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I am a microbiologist with sub-specialization in molecular genetics. I am very much involved in gene regulation studies in both fungal and bacterial systems.

I am part of the Spanish Research Team at the *Universidad de Leon*, Spain, that mapped out the genes involved in the biochemical pathways leading to lysine and beta-lactam synthesis in *Penicillium chrysogenum*. I was the one who sequenced and characterized the regulatory function of the *lys*3 homoaconitase gene in the pathway.

My Spanish colleagues emphasized the role of homocitrate accumulation in the up-regulation of other genes in the pathway. My work led to another aspect in gene regulation – the "moonlighting" function of the homoaconitase protein, being catalytic when iron level is sufficient, forming the iron-sulfur cubane structure common in aconitases, and regulatory when iron is depleted or when the cell is exposed to stresses.

The regulatory form has been predicted through bioinformatics to structurally shift to become an RNA-binding protein, exerting regulation on at least two other genes in the pathway. I have explained through my work that up-regulation of these two other genes is through mRNA stabilization through the binding of the regulatory form of homoaconitase, thus, delaying their degradation and producing more of their protein products.

I have also done extensive studies on the complex pathways in virulence genes regulation in the bacterium *Serratia marcescens*. I found redundant hemolysin genes in this bacterium which encode structurally unrelated proteins that cause cell lysis through different mechanisms. This helps explain the broad host range of this pathogen that includes animals, humans, corals, plants and others. This is in addition to other virulence factors produced by *S. marcescens*.

I am currently exploring the possible medical and industrial applications of some of the virulence factors in this bacterium.