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Design and application of a biomedical sensor for blood volume pulsations

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Abstract

The biomedical sensor developed makes use of Photoplethysmography (PPG) in the transmissive mode. The light source is a LED of wavelength 900nm and the detector a photodiode which are placed on opposite sides of the tissue. These devices are connected to a circuit of amplifiers and filters. The output is connected to a signal processing device which interfaces with a computer for analysis. The device has been applied to the measurement of vascular resistance of capillaries. The ratio of the rise time (T_g) of pulsations to fall time (T_a) of pulsations obtained were used in the determination of microvascular resistance. The subject was in a supine position and allowed to relax with the biomedical sensor attached to his/her finger and blood volume pulsations were taken for 50s to 100s. After taking about 2-3 sets of measurements for each subject, blood flow to the index finger region was then restricted by wrapping an elastic band tightly around the finger under test. This was left for four to five minutes after which the band was removed and the finger re-inserted into the sensor and further measurements taken.

Introduction

In this paper, circuitry for noninvasive monitoring of skin pulsations, using radiation of a near-infrared spectral range was developed. The method makes use of photoplethysmography. This technique was used to determine a quotient value for blood resistance. This was done by using the temporal parameters of a blood volume wave form. This waveform is derived due to the transmission of near-infrared light through the finger that has been modulated by periodic arterial blood volume changes.

The development of a non-invasive technique that detects the cardiovascular pulse wave, which propagates through the body, can contribute significantly to the evaluation of the quality of blood circulation. Since blood circulation is affected by a wide range of illnesses, such a technique can be of significant diagnostic value.

Firstly the design of the PPG sensor itself which was built using integrated circuits and other semiconductor parts. There are two types of PPG, one is reflection and the other which was the mode used in this study was transmission. In transmission mode the source and the detector are on opposite sides of the tissue under study. Photoplethysmography (PPG) is a noninvasive optical way of measuring variations in blood volume and perfusion in tissue. It is used in pulse oximetry. Several parameters of the cardiovascular system such as heart rate, arterial blood pressure and blood flow fluctuate spontaneously. In this study two aspects are being investigated, risetime, T_g and falltime, T_a

The study obtained the approval of the ethics Committee of The University of the West Indies.

Materials and Methods

The source was an infrared source with a peak spectrum at 900nm. This was chosen for its high penetrating ability. A portable device was designed for the processing and detection of skin transmitted optical signals from the finger of the body (See also Spigulis 2005) The signal is first amplified then

filtered using a sallen-key configuration and the amplified again then it processed by a pico scope.

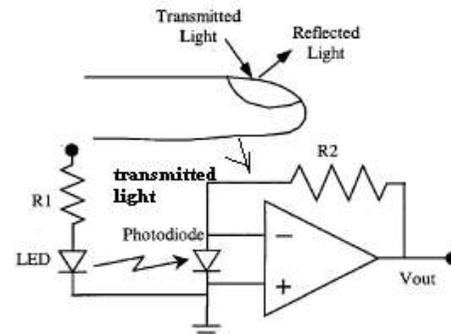


Fig.1 Photoplethysmograph fingernail sensor (Mascaro and Asada 2001)

Figure 1 shows the circuit diagram of the sensor used. The led used has a 900nm wavelength which is used for high penetration into the tissue. The Led illuminates the dermal blood vessels. The photodiode which in this case is positioned on the opposite side of the tissue detects the transmitted light through the finger. The amount of light that is transmitted depends on the volume of blood present in the vascular bed at that point in time. The greater the volume the less light is transmitted. The output voltage from the photodiode circuit will vary as blood volume varies with time. The opamp used is a standard 741 opamp. This in combination with resistors form an amplifier which amplifies the modulated signal

In the Medical Physics and Bioengineering lab within the physics department experimentation was carried out on 50 students. All students volunteered willing and also signed a consent form. Each student was made to lie in a supine position and was given some time to relax before readings were taken. Personal items such as rings, cell phones and bracelets were removed.

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The sensor was attached to the index finger of the student was told to relax and to breathe normally. The sensor was designed in transmissive mode, which means that the light source and detector are on opposite sides of the finger. Two sets of readings were taken for a period between 50 to 100 seconds without obstruction to blood flow. The sensor was removed and a rubberband was tied tightly to the same finger and left for 4 to 5 minutes. The rubber band was then removed quickly and the finger was reintroduced into the sensor and two sets of 100 second readings were taken. The temperature of the room was recorded. The student then gave a medical background of himself/herself and family, such information was held in confidentiality. The ratio of times for the anacrotic or risetime, T_g and catacrotic or falltime, T_a was calculated using the Picoscope software which allows for temporal parameters to be calculated. The risetimes and falltimes were compared before and after the introduction of the rubberband. The modulated light signals from the index finger was fed from the sensor to amplifiers to amplify the signal and a six-pole lowpass filter was used to remove any high frequencies. The residual signal was amplified again and sent to the pico scope where signal processing was done. The picoscope interfaces with a computer allowing the signal to be seen in real-time.

