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For evaluating the potential of vaccines and

therapeutics against CoVs, including SARS-CoV,

MERS-CoVs, and the presently emerging SARS-

CoV-2, suitable animal models that can mimic the

clinical disease are needed (211, 212). Various

animal models were assessed for SARS- and MERS-

CoVs, such as mice, guinea pigs, golden Syrian

hamsters, ferrets, rabbits, nonhuman primates like

rhesus macaques and marmosets, and cats (185,

213-218). The specificity of the virus to hACE2

(receptor of SARS-CoV) was found to be a

significant barrier in developing animal models.

Consequently, a SARS-CoV transgenic mouse model

has been developed by inserting the hACE2 gene

into the mouse genome (219). The inability of

MERS-CoV to replicate in the respiratory tracts of

animals (mice, hamsters, and ferrets) is another

limiting factor. However, with genetic engineering, a

288-330'/\* MERS-CoV genetically modified mouse

model was developed and now is in use for the

assessment of novel drugs and vaccines against

MERS-CoV (220). In the past, small animals (mice

or hamsters) have been targeted for being closer to a

humanized structure, such as mouse DPP4 altered

with human DPP4 (hDPP4), hDPP4-transduced

mice. and hDPP4-Tg mice (transgenic for expressing