Let μ denote the true mean decrease in time through the maze. Then the researchers are testing H_0: $\mu = 0$ versus H_A: $\mu > 0$. If the null hypothesis holds, then the sampling distribution of $\overline{X}$ is normal with mean 0 and standard error $3/\sqrt{20} = 0.6708$. Using a one-sided test at $\alpha = 0.05$, the researchers will reject the null hypothesis if the z-score of the test statistic satisfies $Z \geq 1.645$. This corresponds to $Z = (\overline{X} - 0)/0.6708 \geq 1.645$ or $\overline{X} \geq 1.1035$. So, if the true mean decrease in time is 2 s, what is the probability of correctly rejecting the null hypothesis of $\mu = 0$?

$$\begin{aligned}
1 - \beta &= P(\text{Reject } H_0 \mid H_A \text{ true}) \\
&= P(\overline{X} \geq 1.1035 \mid \mu = 2) \\
&= P\left(\frac{\overline{X} - 2}{0.6708} \geq \frac{1.1035 - 2}{0.6708}\right) \\
&= P(Z \geq -1.3365) \\
&= 0.9093.
\end{aligned}$$

Thus, the researchers have a 91% chance of correctly concluding the drug is effective if the true average decrease in time is 2 s. □