

SYMPTOMATIC X-LINKED CARRIERS

OF

CHRONIC GRANULOMATOUS DISEASE (CGD)



Identify

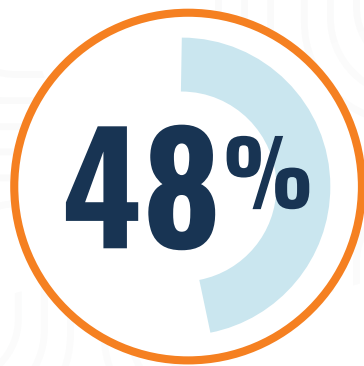


Test



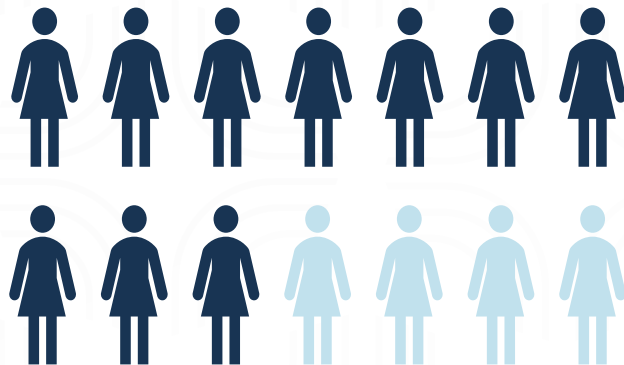
Monitor

Identify symptomatic X-linked carriers of CGD who may be at risk



of all X-linked carriers of chronic granulomatous disease (CGD) reported **infections, autoimmune symptoms, or both** in a 2018 retrospective study.¹

Pneumonias caused by CGD-associated pathogens affected **10 out of 14 X-linked carriers** who experienced at least one serious infection* (*Aspergillus fumigatus* and *Burkholderia cepacia*)¹



X-linked CGD accounts for **~66%** of CGD cases. For every patient with X-linked CGD, there is a potential **undiagnosed symptomatic X-linked carrier mother**.²

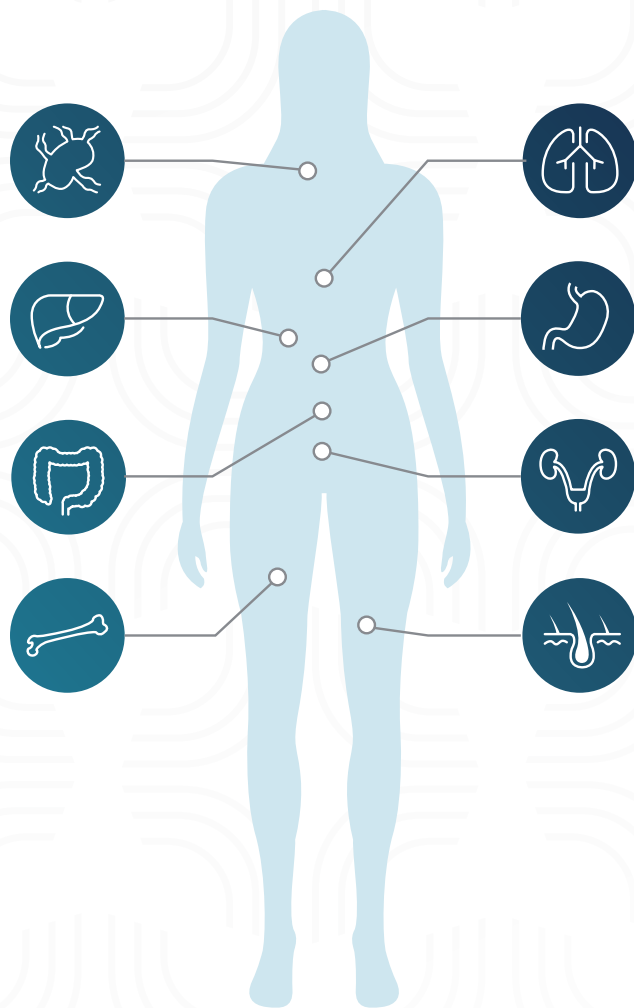
*Serious infection is defined as a clinical event requiring hospitalization and/or intravenous antibiotics.

