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Alterations to DNA by certain enzymes may be modeled as rational tangle replacements (RTR) on the tangle defined by the DNA axis. Through double branched covers, the Montesinos Trick translates the problem of which DNA conformations may be related by a RTR into the problem of which 3-manifolds may be related by Dehn surgery on a knot. However, since two different tangles may have the same double branched cover, it is a more subtle question to understand where these RTRs may occur.

We will discuss these issues focusing upon RTRs between two-bridge links and RTRs between rational tangles as these are the more biologically relevant situations. In certain cases we will give the full picture of where these RTR occur; in other cases we will give a conjectural picture. (Received August 01, 2011)