



**CRISPR/Cas9**

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CRISPR/Cas9

60 1960 Peter Nowell David Hungerford  
(Chronic myeloid leukemia: CML)

1973

Janet Rowley 9 22  
9 *ABL1* 22 *BCR*  
*BCR::ABL1* ( )  
CML (Acute lymphoblastic leukemia: ALL)

*BCR::ABL1* *BCR::ABL1*

*BCR::ABL1* ALL

1 CML

9 *ABL1* 22 *BCR*

*ABL1* *BCR*

2012 Emmanuelle Charpentier

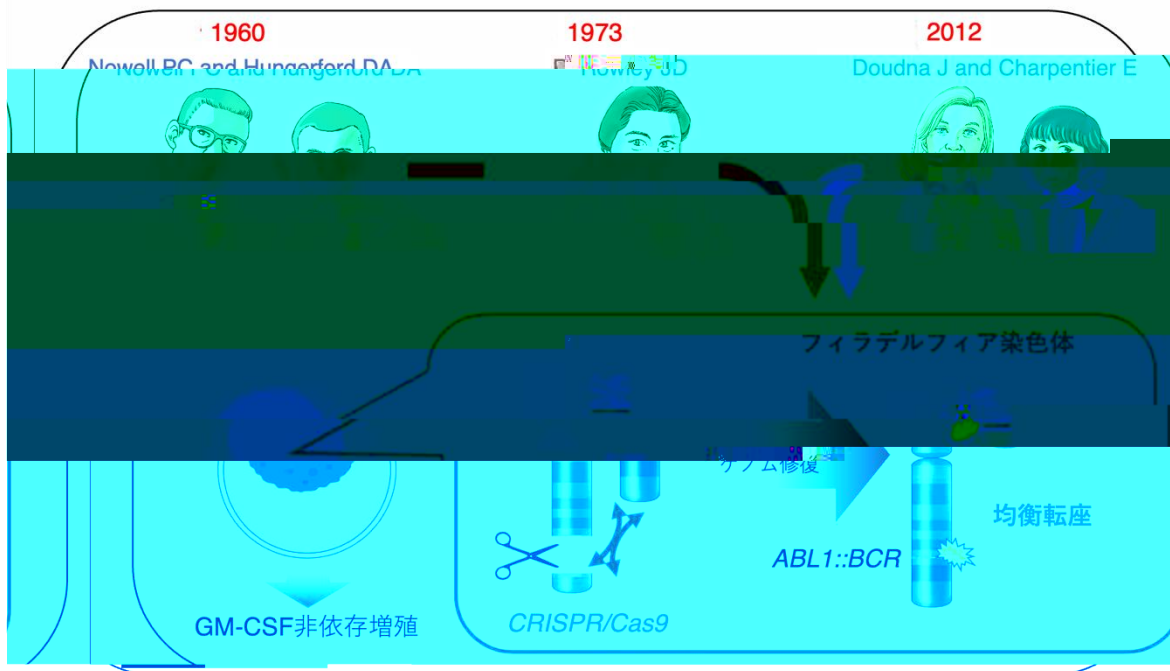
Jennifer Doudna CRISPR/Cas9  
CRISPR/Cas9

