Chapter 5

Summary

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Anacardic acid (6-pentadecylsalicylic acid), extracted from cashew nut shell liquid is a natural phenolic lipid well known for its strong antibacterial, antioxidant and anticancer activities. Its effect has been well studied in bacterial and mammalian systems but remains largely unexplored in fungi. The present study identifies antifungal, cytotoxic and antioxidant activities of anacardic acid in the rice blast fungus *Magnaporthe oryzae*. It was found that anacardic acid causes inhibition of conidial germination and mycelial growth in this ascomycetetous fungus. Phosphotidylserine externalization, chromatin condensation, DNA degradation and loss of mitochondrial membrane potential suggest that growth inhibition of fungus is mainly caused by apoptosis like cell death. Broad-spectrum caspase *inhibitor Z-VAD-FMK treatment indicated that* anacardic acid *induces caspase independent apoptosis in M. oryzae. Expression of a predicted ortholog of apoptosis inducing factor* (AIF) *was upregulated during the process of apoptosis, suggesting* the possibility of mitochondria dependent apoptosis via activation of apoptosis-inducing factor. Anacardic acid treatment leads to decrease in reactive oxygen species rather than increase in ROS accumulation normally observed during apoptosis, confirming the antioxidant properties of anacardic acid as suggested by earlier reports. Our study also shows that anacardic acid renders the fungus highly sensitive to DNA damaging agents like ethyl methanesulfonate (EMS). Treatment of rice leaves with anacardic acid prevents *M. oryzae* from infecting the plant without affecting the leaf, suggesting that anacardic acid can be an effective antifungal agent.