Results



Fig.2 Output real-time display of device

Figure 2 shows what the real-time display is. Fifty three subjects were used. Of the fifty three who came to undergo the test, data from only 27 of them could be used because (1) the data was of poor quality so that calculations could not have been made, (2) some data was missing, (3) their bio-data showed they had an unhealthy habit which is known to affect the blood

volume pulsations or (4) cardiovascular disease. What were left was about 27 useable data sets.

In Fig 3 ratio of T_g , the risetime on the time axis corresponds to A , and the temporal parameter T_a , falltime corresponds to $(T-A)$. Figure 3 has the wave form as displayed in real time as the output from the device.

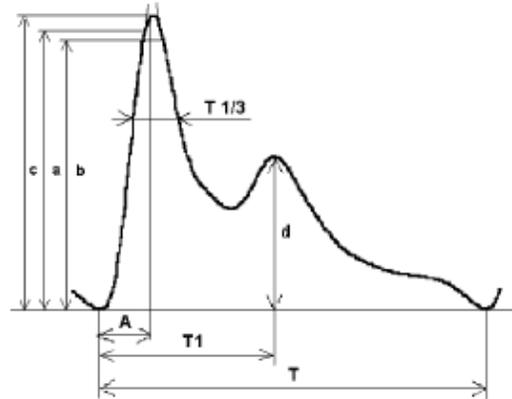


Fig. 3 Description of pulse wave. (See Korpas et al 2003)

Of the 27 data sets that were used 15 originated from data in which T_g/T_a was higher after the removal of the rubber-band compared to the values of unobstructed blood flow. In the remaining 12 data sets T_g/T_a was lower. When family history was considered only 13 from the first group and one from the second group could be used. Therefore, overall 13 cases T_g/T_a was higher and in one case it was lower.

Discussion

Although the sample size is small, there is clear evidence that for healthy subjects the ratio of T_g/T_a is higher after blood occlusion suggesting that this ratio is related to the micro vascular resistance in the blood vessels. T_g/T_a can therefore be used as a measure of the micro vascular resistance. In conclusion the device can be used in measurement of blood volume pulsations and in the measurement of micro vascular resistance. However, the results hold only in cases where there is no family or lifestyle factors that may influence the cardiovascular system. Alcohol use and cardiovascular diseases change the time parameters of the pulse waveform.

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Modeling Economic Impact of Changes in Tourism for the French Overseas Region: The Guadeloupean Case

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Abstract

In using the Guadeloupean case as an example, this article seeks to contribute to the empirical studies currently being carried out elsewhere in the Caribbean region, with the aim of answering certain questions related to the modelling of changes within the tourism industry.

On the one hand it deals with enlarging the data base of similar empirical studies. Because the tourism sector is being made to occupy a strategic position, it is becoming increasingly necessary to identify the different related macroeconomic problems that may arise: forecasts of tourist arrivals, analysis of different scenarios for macroeconomic evolution, impact on specific sectors of demand variations within the sector, etc.

On other hand, it seeks to provide examples of the different types of economic analysis needed by decision makers, at both the local and national levels of government. It is evident that recent budgetary measures and investment incitements set up in Guadeloupe by local government bodies and by the French government show a certain amount of faith in the tourism sector, which is often viewed as a “magic cure” for generating economic activity and employment. In return for their commitment to providing financing, the authorities are now demanding a certain level of expertise capable of accurately determining the direct and indirect effects of tourism on economic activity and more specifically on the creation of wealth and employment.

Introduction

As far as both the international economy and more limited national or regional economies are concerned, the tourism sector has shown progressive development, especially since the liberalization of the airline industry in the 1990's. According to statistics provided by the WTO¹, the total number of tourist arrivals increased from 69.3 million in 1960 to 286.5 million in 1980, attaining 455.9 million in 1990 and 702.6 million in 2002. Thus, there were four times as many tourists travelling in 2002 than there were in 1960. Similarly, since the early 1990's, the evolutionary curve for this variable has been showing a steeper rise than during preceding periods.

Similarly, revenues from tourism have increased from 7 billion US dollars in 1960, to 103 billion in 1980 and 341 billion in 1994. International trade figures also show that tourism occupies a leading position among the various categories of

goods and services being exchanged worldwide, well ahead of oil and automobiles.

