Bölüm 15

BEYİN KAYNAKLI NÖROTROFİK FAKTÖR (BDNF)

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GİRİŞ

Beyin kaynaklı nörotrofik faktörün (BDNF) nöronların gelişimini ve plastisteyi kontrol ettiği ve öğrenme ve hafızada rol oynadığı gösterilmiştir. Aynı zamanda BDNF'ün vücut ağırlığı ve enerji metabolizmasını kontrol eden hipotalamik yolakda da rol oynadığı bilinmektedir. Son çalışmalarda BDNF'ün sadece merkezi değil aynı zamanda periferal organların metabolizmasında da rol oynadığı belirtilmiştir. Alzheimer, majör depresyon, nörodejeneratif hastalıklarda BDNF'ün düşük seviyelerde seyrettiği gözlenmiştir. Bunlara ilaveten obesite ve tip 2 diyabette de düşük BDNF seviyeleri tespit edilmiştir. BDNF iskelet kası gibi nörojenik olmayan dokulardan da eksprese edildiği için, egzersiz BDNF seviyelerini sadece beyinde ve plazmada değil aynı zamanda iskelet kaslarında da arttırır. İskelet kaslarının elektriksel stimulasyonu ile BDNF mRNA'sı ve protein ekspresyonu arttırılır. BDNF AMP- aktive edilmiş protein kinaz ve asetil koenzim A karboksilaz-beta (ACCβ) fosforilazasyonunu arttırır ve hem in vitro hem de ex vivo yağ oksidasyonunu arttırır. Bu veriler, iskelet kasında kasılabilen-uyarılabilen bir protein olarak BDNF'ün AMPK aktivasyonuyla iskelet kasında lipit oksidasyonunu artırdığını ortaya koymuştur. Hem nörodejeneratif hastalıklarda hem de tip 2 diyabette düşük BDNF seviyeleri bulgusu bu hastalıkların kümesini açıklayabilir. BDNF demans ve tip 2 diyabete karşı koruyuculuk sağlayacak egzersizin yararlı etkilerinden çoğunun ortaya çıkmasına aracılık eder.

NÖROTROFİNLER

Nöronların yaşamsal etkinliklerini sürdürmesi ve büyümesi için gerekli birkaç protein ayrıştırılmış ve incelenmiştir. Bu nörotrofinlerden bazıları astrositler tarafından üretilir, diğerleri kasların ve nöronların innerve ettiği yapıların ürünüdür. Bunlar nöronların sonundaki reseptöre bağlanır. Bu proteinler nöron içine alınır ve sonra retrograd taşıma ile nöronun hücre gövdesine ulaştırılır, burada nöronun gelişimi, büyümesi ve yaşamını sürdürmesi ile ilgili proteinlerin yapımını destek-

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Kemirgenlerde tekerlekli koşu çoklu beyin bölgelerindeki, özellikle dental gyrus granül nöronlarda, CA1 nöronlarında, serebral korteksteki ikinci ve üçüncü katmanlardaki nöronlarda, transkripsiyonel seviyede BDNF ekspresyonunu indüklemektedir[58].

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