

Crosstalk between calcium and redox signaling: From molecular mechanisms to health implications

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Studies done many years ago established unequivocally the key role of calcium as a universal second messenger. In contrast, the second messenger roles of reactive oxygen and nitrogen species have emerged only recently. Therefore, their contributions to physiological cell signaling pathways have not yet become universally accepted, and many biological researchers still regard them only as cellular noxious agents. Furthermore, it is becoming increasingly apparent that there are significant interactions between calcium and redox species, and that these interactions modify a variety of proteins that participate in signaling transduction pathways and in other fundamental cellular functions that determine cell life or death. This review article addresses first the central aspects of calcium and redox signaling pathways in animal cells, and continues with the molecular mechanisms that underlie crosstalk between calcium and redox signals under a number of physiological or pathological conditio