

# 20 - Genetics of cytochrome function

## Genetics of cytochrome function

888 The Maudsley® Prescribing Guidelines in Psychiatry CHAPTER 11 Genetics of cytochrome function The function of CYPs is under genetic control. Each individual's CYP function is determined by heredity and is often, but not always, linked to ethnicity. Phenotypes are usually described as poor metabolisers, intermediate metabolisers, normal metabolisers and rapid or ultrarapid metabolisers. Table 11.6 gives the approximate distribution of phenotypes across nine ethnicities. Awareness of differences in phenotype frequencies can help predict and understand drug metabolism differences. As an example, CYP1A2 ultrarapid metaboliser phenotypes are most often seen in African Americans and so we might expect a higher rate of clozapine failure (or at least low plasma levels) in this population.

Table 11.6 Estimated phenotype frequency by ancestry for CYP1A2, CYP2D6, CYP2C19, CYP2C9 and CYP3A4.10-22 Genotype-predicted phenotypes African<sup>10,11</sup> African American<sup>12,13</sup> European ancestry + North American<sup>14</sup> Near Eastern East Asian South/Central Asian Americas Latino<sup>15</sup> Oceanian

Phenotype	African <sup>10,11</sup>	African American <sup>12,13</sup>	European ancestry + North American <sup>14</sup>	Near Eastern	East Asian	South/Central Asian	Americas	Latino <sup>15</sup>	Oceanian
CYP1A2 Ultrarapid metaboliser	10-20%	15-30%	1-4%	5-10%	1-5%	3-8%	5-10%	7-12%	5-10%
Normal metaboliser	55-70%	50-60%	70-80%	65-75%	65-75%	60-70%	60-70%	65-75%	65-75%
Intermediate metaboliser	10-20%	10-15%	10-15%	10-15%	10-20%	10-15%	10-15%	10-15%	10-15%
Poor metaboliser	5-10%	5-10%	5-10%	5-10%	10-15%	10-15%	5-10%	5-10%	5-10%
CYP2D6 Ultrarapid metaboliser	4%	5%	3%	10%	1%	2%	6%	4%	20%
Normal metaboliser	43%	56%	51%	55%	52%	62%	64%	59%	67%
Intermediate metaboliser	44%	36%	39%	30%	39%	30%	24%	29%	10%
Poor metaboliser	2%	2%	7%	2%	1%	2%	2%	3%	0%
CYP2C19 Ultrarapid metaboliser	3%	4%	5%	4%	0%	3%	1%	3%	0%
Rapid metaboliser	19%	24%	27%	26%	3%	19%	14%	24%	2%
Normal metaboliser	30%	33%	40%	45%	38%	30%	63%	53%	4%
Intermediate metaboliser	36%	31%	26%	24%	46%	41%	21%	19%	37%
Likely intermediate metaboliser	4%	3%	0%	0%	0%	0%	0%	0%	0%
Poor metaboliser	6%	4%	2%	2%	13%	8%	2%	1%	57%
Likely poor metaboliser	1%	1%	0%	0%	0%	0%	0%	0%	0%
CYP2C9 Normal metaboliser	73%	76%	63%	61%	84%	60%	83%	75%	91%

(Continued )

Table 11.6 (Continued ) Genotype-predicted phenotypes African<sup>10,11</sup> African American<sup>12,13</sup> European ancestry + North American<sup>14</sup> Near Eastern East Asian South/Central Asian Americas

Latino15 Oceanian Intermediate metaboliser 26% 24% 35% 36% 15% 36% 16% 25% 9% Poor  
metaboliser 1% 1% 3% 3% 1% 4% 0% 1% 0% CYP3A4 Ultrarapid metaboliser 7-15% 10-15% 1-5%  
5-10% 1-4% 2-6% 4-9% 3-8% 4-10% Normal metaboliser 50-65% 55-70% 65-75% 60-70%  
60-75% 60-70% 55-65% 60-70% 60-70% Intermediate metaboliser 15-25% 10-20% 15-20%  
15-20% 15-25% 15-20% 15-20% 15-20% 15-20% 15-20% Poor metaboliser 5-10% 5-10% 5-10% 5-10%  
5-10% 5-10% 5-10% 5-10% 5-10%

---

Revision #1

Created 2026-01-04 20:18:11 UTC by Omar Ayman

Updated 2026-01-04 20:18:11 UTC by Omar Ayman