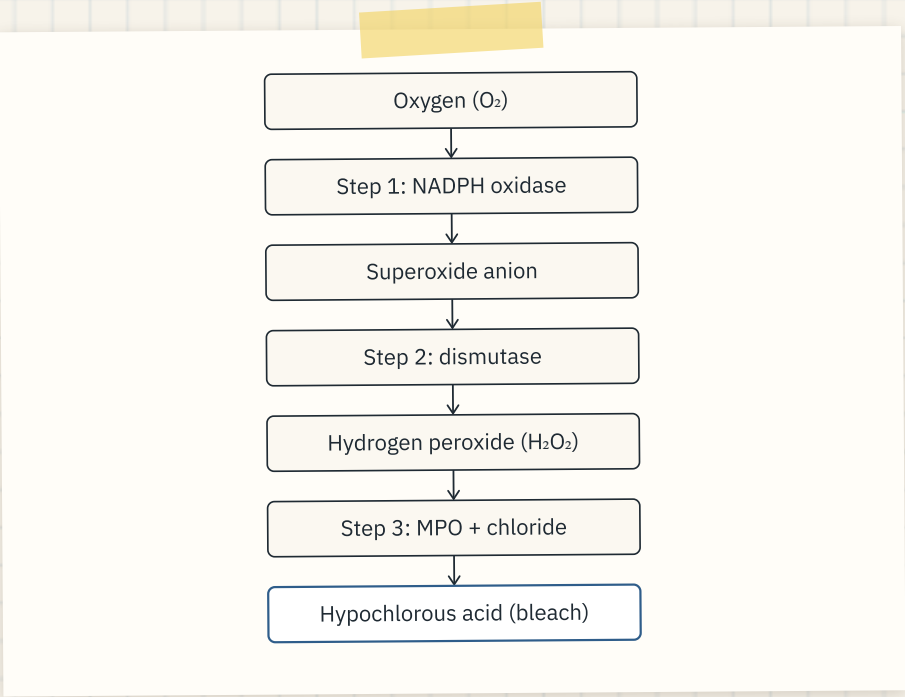
CGD in one page

NADPH oxidase, the respiratory burst and catalase



Step by step

1. Oxidase: oxygen → superoxide
2. Dismutase: superoxide → H_2O_2
3. MPO + Cl^-: H_2O_2 → HOCl (bleach)
4. CGD breaks step one

STEP ONE: THE BOOKKEEPING

$$NADPH + 2\ O_2 \rightarrow NADP^+ + 2\ O_2^- + H^+$$

one NADPH and two oxygen give two superoxide ions

Test	Normal	CGD
NBT dye	Dark blue	Stays yellow
DHR flow cytometry	Fluoresces	Flat, no fluorescence

Tests for CGD

Rule of thumb

Oxygen, superoxide, hydrogen peroxide, bleach

Little or no superoxide: little H_2O_2, no bleach

Catalase destroys the leftover H_2O_2

Exam traps

- gp91phox is X-linked (mainly boys); the other subunits are autosomal recessive.
- Catalase-positive: Staphylococcus aureus, Aspergillus, Burkholderia cepacia, Serratia marcescens, Nocardia.
- The catalase-positive pattern is an exam convention and a simplification.

Chronic granulomatous disease: NADPH oxidase and the respiratory burst

Video, written lesson, practice question and sources: medservatory.com/usmle-step-1/immunology/chronic-granulomatous-disease-nadph-oxidase

For exam study only, not medical advice. Follow local guidelines and your lab's ranges.
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