EFFECTS OF PENICILLIN ON BACTERIAL CELL WALL SYNTHESIS IN *E. coli* AND
IN *S. aureus*. S. Matheson* and J. L. Strominger. Dept. of Pharmacology,
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Several lines of evidence indicating that penicillin interferes
specifically with the synthesis of the cell wall of *S. aureus* are
substantiated by the following experiments: Incorporation of C\textsubscript{14}-
lysine into cell wall was inhibited 91% by penicillin under conditions
where incorporation into cell protein was diminished by only 2%.
Similarly, incorporation of P\textsuperscript{32}-inorganic phosphate into the cell
wall of *S. aureus* was inhibited 68% under conditions where no
inhibition of incorporation was observed into the cold TCA
precipitate of the cell contents. In *E. coli*, where the cell wall
structure is more complex, incorporation of H\textsuperscript{3}-diaminopimelic acid
into cell wall was inhibited 72% where C\textsubscript{14}-glucose incorporation
into cell wall was inhibited only 14% (double labeling experiment).

An *E. coli* mutant requiring both DAP and lysine, kindly given by
J. Lederberg, was used in these experiments. These observations
provide direct evidence that penicillin inhibits the synthesis of
the "basal structure" of the cell wall in both *S. aureus* and *E. coli*.

In *E. coli*, the main fraction of the complex cell wall is a "super-
structure" containing protein and lipid, the synthesis of which from
C\textsubscript{14}-glucose is not inhibited by penicillin (cf. Trucco and Pardue,
*J. Biol. Chem.* 230:435, 1958, whose conflicting conclusions are
resolved by these experiments). (Supported by NIAID Grant)