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## REPORT: LABORATORY EVALUATION OF TWO LONG LASTING INSECTICIDAL NETS

### Introduction

Pyrethroid treated bednets have been shown by previous studies to be effective against malaria transmission and morbidity. However the treated nets over time will lose their efficacy of preventing malaria transmission when people wash these nets. Re-impregnations of these nets have proven to be costly; hence the introduction of long-lasting insecticidal treated nets like PermaNet. PermaNet is currently the Long Lasting Insecticidal Net (LLIN) recommended by WHO for malaria prevention and control. Since then, there have been other LLIN nets manufactured to be of assistance in the fight against malaria. There are two such nets that have been given to the PNGIMR labs in Madang for efficacy testing.

This is a brief report of the results of the laboratory evaluation of two LLIN nets (Dawa Plus & an another anonymous net) carried out in the entomology laboratories of the Papua New Guinea Institute of Medical Research (Madang) to test the efficacy of the different nets after 0, 10, 15, 20 and 25 washes.

### Methods

Materials from the 2 LLIN nets and 1 untreated net (used as control) were tested in parallel to determine efficacy after 0, 10, 15, 20 and 25 washes.

### *Bioassay procedure*

Five to six susceptible non-blood fed, wild-caught female *Anopheles punctulatus* mosquitoes were exposed to netting materials for 3 minutes under standard WHO cones, after which they were held for 24 hours with access to sugar solution. Knock down was measured after 60 minutes post-exposure and mortality after 24

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hours. Mosquitoes exposed to untreated nets were used as controls. Bioassays were carried out at room temperatures of  $28 \pm 2$  °C and  $80 \pm 5\%$  relative humidity.

### ***Washing procedure***

Net samples (25 x 25 cm<sup>3</sup>) were individually introduced into 1L wash bottles containing 0.5 L double distilled water and 2 g/L commercial detergent (OMO®). Wash bottles were then immediately put into a water-bath at a temperature of 30°C and shaken for 10 minutes. We used a Ratek Instruments shaking water-bath with the speed dial set at 7 to produce 155 movements per minute. After washing in detergent, the net samples were removed and rinsed twice for 10 minutes each in clean double distilled water in the same shaking conditions as stated above.

### **Results**

For every net type, 10 tests were performed for each of the different wash conditions. The results of the 10 tests (about 50 mosquitoes) for each wash condition were pooled and analyzed for knockdown and mortality rates as shown in Table1.

The mean mortality rates for the mosquitoes exposed to untreated material (control) were below 5%.

The mortality rate for mosquitoes exposed to Dawa Plus was 100% from unwashed nets to 20 washes and dropped to 96% for nets washed 25 times. Knock down was 100% for unwashed and all wash conditions.

For the other anonymous LLIN net (blue bed-net), mortality rate was 100% for unwashed material and dropped below 80% after 10 washes. The knock down rate was 74% for unwashed nets and continued to drop after every wash condition.

### **Conclusion**

The Dawa Plus net had a higher efficacy with a mortality rate of 100% up to the 20<sup>th</sup> wash condition compared to the blue anonymous LLIN bed-net.

**Table 1:** Bioassay results of the two LLINs washed 0, 10, 15, 20 and 25 times

Knock down and mortality rates of <i>Anopheles punctulatus</i> mosquitoes									
	Exposed for 3 minutes	Knock down after 1 hr	Dead after 24 hr	Exposed for 3 minutes	Knock down after 1 hr	Dead after 24 hr	Exposed for 3 minutes	Knock down after 1 hr	Dead after 24 hr
	Control			Dawa Plus			Anonymous blue LLIN net		
# of washes	n	%	%	n	%	%	n	%	%
<b>0 washes</b>	50	0	2	51	<b>100</b>	<b>100</b>	52	<b>74</b>	<b>100</b>
<b>10 times</b>	51	0	0	58	<b>100</b>	<b>100</b>	50	<b>72</b>	<b>79</b>
<b>15 times</b>	51	0	4	50	<b>100</b>	<b>100</b>	50	<b>58</b>	<b>78</b>
<b>20 times</b>	50	0	1	52	<b>100</b>	<b>100</b>	50	<b>54</b>	<b>66</b>
<b>25 times</b>	50	0	2	50	<b>100</b>	<b>96</b>	50	<b>48</b>	<b>46</b>

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