In the developed countries which are the principal beneficiaries of revenues generated by international tourism, the sector plays an extremely important role, in terms of employment, consumption and investment. In most other countries therefore, the emergence of a tourism industry is considered to be a strategy for economic development. This is the case in certain Caribbean countries, such as Cuba and the Dominican Republic, where growth rates have been relatively high in recent years, due to economic policies which place a lot of emphasis on tourism.

Within the Caribbean region moreover, in the space of one decade since 1990, there has been a real shift in the distribution of the “tourist arrival cards” among certain countries. The big winners have in fact proven to be Cuba and the Dominican Republic, which both occupy the top spots. The number of visitors to the former grew by 1 400 000 between 1990 and 2001, resulting in Cuba's jumping from fifteenth place to the

¹ World Tourism Organization



number one position. During the same period, the Dominican Republic saw an additional 1 500 000 tourist arrivals, and moved from fourth to second place. Inversely, countries like the Bahamas, Barbados and Jamaica have shown relatively little progress or even slight regression in the Bahamian case.

These brief observations suffice to demonstrate the value of studies measuring the macro-economic impact of variations in tourist arrivals within a country and the need for forecasts in this domain. This value is multi-dimensional, as is highlighted by Witt and Witt (1995): "short term forecasts are required for scheduling and staffing, medium term forecasts for planning tour operator brochures and long term forecasts for investment in aircraft, hotels and infrastructure".

In using the Guadeloupean case as an example, this article seeks to contribute to the empirical studies currently being carried out elsewhere in the Caribbean region, with the aim of answering certain questions within the tourism industry.

On one hand it deals with enlarging the data base of empirical studies dedicated to modelling changes within the Caribbean's tourism industry. Because the tourism sector is being made to occupy a strategic position, it is becoming increasingly necessary to identify the different related macroeconomic problems that may arise: forecasts of tourist arrivals, analysis of different scenarios for macroeconomic evolution, impact on specific sectors of demand variations, etc.

On the other hand, it seeks to provide examples of the different types of economic analysis needed by decision makers, at both the local and national levels of government. It is evident that recent budgetary measures and investment incitements set up in Guadeloupe by local government bodies and by the French government show a certain amount of faith in the tourism sector, which is often viewed as a "magic cure" for generating economic activity and employment in Guadeloupe. In return for their commitment to providing financing, they are now demanding a certain level of expertise capable of accurately determining the direct and indirect effects of tourism on economic activity and more specifically on the creation of wealth and employment.

The text is developed in three parts. The first rapidly outlines the evolution of Guadeloupe's tourist industry, describes its positioning with regard to other Caribbean countries and discusses present-day stakes. The second reviews writings on the different approaches to modelling that are normally used to give an account of the dynamics of the principal variables responsible for tourism's evolution. The third section presents a SAM type model created for Guadeloupe and proposes its use in the elaboration of macroeconomic simulations of tourism's impact.

Materials & Methods

There is a relative abundance of literature proposing economic analyses of the tourism industry. Initially, these works took the form of structural econometric studies, during a period of considerable contribution in the field of Keynes-inspired macro-econometric modelling.

These studies were at first carried out in developed countries and they had a tendency to concentrate on the definition of behavioural patterns, in the aim of specifying the determining factors related to tourism demands.

The models produced within this context dealt for the most part with tourism-related earnings and expenditures, for which two types of variables were distinguished: those showing a price effect, aimed at taking account of visitor reactions to price and exchange rate modifications and, those showing a revenue effect, linked to a rise in tourist expenditure following an increase in their buying power (see Coulomb (1988)).

After this initial period, studies were progressively extended to include the rest of the world since the tourist trade was being increasingly placed at the heart of economic strategies in most countries. This holds true for activities directly or indirectly dependent on tourism as well as for activities related to employment or to the foreign trade balance.

In the Caribbean's very particular case, the first empirical implementations including forecasts of behavioural relations were proposed in the late 1980's (see Clarke et al. (1986), Belchere (1988), Rosensweig (1988) and Carey (1991)).



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The almost systematic use of the OLS method was eventually phased out and in the ensuing years studies were carried out in a context which gradually approached that of modern econometrics. Consequently, publications from the late 1990's placed modern econometric techniques such as the use of non-stationary variables and Zellner's SUR (seemingly unrelated regression), at the heart of their methodological approaches.

Whether dealing with cases specific to individual countries or with comparative analyses of several economies, these studies paid particular attention to various issues, such as the price effects on tourism results, the problem of tourism maturity (Whitehall and Greenidge (1996)), the forecasting of tourist arrivals (Downes, Greenidge and Worrell (1997)), etc.

The methodological approach based on an input-output reasoning in national accounting and in computable general-equilibrium models has also retained the attention of many adepts of quantitative macroeconomics.

