

BÖLÜM 2

Nükleik Asitler

Mesut TAŞKIN¹

| Giriş

Nükleik asitler, tüm hücrelerde ve virüslerde temel roller oynayan büyük biyomoleküllerdir. Diğer bir ifade ile, nükleik asitler, bilinen tüm yaşam formları için gerekli olan molekulardır. Nükleik asitler, nükleotit adı verilen monomerlerde oluşurlar. Nükleotitler ise 5 karbonlu bir şeker, bir fosfat grubu ve bir azotlu bazdan meydana gelirler. Nükleik asitlerin iki ana sınıfı, deoksiribonükleik asit (DNA) ve ribonükleik asittir (RNA). Şeker riboz ise, molekül RNA'dır. Şeker, ribozun bir versiyonu olan deoksiriboz ise, molekül DNA'dır (1).

Nükleik asitler genomik bilginin depolanmasını ve ifade edilmesinde görev almaktadır. DNA, hücrelerin protein yapmak için ihtiyaç duyduğu bilgileri kodlamaktadır. RNA ise protein sentezi de dahil olmak üzere çoklu hücre roller oynamaktadır. Nükleik asitlerin moleküler yapısının aydınlatılmasının yanısıra genetik bilginin biyolojik fonksiyona dönüştürülmesinde ve kodlanmasındaki rollerinin anlaşılmasından bu yana, nükleik asit biyolojisi hakkındaki bilgiler sürekli olarak artmaktadır (2,3).

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ve hücrel aktivitenin düzenlenmesi için hedef hücreler tarafından alınırlar. Ek olarak, araştırmacılar bu hücre dışı miRNA'ları çeşitli hastalıklar için ideal biyobelirteçler olarak inceliyorlar. Araştırmalar, dolaşımdaki miRNA'ların, onkogenleri ve tümör baskılayıcıları kontrol etmedeki rolleri aracılığıyla kansere dahil olduğunu zaten göstermiştir (99-101)

Small Interfering RNA'lar (siRNA) RNA'lara müdahale yoluyla gen ekspresyonunu engelleyen, çift sarmallı, kodlamayan RNA'lardır. mRNA'yı bozarak ve proteinlerin translasyonunu engelleyerek gen ifadesine müdahale ederler. siRNA'lar, uzun çift sarmallı RNA'lardan oluşur. Tamamen oluştuğunda, siRNA, RNA kaynaklı susturma kompleksine (RISC) bağlanır ve mRNA'yı, katalitik bir RISC proteini olan Argonaute aracılığıyla böler. siRNA'lar, genleri yıkma yetenekleri ve güçleri nedeniyle hastalıklar için terapötik ajanlar olma potansiyeline sahiptir. miRNA'ların aksine, siRNA'lar spesifik olarak seçilen bir geni hedefleyebilir ve tek bir siRNA birden çok kez işlev görebilir (99,102).

Bazı RNA'lar aynı zamanda biyokimyasal reaksiyonları yönlendirmek için katalitik RNA olarak da işlev görür; bu nedenle bunlara ribozimler denir. Ribozimler bazen katalitik fonksiyonlarını yerine getirmek için yardımcı proteinlerle de eşleşirler. Ribozimler tarafından katalize edilen biyokimyasal reaksiyonlar arasında protein sentezi, RNA eklenmesi ve RNA bölünmesi yer alır. Ribozimler, fosforil transferi için nükleofilik ikame reaksiyonlarına izin veren aktif bir bölge oluşturmak üzere karmaşık bir üçüncül yapıya katlanır. Bu reaksiyonlar, ribonükleositlerin ve metal iyonlarının katılımıyla asit-baz kataliziyle kolaylaştırılır. Ribozimler iki türe ayrılır: küçük ribozimler (örn. saç tokası, çekiç kafalı ve Hepatit delta virüsü) ve büyük ribozimler (grup I ve II intronlar, RNaz P, spliceozom ve ribozomlar) (87).

Kaynaklar

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