Zeisel, SH. Choline: Needed for normal development of memory. *JACN* 2000; 19: 528S-531S.

Choline is a dietary component essential for normal function of all cells. It, or its metabolites, assures the structural integrity and signaling functions of cell membranes; it is the major source of methyl-groups in the diet (one of choline's metabolites, betaine, participates in the methylation of homocysteine to form methionine); and it directly affects nerve signaling, cell signaling and lipid transport/metabolism. In 1998, the National Academy of Sciences, USA, issued a report identifying choline as a required nutrient for humans and recommended daily intake amounts. Eggs are an excellent dietary source of choline.

Pregnancy and lactation are periods when maternal reserves of choline are depleted. At the same time, the availability of choline for normal development of the brain is critical. When rat pups received choline supplements (in utero or during the second week of life), their brain function changed, resulting in the lifelong memory enhancement. This change in memory function appears to be due to changes in the development of the memory center (hippocampus) in the brain. The mother's dietary choline during a critical period in brain development of her infant influences the rate of birth and death of nerve cells in this center. These changes are so important that we can pick out the groups of animals whose mothers had extra choline even when these animals are elderly. Thus, memory function in the aged rat is, in part, determined by what the mother ate. This is not the first example of a critical nutrient that must be present at a specific time in brain development. If folate isn't available in the first few weeks of pregnancy, the brain does not form normally. Thus, we suggest that pregnancy is a period when special attention has to be paid to dietary intake.