Symptoms associated with CGD are not uncommon for X-linked carriers

Carriers of X-linked chronic granulomatous disease (CGD) can experience a wide range of inflammatory and autoimmune symptoms and may require medical management.

Symptoms are often misunderstood or misdiagnosed.^{1,3,4}

Common presentations may include lupus-like symptoms (mouth ulcers, joint pain), recurrent infections, persistent abscesses, and gastrointestinal pain or diarrhea. There may be concomitant symptoms, such as^{1-3,5}:



- Colitis
- Discoid lupus erythematosus
- Fatigue
- Granulomas (gastrointestinal and genitourinary)
- Joint pain
- Lymphadenitis
- Osteomyelitis
- Photosensitive rashes
- Pulmonary infections
- Raynaud's phenomenon
- Skin and organ abscesses
- Stomatitis
- Weight loss



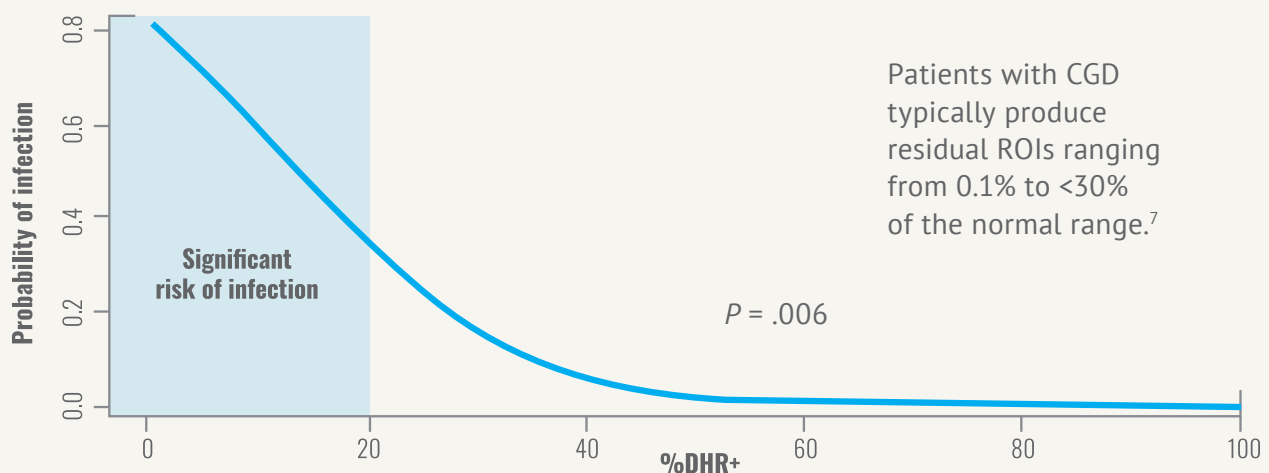
In a 2022 survey, X-linked carriers of CGD reported skin abscesses (35%), pneumonia (30%) and cellulitis (21%). One in four were using prophylactic antibiotics.⁶

DHR testing assesses risk stratification for serious* infections

The dihydrorhodamine (DHR) test is the most widely used method for detecting CGD and is also used to evaluate X-linked carrier status.²

The DHR test is a lab test that assesses neutrophil superoxide production, a potential risk indicator for serious infections in CGD. Low or no neutrophil function makes a person vulnerable to recurrent and/or serious* infections.^{1,2}

Lower % DHR + values are associated with a higher risk of infection¹



A logistic regression model was used to estimate the probability of infection or autoimmune/inflammatory manifestation (AIM) as a function of %DHR+ value. *P* values tested whether the %DHR+ value is a significant predictor for infection or AIM. Statistical significance of risk of infection for X-linked carriers was only seen at %DHR+ values less than 20%.¹

ROI, reactive oxygen intermediates.

