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**COMPARATIVE ANALYSIS OF PROTEIN INTERACTIONS IN CYSTINURIA
IN DOGS AND CATS**

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Cystinuria is a hereditary metabolic disorder affecting various breeds of domestic dog (*Canis lupus familiaris*) and cat (*Felis catus*). It results from mutations in the *SLC3A1* and *SLC7A9* genes, which encode amino acid transporters in the kidneys, leading to impaired cystine reabsorption and excessive urinary excretion. Under acidic conditions, this promotes cystine crystal formation. Diagnosis is based on urine analysis, while treatment focuses on preventing stone formation, dissolution, or removal. Genetic studies help improve disease understanding and management.

The analyses were conducted using the bioinformatics software STRING v.12 and the UniProt database.

The comparative analysis of protein interactions related to cystinuria in dogs and cats using STRING v12 revealed notable differences between these two species. In both cases, *SLC3A1* and *SLC7A9* remain central to the protein network, confirming their key role in cystine transport in the kidneys. Additionally, in both species, the proteins *SLC1A1* and *SLC1A7* appear in the protein network. However, dogs exhibit interactions with the proteins *SLC6A19* and *SLC1A5*. In contrast, cats exhibit a unique interaction with proteins *M3WW9_FELCA* and *SLC3A2*, suggesting potential species-specific regulatory mechanisms. These findings highlight molecular differences that could contribute to variations in disease manifestation and progression between species.

In both species, the key amino acid transport proteins are *SLC3A1* and *SLC7A9*, with *SLC1A1* and *SLC1A7* also present. However, significant differences are evident within the protein interaction networks. In cats, a specific protein *M3WW9_FELCA*, which likely is an amino acid transporter in renal tubules, interacts with *SLC3A2*, a protein functioning as a hydrolase, thereby giving rise to a species-specific mechanism for amino acid transport. In dogs, an interaction is observed

between SLC6A19 and SLC1A5, proteins belonging to distinct families yet both involved in amino acid transport. These differences in protein interactions may account for the variations in symptom severity and the progression of cystinuria between the species.

References

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