In silico discovery of novel Retinoic Acid Receptor agonist structures

ABSTRACT

The predicted receptor model produced two novel agonists that were active at 50 nM. One of them showcases unique structural characteristics that could lead to the development of new ligands for cancer treatment.

INTRODUCTION

The signaling circuitry of bacteria is essentially made up of two-component systems that involve the activation of a histidine kinase on repressed histoplasmic acid and then transfer the phosphoryl group to ATP in the aspartate-rich supernatant domain. This was previously only observed in other organisms, but now this type of system is common among bacteria. Over the last few years, histidine kinase homologues and their receivers have been identified in eukaryotic organisms, as well as genes that encode these molecules. The majority of eukaryotic gene products are involved in a phosphoryl relay, which includes kinases, receiver domains, and receptacles. The Saccharomyces cerevisiae gene product, Sln1, was shown to function as a histidine kinase in both vitro and in vivo. Additionally, the histochemical activity of the ethylene receptor Etr1 from Arabidopsis was demonstrated in vitrO. Nevertheless, later research revealed that eukaryotic bifunctional systems do not operate as distinct pathways but are frequently linked to serine/threonine- and tyrosine kinase cascades. As a result, the yeast Sln1-Ypd1–Ssk1 phosphoryl relay functions as an osmosensor and triggers MAP-kinastic activity when cells are exposed to high osseous levels. The Dictyostelium discoideum protein RegA contains a N-terminal receiver domain and phosphodiesterase domain. RegCA response regulator phosphate is activated by phosphorylation of RegAA, which lowers the intracellular cAMP level. The light-regulated serine/threonine kinases in vitro, not those regulated by the histidine kiase paradigm, were observed to be mediated by phytochromes, another homologue of histochemical kines, in vivo (see also mycology). Despite being homologous to bacterial histidine "two-component" systems, these results suggest that they may undergo post-translational modifications similar to those observed in the well-established eukaryotic signal transduction systems. Different developmental phenotypes, such as rapid aggregation, disproportioned fruiting body and stalk ratios or impaired spore formation, are caused by the deletion of individual histidine kinase genes. Furthermore, cells lacking the histotoxic factor dokA are osmosensitive and grow slower when exposed to high OD levels for up to two hours. In light of the fact that it is known that ICTY (Dictyostelium) belongs to the oocyte response system, we have investigated whether or not DokA shows kinase activity in an expression-dependent way: here we show that the histidine kinsases dok A homologue are at most phosphorylated on a serine residue in vivo when Dictryotic response systems are exposed to high olarity medium. Moreover, we prove that the phosphorylation site is situated in a homologous domain with bacterial histidine kinases, and that docetamine modification does not affect the serine phosphate synthesis of DokA.

CONCLUSION

The results of this research indicate that GSK3, rather than GLK3, can phosphorylate serine 33 of p53 by increasing transcriptional activity in vivo. GSK3 is not involved in the p53-DNA damage response pathway, but may act as an intermediary for other forms of DNA damage and potential

mechanisms of innate activation such as oncogene activations.