**The Citric Acid and Urea Cycles Can Be Linked**

* Fumarate produced in the urea cycle is also an intermediate of the citric acid cycle.
* These two cycles are interconnected by fumarate (**Fig. 18-12)**.
* Several enzymes of the citric acid cycle, including fumarase and malat dehydrogenase, are also present as isozymes in the cytosol.
* The fumarate can be converted to malate in the cytosol. The malate can be transported into mitochondria for use in the citric acid cycle.
* Aspartate formed in mitochondria by transamination between oxaloacetate and glutamate

can be transported to the cytosol.

* Aspartate serves as nitrogen donor in the urea cycle reaction.
* These reactions provide metabolic links between the separate pathways. It is called **aspartate-argininosuccinate shunt**.



**FIGURE 18-12** Links between the urea cycle and citric acid cycle.