2020

(GM-CSF) TF-1 TF-1

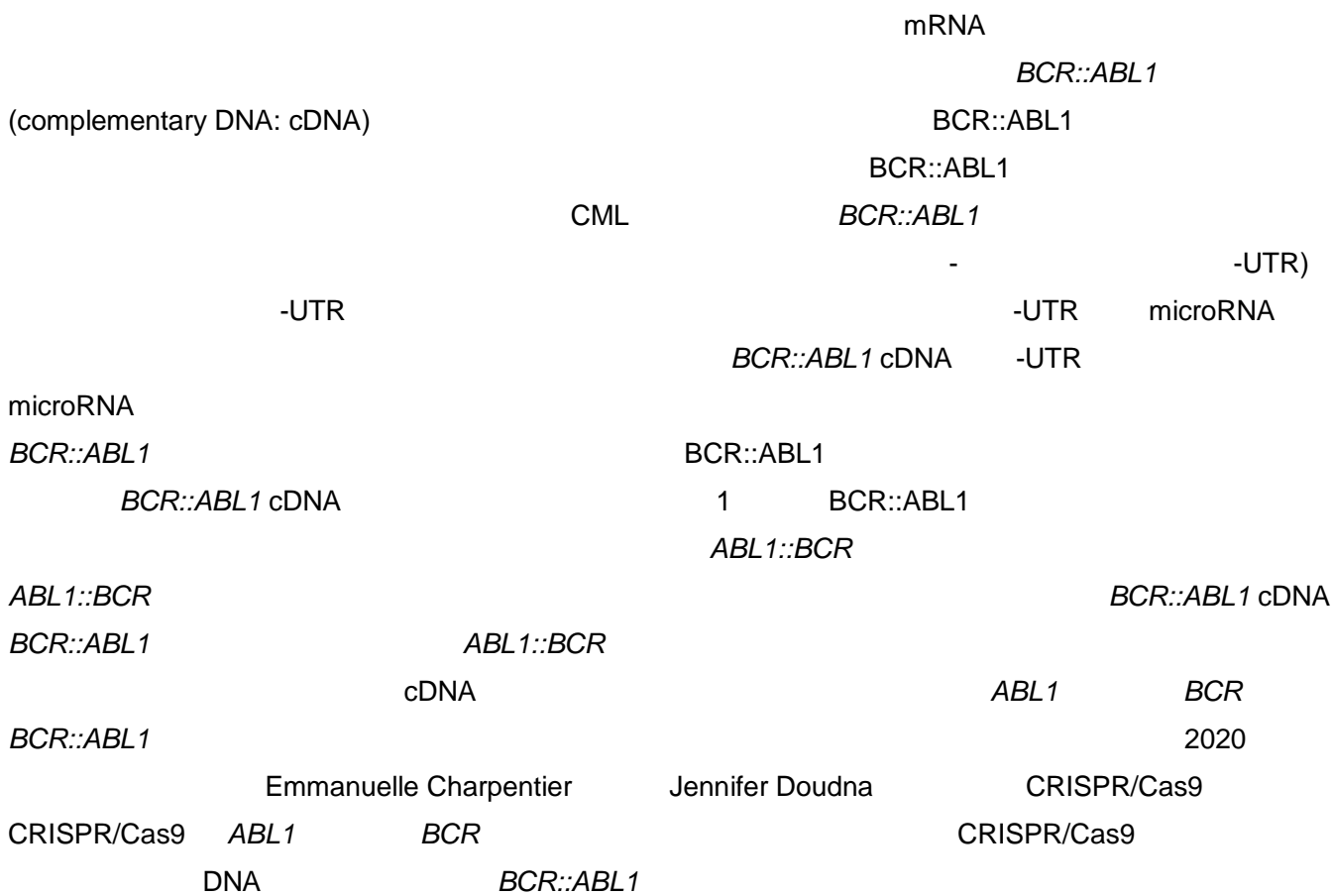
TF-1 *ABL1* *BCR* CRISPR/Cas9

TF-1

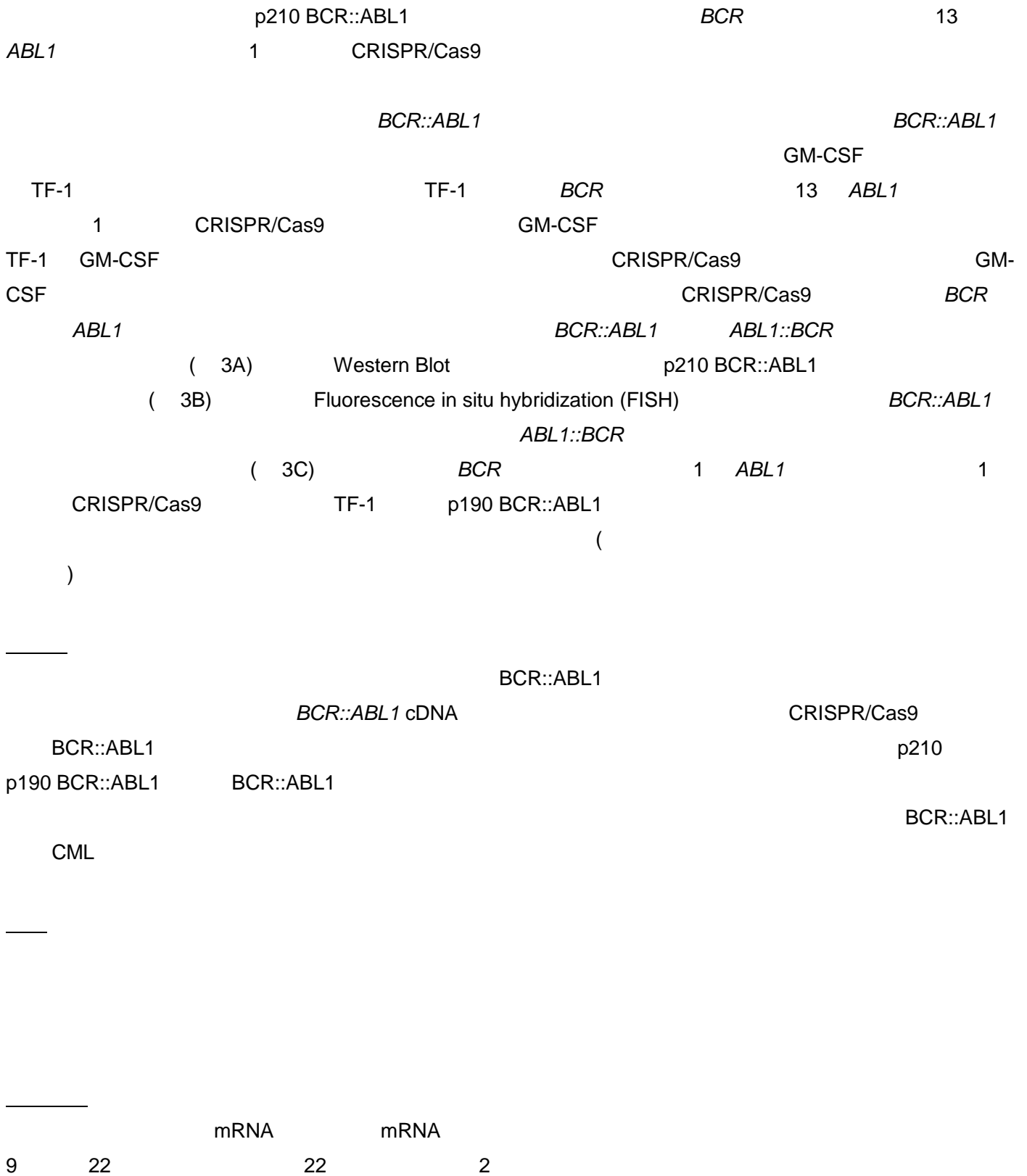


1. BCR::ABL1

CRISPR/Cas9



2 ABL1 2 BCR::ABL1 BCR 13 15 2 p210 BCR::ABL1 p190 BCR::ABL1



GM-CSF Granulocyte-macrophage colony stimulation factor

microRNA 20 25 RNA