Adapted with permission from Marciano BE, et al; 2018.¹



DHR values <20% can indicate a higher risk of potentially life-threatening infections for X-linked carriers of CGD. DHR values <10% are highly associated with risk of infection.¹

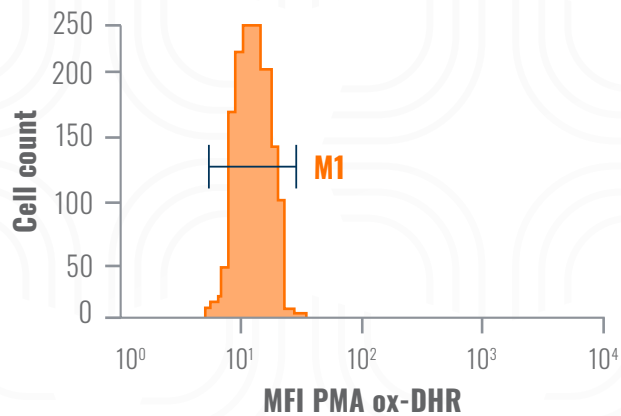
*Serious infection is defined as a clinical event requiring hospitalization and/or intravenous antibiotics.

Symptomatic X-linked carriers may display DHR values similar to that of X-linked CGD

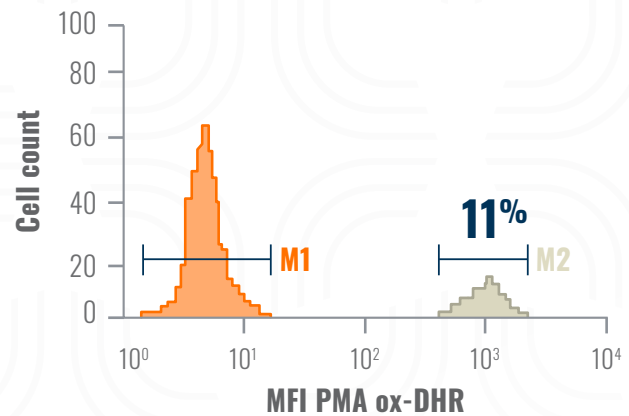
Carriers of X-linked chronic granulomatous disease (CGD) **can experience symptoms** like affected patients, including infections, that may be correlated to DHR value.^{1,3}

Potential treatment options may be considered for X-linked carriers with low dihydrorhodamine (DHR) values. Additionally, a %DHR+ value may give insight into a carrier's risk of infection when symptoms alone do not.^{1,2}

TYPICAL PATIENT WITH X-LINKED CGD⁸



HIGHLY LYONIZED X-LINKED CARRIER⁹



 = insufficient neutrophil response  = normal neutrophil response

MFI, mean fluorescence intensity; PMA, phorbol myristate acetate.



Scan the code or [click here](#) to learn more about reading DHR histograms.



Monitor DHR values over time to detect changes in risk

In X-linked carriers, X-chromosome inactivation can produce a skewed expression of the mutated gene that causes CGD, an effect called lyonization. Over time, X-chromosome inactivation favoring the CGD gene can become more pronounced and lead to an **increased risk of a potentially life-threatening serious infection**.^{10,11}

Guidelines for DHR level testing are currently being studied. Consider re-testing periodically or when your patient¹⁻³:



Develops new symptoms



Shows signs of infection



Has worsening symptoms

According to practice parameters for the diagnosis and management of primary immunodeficiency disease (PIDD)¹²:

- "The possibility of an X-linked PIDD **should be considered, even in female patients**, when other possibilities have been ruled out"
- "Carrier status should be determined for **all potentially affected relatives of patients** with severe PIDDs"



of X-linked carriers of CGD are at risk of significant infection³

X-linked carrier symptoms may be related to chronic granulomatous disease (CGD). Test or refer to assess your patient's risk of infection.



Ready to test?

[Request a dihydrorhodamine \(DHR\) Collection Kit](#), get testing support, or learn how to use the test step-by-step.



Not ready to test? Refer.

[Find a CGD specialist](#) in your area.

References:

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