Cover Stories:

Major Scientific Publications Featuring NRI-Funded Research

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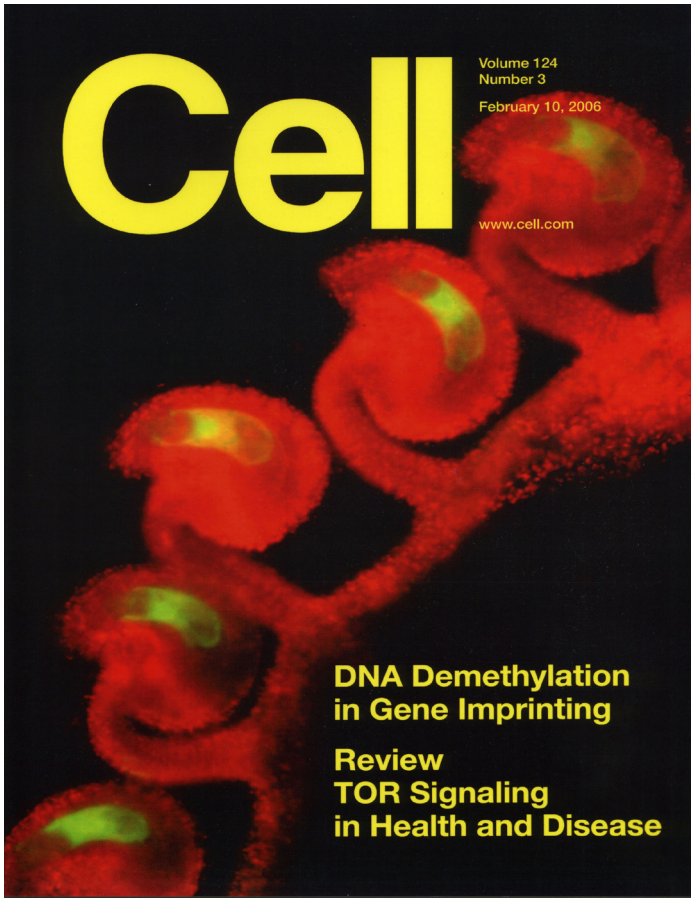

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Gehring, M., Huh, J. H., Hsieh, T.-F., Penterman, J., Choi, Y., Harada, J.J., Goldberg, R.B., Fischer, R.L. 2006. DEMETER DNA glycosylase establishes MEDEA Polycomb gene self-imprinting by allele-specific demethylation. ***Cell*** 124:495-506.

Different versions of imprinted genes are expressed differently depending on whether they are inherited from the male or female parent. Imprinting regulates a number of genes essential for normal development in mammals and flowering plants. In mammals, imprinted genes contribute to the control of fetal growth and placental development. Diseases are linked to mutations in imprinted genes or aberrant regulation of their expression. The endosperm, one of the products of the double fertilization process unique to flowering plants, is an important site of imprinting in plants. The endosperm has functions analogous to the placenta and supports seed growth and development. Failure to imprint certain genes results in embryo abortion and seed death. Using the model plant Arabidopsis, the researchers discovered how gene imprinting is regulated. This information resides in DNA and its associated proteins, which exist either in an open conformation with the genes accessible to the transcription machinery, or in a compacted conformation that silences genes. Two interdependent processes regulate this conformational change: the chemical modification of histone proteins around which the DNA is wrapped, and the modification of one of DNA's building blocks, cytosine. Both mechanisms contribute to the regulation of gene imprinting. Seeds are not only the end product of plant reproduction, but also represent the primary nutrient source for humans and domesticated animals. Understanding the mechanism of gene imprinting provides scientists with information to improve seed growth, development and viability.

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