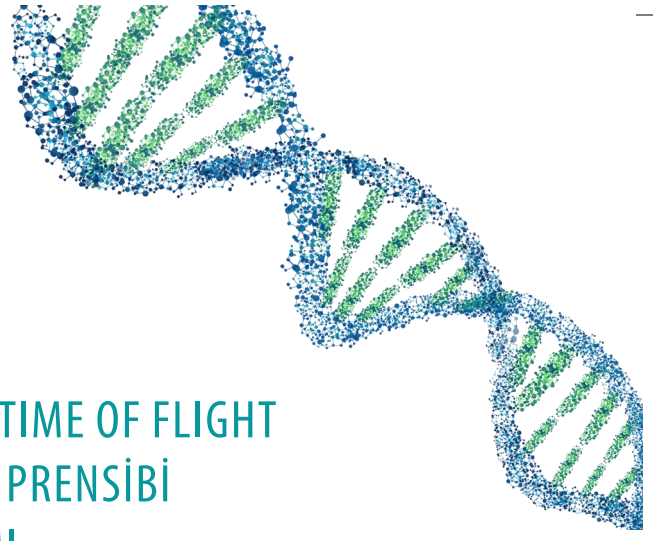


## BÖLÜM 12

# MATRIX-ASSISTED LASER DESORPTION-TIME OF FLIGHT MASS SPECTROMETRY (MALDI-TOF MS) PRENSİBİ VE KLİNİK MİKROBİYOLOJİDE KULLANIMI



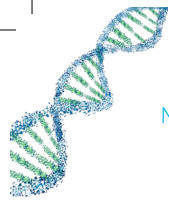
Banu SANCAK<sup>1</sup>

Mikroorganizmaların tanımlanmasında moleküllerin kütle/yük ( $m/z$ ) oranlarının araştırıldığı bir yöntem olan matriks aracılı lazer dezorpsiyon iyonizasyon-uçuş zamanı kütle spektrometresi (MALDI-TOF MS; "Matrix-assisted laser desorption ionization-time of flight mass spectrometry") teknolojisinin kullanılmaya başlaması mikrobiyoloji alanında yeni bir dönemin başlamasına yol açmıştır. MALDI-TOF MS, uygulamasının kolay olması, çok hızlı tanımlama gerçekleştirmesi ve maliyet etkin olması gibi nedenlerinden dolayı günümüzde konvansiyonel ve moleküler tanımlama yöntemlerine bir alternatif olarak kabul görmektedir. Konvansiyonel yöntemler kullanılarak mikroorganizmaların fenotipik olarak tanımlanması uzun bir süreç gerektirirken, MALDI-TOF MS ile 1-2 saat gibi çok kısa sürede tanımlama gerçekleştirilmektedir. Son on yıl içerisinde klinik mikrobiyoloji laboratuvarlarının iş akışında hızla yerini alan bu yöntemle proteomik analiz yapılarak bakteri ve mantarların cins ve tür düzeyinde tanımlamaları yapılabilmektedir<sup>1-4</sup>.

İlk kez 1975 yılında *Catherine Fenselau* ve *John Anhalt*, çeşitli bakteri türlerinde farklı kütle spektralleri elde etmeleri üzerine kütle spektrometrisi kullanılarak bakterilerin tanımlanması fikrini ortaya atmışlardır. Ancak kullandıkları sert iyonizasyon tekniği, proteinlerin parçalanmasına yol açtığı ve sadece lipidlerin saptanmasına olanak sağladığı için bakterilerin tür düzeyinde tanımlanmasında başarı elde edilememiştir. Bundan on yıl sonra *Koichi Tanaka*'nın yumuşak iyonizasyon tekniğini tanımlamasını takiben, gliserol ve metal toz kullanılarak polipeptit gibi yüksek moleküler ağırlıklı moleküllerin kütle spektrometrisi ile analizi mümkün olmuştur. Aynı tarihlerde *Franz Hillenkamp* ve *Michael Karas* işlem sırasında organik bir madde olan matriksi kullanarak yumuşak dezorpsiyon ve iyonizasyonun gerçekleştiğini bildirmişlerdir. Böylece MALDI-TOF MS'in klinik mikrobiyoloji laboratuvarlarında tanı amaçlı kullanılmasının yolu açılmıştır<sup>1,5-7</sup>.

MALDI-TOF MS ile mikroorganizmaların tanımlanması klinik örnekte bulunan proteinlerin

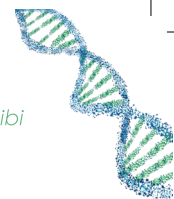
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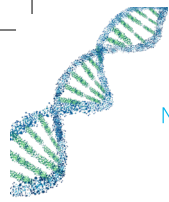
sonucunda ilaç inaktif forma dönüşmektedir. Beta-laktam halkasının hidrolizi sonucunda bir su molekülü bağlanarak ilacın kütleinde 18 Da'lık bir artışa yol açmaktadır. Sonuç olarak ilaca ait pikin kaybolması ve 18 Da daha büyük yeni pik tespit edilmesi ilacın inaktif forma dönüştüğü göstermektedir <sup>11,14,53,65,66</sup>.

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