

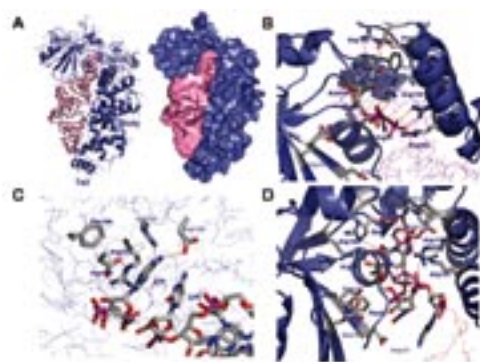
Molecular Basis for Template-Independent RNA Polymerization

- Collaboration between protein and RNA for determination of nucleotide specificity -

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The CCA-adding enzyme is the smartest enzyme among a large number of template-independent RNA polymerases. It adds and/or synthesizes the defined sequence CCA onto the 3' end of tRNA without aid of nucleic acid template. The ternary structure of the enzyme complexed with tRNA primer lacking terminal A and incoming ATP analog has been determined. The structure shows the base moiety of ATP stacks with base moiety of the 3' end of tRNA primer and is recognized by complementary amino acid residues through "Watson-Crick" like base pairing. These results suggest that the complex of RNA and protein together compose the template for the incoming ATP and the collaboration of RNA and protein determines the nucleotide specificity of the enzyme.



A. Overall structure of ternary complex: The enzyme and tRNA are colored in blue and pink, respectively. B. Recognition of incoming ATP analog by complementary amino acids. C. Stacking ark formed by RNA primer and amino acids. D. Recognition of C74C75 of tRNA primer by complementary amino acids pocket.

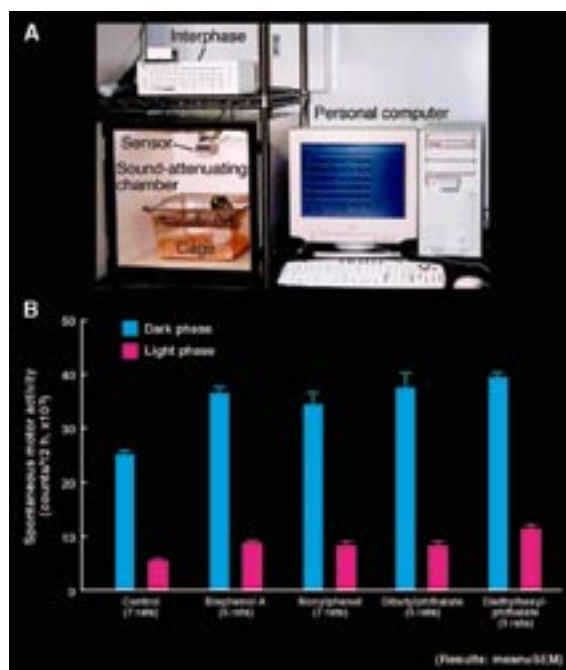
New Technology to Identify Environmental Chemicals Causing Mental Disorders

- Assessment of psychotropic chemicals with experimental animals -

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We have developed screening technology to identify environmental chemicals affecting the brain. Environmental chemical was administered into the rat brain at 5 days of age, and spontaneous motor activity was measured at 4-5 weeks of age. Some of phenols and phthalates caused hyperactivities similarly to a neurotoxin, 6-hydroxydopamine [Fig.]. The histological analysis revealed that some phenols, such as bisphenol A, blocked the development of dopaminergic neurons. This technique is expected not only to draft the regulation for chemicals but also to contribute to the creation of better chemical substitutes and new drugs for prevention or treatment of mental disorders.



Spontaneous motor activity in the rat
A: Motor activity monitoring system
B: Environmental chemicals caused motor hyperactivities not only during the dark phase, but also during the light phase.