質

14~16員環の巨大ラクトン環を有する構造の抗生物質群であり、細菌のリボソームに作用して蛋白質合成を抑制します。

4) テトラサイクリン系抗生物質

4つの6員環が並んだ化学構造的な特徴を有する抗生物質群であり、細菌のリボソームに作用して蛋白質合成を抑制し、静菌作用を發揮します。

5) アミノグリコシド系抗生物質

化学構造的にアミノ基の付いた糖を有する抗生物質群であり、マクロライド系やテトラサイクリン系と同様にリボソームに作用して蛋白質合成を抑制し、静菌作用を發揮します。

6) ニューキノロン系抗菌薬

ピリドンカルボン酸系の誘導体であり、化学合成抗菌薬に分類されます。細菌のDNAの複製に欠かせないDNAジヤイレースを阻害し、殺菌作用を發揮します。

抗生物質の種類と作用

細胞壁の合成を阻害	ペニシリン系	尿路や皮膚の感染症
	セフェム系	尿路や呼吸器の感染症
	ホスホマイシン	腸や腹部の感染症
タンパク質の合成を阻害	アミノグリコシド系	結核や緑膿菌感染症
	マクロライド系	マイコプラズマ、レジオネラ
	テトラサイクリン系	皮膚感染やマイコプラズマ
核酸の合成を阻害	キノロン系	呼吸器や腸の感染症

実験でよく使われる抗生物質の構造

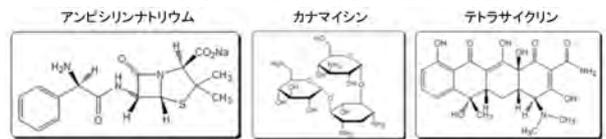
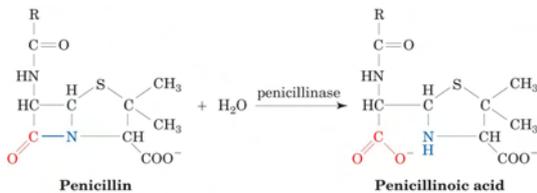


Figure 11-26 Enzymatic inactivation of penicillin.



ラクタム (lactam) は、カルボキシル基とアミノ基が脱水縮合した形を持って環を成している化合物の総称

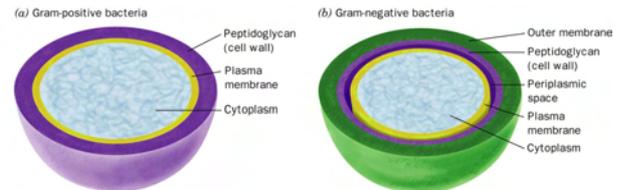


Figure 11-23 Schematic diagram comparing the cell envelopes of (a) gram-positive bacteria and (b) gram-negative bacteria.

ペプチドグリカンの構成ユニットとペプチド鎖の結合

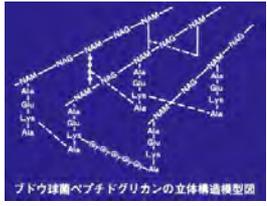
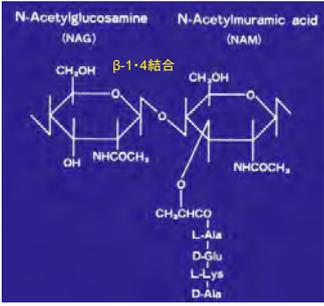


Figure 15-8 The alternating NAG–NAM polysaccharide component of bacterial cell walls.

