



**Centurion**  
**UNIVERSITY**

*Shaping Lives...  
Empowering Communities...*

# Nitrogen Balance

Dr. Amrutha Gopan  
Assistant Professor  
School of Fisheries  
Centurion University of Technology and Management  
Odisha

Centurion University of Technology and Management



Centurion  
UNIVERSITY

Shaping Lives...  
Empowering Communities...

# Ammonia production

- Ammonia is the major end product of N-metabolism in almost all osteichthyees
- The largest source of ammonia is catabolism of dietary or structural protein
- Essential amino acids in fish are the same as those in mammals: arginine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, and valine (Halver and Shanks, 1960)
- If the diet is deficient in lipid, then a greater proportion of dietary protein is metabolized for energy or deaminated for conversion to fat and carbohydrate, more ammonia is excreted, and a lower percentage of dietary N is retained for growth



**Centurion**  
**UNIVERSITY**  
*Shaping Lives...*  
*Empowering Communities...*

All fish exhibit a marked ability to consume their own structural protein during prolonged starvation

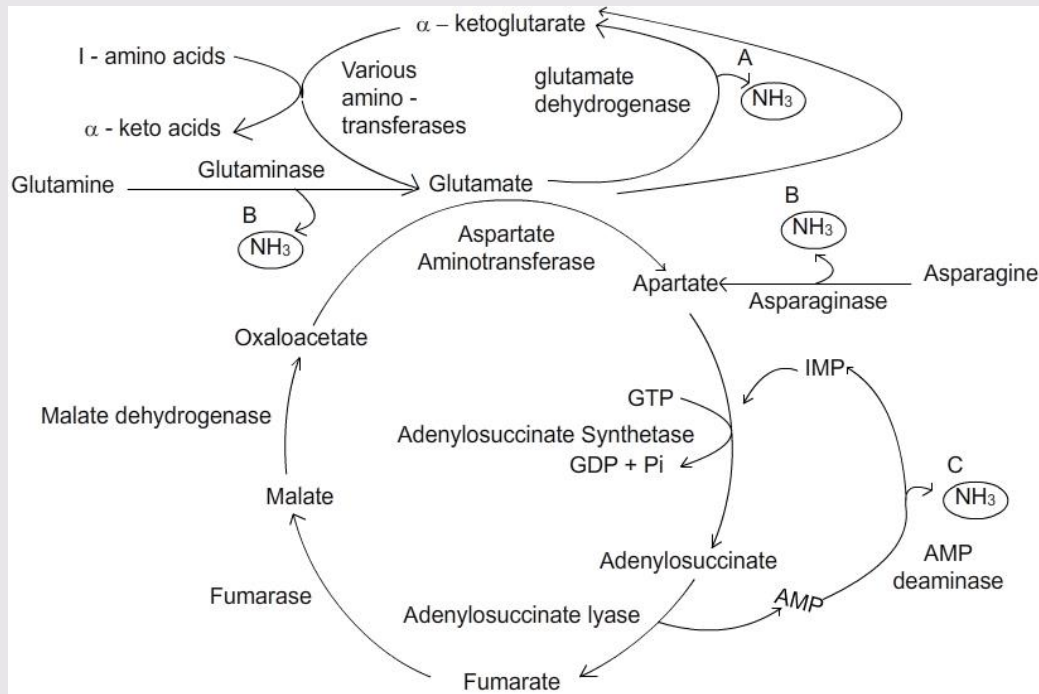
Glycogen reserves tend to be spared during starvation, probably because of their survival value as an anaerobic fuel during burst exercise and hypoxia

When fish are feeding and growing, absorbed amino acids in excess of those needed for protein synthesis are deaminated and then oxidized in the Kreb's cycle or converted to fat and carbohydrate



# Centurion UNIVERSITY

Shaping Lives...  
Empowering Communities...



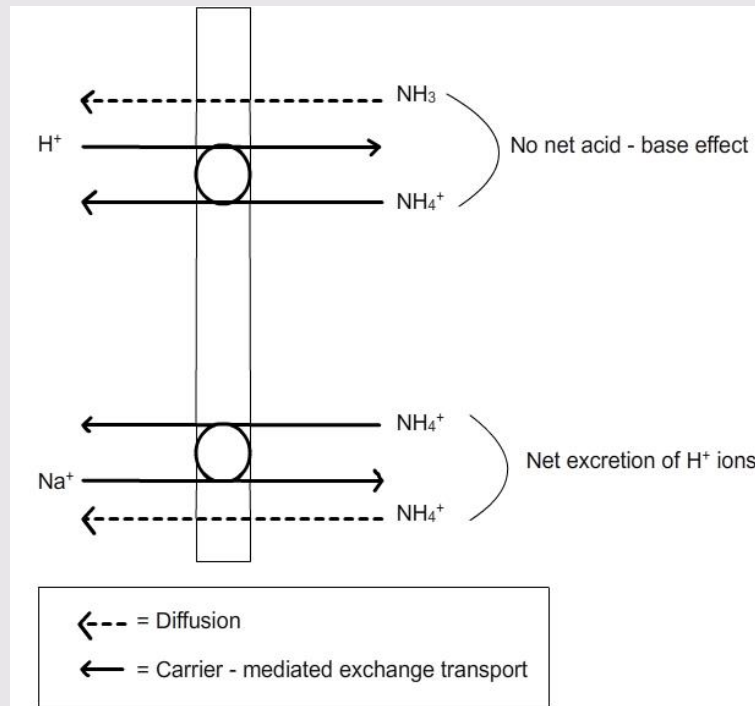
Biochemical pathways in fish for the production of ammonia from A. *l-amino acids* (transamination), B. amides (hydrolysis of amide groups), and C. adenylates (purine nucleotide cycle), and their interrelationships.



**Centurion**  
**UNIVERSITY**

*Shaping Lives...  
Empowering Communities...*

# Ammonia excretion



Summary of mechanisms by which ammonia may be excreted from blood to water across the mucosal surface of the gill epithelium, and their consequences for the acid-base status of the fish.



**Centurion**  
**UNIVERSITY**

Shaping Lives...  
Empowering Communi

