

The diagram illustrates the metabolic pathway of L-Leucine degradation. It begins with L-Leucine, which is converted to 4-MOP (4-methyl-2-oxopentanoate) via a reversible reaction. 4-MOP is then converted to S-(3-Methylbutanoyl)-dihydrolipoamide. This intermediate can be converted to Isovaleryl-CoA, which then leads to Fatty Acid Biosynthesis (indicated by a dashed arrow). Alternatively, Isovaleryl-CoA is converted to Dimethylacryloyl-CoA by the enzyme *gnyD*. Dimethylacryloyl-CoA is then converted to 3-Methylglutaconyl-CoA by the enzymes *gnyA* and *gnyB*. 3-Methylglutaconyl-CoA is converted to HMG-CoA by the enzyme *gnyH*. HMG-CoA is then converted to Acetoacetate by the enzyme *gnyL*. Acetoacetate is further converted to Acetyl-CoA, which enters the Citric Acid Cycle.

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graph TD
    LLeucine[L-Leucine] <--> 4MOP[4-MOP]
    4MOP --> S3MBS[S-(3-Methylbutanoyl)-dihydrolipoamide]
    S3MBS --> IsovalerylCoA[Isovaleryl-CoA]
    IsovalerylCoA -.-> FattyAcidBiosynthesis[Fatty Acid Biosynthesis]
    IsovalerylCoA -- gnyD --> DimethylacryloylCoA[Dimethylacryloyl-CoA]
    DimethylacryloylCoA -- gnyA AND gnyB --> 3MethylglutaconylCoA[3-Methylglutaconyl-CoA]
    3MethylglutaconylCoA -- gnyH --> HMGCoA[HMG-CoA]
    HMGCoA -- gnyL --> Acetoacetate[Acetoacetate]
    Acetoacetate --> AcetylCoA[Acetyl-CoA]
    AcetylCoA --> CitricAcidCycle[Citric Acid Cycle]
  
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