

## Short Report

## Haemostatic profile of the San (Bushmen) relocated to Schmidtsdrif

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**Objective.** To document the routine haemostatic variables of a group of San relocated from Namibia to South Africa.

**Design.** Cross-sectional study done in two stages.

**Setting.** Schmidtsdrif military camp in late 1990 and early 1991.

**Subjects.** Healthy adult San volunteers: 31 males and 54 females from the Vasakela and Barakwena groups in 1990; 135 males from the Vasakela group in 1991. The subjects were all soldiers or their dependants.

**Main outcome measures.** The following tests were performed: activated partial thromboplastin time, prothrombin time, thrombin time, fibrinogen and coagulation factors V, VII, VIII, IX, X, XI and XII. The results were compared with a Western population reference group ( $N = 50$ ).

**Main results.** Almost all the haemostatic variables were statistically significantly lower than those of the reference group. The mean derived fibrinogen concentration in the plasma in the first stage of the study (1990) was significantly higher, but this reverted to normal during the second stage (1991), perhaps reflecting a general improvement in health.

**Conclusions.** Even though the San are one of the best studied groups of indigenous people, this is the first published report on their haemostatic condition. The generally lower levels of haemostatic variables may reflect the lower prevalence of cardiovascular disease in the San. The population needs to be followed up as they westernise.

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Early in 1990 a group of San soldiers who fought with the South African army in northern Namibia, were relocated from the region of Tsumkwe to Schmidtsdrif military camp near Kimberley. A total of 4 000 people were relocated, including the soldiers and their dependants. Seventy-five per cent of

the people belonged to the Vasakela tribe and 25% to the Barakwena tribe. These traditional hunter-gatherers had gradually been developing a more Western lifestyle during their association with the military.

There was no clinical evidence of ischaemic heart disease (IHD) among the San while they were living as hunter-gatherers.<sup>1,2</sup> This is still the case. It is known that diet plays an important role in the development of atherosclerosis. The study population has a semi-Western diet with a relatively low fat intake. Fat contributes approximately 23% of their energy intake with an ideal ratio of saturated to polyunsaturated fatty acids. Carbohydrates, especially in the form of sucrose, comprise 61% of their energy intake (E Vorster — personal communication).

Although the San is one of the best studied groups of indigenous people in the world, their haemostatic profile has never been studied. This population, which was in the process of urbanisation, offered a unique opportunity. We were particularly interested in the plasma fibrinogen and factor VII levels. An increase in the plasma fibrinogen level is significantly associated with IHD.<sup>3,4</sup> High activity of the procoagulant clotting zymogen, factor VII, has also been shown to be an important risk factor for IHD.<sup>3</sup>

## Subjects and methods

The study was undertaken in two stages, i.e. in late 1990 and early 1991. The first part included 95 adult (54 female) San volunteers, from both the Vasakela and Barakwena tribes, with a mean age of  $30 \pm 12$  years and a mean body mass index of  $19 \pm 3$ . Blood was collected from each volunteer into 3.2% tri-sodium citrate (9:1 blood to citrate; vol/vol), using a double-syringe technique. The samples were placed on ice until the plasma was separated by centrifugation within 4 hours of collection. To prevent deterioration, the plasma samples were stored at  $-70^\circ\text{C}$  for less than 1 week and thawed in a  $37^\circ\text{C}$  waterbath.<sup>5</sup> The prothrombin time (PT)(Innovin, Dade, Miami, USA), activated partial thromboplastin time (aPTT) (Actin FS, Dade, Miami, USA) and thrombin time (TT) (bovine thrombin, Dade, Miami, USA) were measured with a Cobas Fibro semi-automated optical system (Roche, Basel, Switzerland).<sup>6</sup> The plasma concentrations of fibrinogen (derived fibrinogen) and coagulation factors II, V, VII, VIII, IX, X, XI and XII were determined using an Automated Coagulation Laboratory (ACL) instrument (Instrumentation Laboratory, Milan, Italy) according to the instructions of the manufacturers.<sup>7</sup>

The second part of the study, undertaken approximately 6 months after the first, included 135 San men from the Vasakela tribe. This tribe was selected because they are the less interbred group. Only men were studied because they were more easily accessible and the influence of female hormone changes was excluded. In this part of the study the derived and the clottable fibrinogen concentrations were measured. The latter was performed according to the method of Clauss<sup>8</sup> by means of the Cobas Fibro semi-automated optical system (Roche, Basel, Switzerland). The clottable fibrinogen was measured because it is the preferred method of determination used in epidemiological studies. The means and standard deviations were calculated for each haemostatic variable. Student's *t*-test for unpaired

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data was used to compare the results of the San with the reference values of our haemostasis laboratory. These were derived from a local Western population consisting of blacks, whites and coloureds ( $N = 50$ ). A  $P$ -value  $< 0.05$  was regarded as significant.

## Results

The haemostatic variables of all subjects combined ( $N = 95$ ), measured in the first part of the study, are given in Table I. Although most of the variables were significantly lower than in the reference group, not all the differences were clinically relevant. The mean derived fibrinogen concentration of the San group was significantly higher than that of the reference group.

Table I. Haemostatic variables of the San ( $N = 95$ ) during the first part of the study, and of the reference group ( $N = 50$ ) (mean  $\pm$  1SD)

	San	Reference
aPTT(s)	34.8 $\pm$ 4.5	34.4 $\pm$ 3.4
PT(s)	14.4 $\pm$ 1.2	15.4 $\pm$ 1.0*
TT(s)	26.9 $\pm$ 3.0	29.4 $\pm$ 4.5*
Factor II (%)	105 $\pm$ 14	101 $\pm$ 10*
V	91 $\pm$ 24	112 $\pm$ 25*
VII	89 $\pm$ 20	95 $\pm$ 16
VIII	88 $\pm$ 29	125 $\pm$ 53*
IX	95 $\pm$ 44	134 $\pm$ 53*
X	101 $\pm$ 20	100 $\pm$ 16
XI	82 $\pm$ 30	131 $\pm$ 48*
XII	89 $\pm$ 26	117 $\pm$ 35*
Fibrinogen	4.2 $\pm$ 1.4	2.4 $\pm$ 0.6*

\*  $P < 0.05$ .  
aPTT = activated partial thromboplastin time; PT = prothrombin time; TT = thrombin time.

The mean derived fibrinogen concentration measured in the second part of the study in the selected Vasakela group ( $N = 135$ ) was  $2.7 \pm 0.8$  g/l. This was not significantly different from the reference values, but was lower than that measured in the first part of the study (Table I). The mean clottable fibrinogen concentration of the Vasakela group,  $2.3 \pm 0.6$  g/l, was not significantly different from the derived fibrinogen levels.

## Conclusions

The finding that most of the coagulation factors were significantly lower than that of a Western population may be associated with the well-documented low prevalence of cardiovascular disease in the San.<sup>1,2</sup> The high levels of fibrinogen measured in the first part of the study might be attributed to the high prevalence of parasitic infections in the study population<sup>9,10</sup> and possibly tobacco smoking.<sup>11</sup> To our knowledge the fibrinogen genotypes of the San have not been investigated. These may account for up to half of the variance in fibrinogen concentrations.<sup>4</sup> At follow-up the fibrinogen concentrations were similar to the reference values. The decrease in fibrinogen concentrations may be associated with the improvement in the state of health.<sup>12</sup>

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