

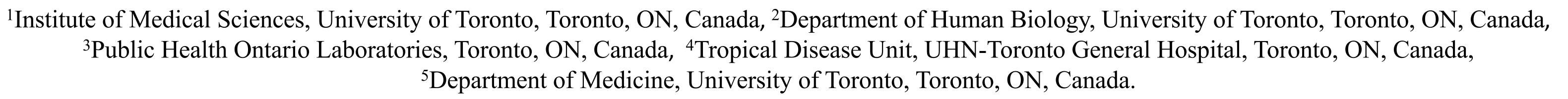
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Intercurrent Flaviviral Viremia in Ill Returned Travelers with Plasmodium vivax Malaria



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Introduction

- Flaviviruses: transmitted to humans through infected bites of *Culex* spp. and Aedes mosquitoes¹
- *Plasmodium vivax*: spread by the bite of *Anopheles* mosquito² • Flaviviral infection could precipitate a *P. vivax* relapse³



- DNA extracted from whole blood specimens and tested for malaria by microscopy and rapid diagnostic test (RDT) between 2006 and 2019 at Public Health Ontario Laboratory-Toronto^{5,6}
- RNA extracted from *P. vivax* positive whole blood specimens and

• Given overlap of epidemiological and clinical presentations of both flaviviral and malaria infections, diagnostic testing where malaria is confirmed or excluded, without subsequent flaviviral testing may mask true epidemiology of co-infections⁴

Objective: We aim to understand the incidence of intercurrent flaviviral infection in confirmed *Plasmodium vivax* infection.

examined by real-time PCR (qPCR) for the following targets: flaviviruses (pan-FLAV) and dengue virus types 1-4 (DEN1, DEN2, DEN3, DEN4)⁷⁻⁹

> 696 whole-blood specimens tested with confirmed *P. vivax* from 2006-2019

502 unique specimens of *P*. vivax with documented travel history tested for dengue and flavivirus by qPČR

Figure 1: Workflow highlighting *P. vivax* confirmed diagnostic testing for intercurrent flaviviral infection using qPCR.

Results

Table 1: Clinical and parasitological characteristics
 of P. vivax cases.

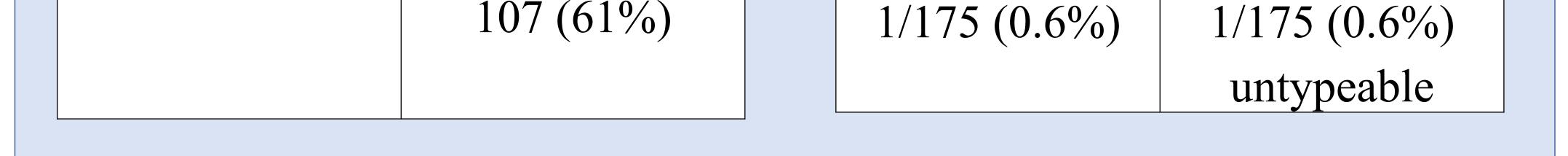
Table 2: Known travel history

Discussion & Conclusions

Both the Pan-FLAV and the Pan-DENV assays yielded a 0.6% positivity rate (1/175) each (Table 3)

	Total [n=175		Total [n=68 (%)]
	(%)]	Sub-Saharan	5 (7%)
Median Age, years	34 years	Africa	
(range)	(4 - 88 years)	Indian	53 (78%)
Median Parasitemia, % (range)	0.1 %	Subcontinent	
	(< 0.01 % - 1.1	India	34 (50%)
	· · · · · · · · · · · · · · · · · · ·	Latin America	9 (13%)
Sex			1 (00())
Male	121 (69 %)	Southeast Asia	1 (2%)
Female Unknown	50 (29 %)	Table 3: DENV an	d Flavivirus qPCR
	4(2%)	positive results.	
Travel History		DENV qPCR	Flavivirus
Yes	68 (39%)		qPCR
Unknown	107 (61%)	1/175 (0.60/2)	1/175(0.60%)

- Type-specific real-time PCR revealed DEN1, detected on both Pan-FLAV and Pan-DENV assays
- *P. vivax* infections rates are highest from India, Pakistan and Guyana¹⁰
- Intercurrent flaviviral viremia was noted in 0.6% of specimens, suggesting primary flaviviral infection could have triggered relapse of P. vivax
- Alternatively, co-infections may suggest primary infection with both organisms given the overlap of vector populations in these endemic areas
- Consideration of flaviviral co-infection should be given to P. vivax patients to appropriately manage clinical manifestations including deep thrombocytopenia, lymphopenia, and high yield arboviral symptomology including rash and retro-orbital headache⁴



References

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