A large proportion of extremely low-birth-weight infants require parenteral nutrition for variable lengths of time. Amino acids are the key ingredient of parenteral nutrition. The aim of appropriate amino acid administration is to promote anabolism and optimal cellular development with the final goal of reducing postnatal growth restriction, which is associated with neurodevelopmental delays. The benefits of early amino acid commencement is compelling, especially on nitrogen balance, while long-term outcome studies are lacking. An intake of 2.5 g/kg per day of amino acids is to be preferred to lower amounts. Benefits of amino acid intakes >2.5 g/kg per day without extra energy remain controversial. Two randomized controlled trials do not show benefits on short-term growth and neurodevelopment at the 2-year follow-up. Studies with amino acid intake >2.5 g/kg per day with extra energy are warranted.