Adams and Parmenter (1992 and 1995), were the first to opt for an input-output type model. Since then, there has been widespread utilisation of general-equilibrium modelling, as can be noted in the many applications realized for the Australian economy, (Skene (1993), Madden and Thapa (2000), Woollett, Townsend and Watts (2001), Dwyer *et al.* (2003a, 2003b)), for the American economy (Blake *et al.*, 2000), in Hawaii (Zhou *et al.*, 1997), Spain (Blake, 2000), the United Kingdom (Blake, Sinclair and Sugiyarto, 2003) and in the Balearic Islands (Valle and Polo, 2004).

In the Caribbean, most of the work done in this domain was published in the late 1990's. These studies were consecrated to analysing the sectors most affected by tourist expenditure and by their contribution to economic growth. While pioneering authors such as Armstrong, Daniels and Francis (1974) managed to shed some early light on certain macroeconomic aspects of the tourism sector in the Caribbean, their focus was placed particularly on the Barbadian economy, based on a limited input-output table (13,13) and on figures from 1968. It was necessary to wait two decades for research work to attain a level corresponding to the importance of tourism within the region.

Thus, McDavid (2000) produced an application for the Jamaican economy in 2003, using an input-output table constructed with data from 1993, data which he also used to create a SAM and a CGE model, in order to respond to certain questions concerning the interdependent relationship between tourism and economic growth.

Finally, the temporal series approach, in as much as a methodological alternative, also held the interest of many researchers working on modelling the tourist trade.

Empirical investigations were undertaken with the aim of highlighting particular elements capable of being apprehended with a limited number of variables. This was achieved through the use of various methods of analyzing temporal series. For example, González and Moral (1995) proposed the use of a decomposition model including a revenue indicator, two price indices, an aleatory tendency and an aleatory seasonal component to explain Spain's external tourist demand. For a more general look at these studies, Witt and Witt's (1995) review can be consulted.

In the French West Indies, the first quantitative analyses concerning tourism only appeared in recent years.

First, in 2003, Fakhoury, Joeger and Naudet of the French National Institute of Statistics and Economic Studies (INSEE) and the French Development Agency (AFD) were able to make certain estimations concerning the economic fallout of international tourism on the different economic branches and aggregates in Guadeloupe. Their work was carried out as part of a project aimed at developing rapid economic accounts, and using the TABLO model, which is a Keynesian type quasi-accounting tool.

Then, in Martinique, while united for a convention, Carpin, Logossah, Marquès and Para from the INSEE, the Martinican tourism development agency (ARDTM) and the Martinican centre for research in economic/management modelling and computer applications (CEREGMIA) developed a satellite account for tourism in an attempt to meet a double objective: assess tourism's weight in the region's development and contribute to decision-making within the sector. From a technical standpoint, this



study is based on the calculation of the Leontief multiplier using the TEI developed by the INSEE and also on direct, indirect and induced effect multipliers.

Finally, in 2004, Mathouraparsad, Maurin and Montauban from the research centre for economic studies applied to development (LEAD) attached to the Université des Antilles et de la Guyane, also dealt with this question and created the first SAM model prototype, which they used to explore different scenarios related to macroeconomic evolution, including simulations for the tourism sector. The work presented here in fact represents a continuation of this production.

Results & Discussion

The simulations were realized based on a SAM elaborated from an input-output table created for Guadeloupe using the data available for 2000. This is the last year for which accounts were published. Dans un premier temps, nous avons estimé différents comptes synthétisant le secteur tourisme. This estimation was achieved by differentiating between the accounts of the original SAM and that in which tourist expenditures showed a 100% evolution. The different results obtained were then considered to be corresponding to those generated by the tourism account. Then, a simulation of tourism's impact on the economy was effected.

It is undeniable that tourism represents an important stake in Guadeloupe's economy. As a generator of employment, its financial repercussions on several branches of activity make it into a real axis for development. However, in recent years, this sector has been suffering a decrease in visitor numbers to the Guadeloupe archipelago. Touristes numbers have gone from 807 000 in 2000 to 773 400 in 2001. Terrorist attacks, airline company bankruptcy and hikes in ticket prices are just some of the possible reasons behind this 4% drop in tourist visitation. What are the economic consequences of this 4% drop in tourist expenditure?

Tourists spent 328 million euros during the course of 2000. The major areas of tourist expenditure were hotel accommodations and

restaurant expenses, to which they consecrated 56% of their total budget. Following this were expenditures for vehicle rentals and consumer goods purchases.

Tourism represents 6% of the total GDP, 9% of total household consumption in Guadeloupe and its dependencies and 7 726 jobs. Tourists consume 11% of the local production of alcoholic drinks and 9% of services to individuals. Their presence accounts for almost one third of the turnover in the hotel and restaurant branch.

The SAM allows for the estimation of a branch account, of the different forms of intermediate consumption as well of certain aggregates.

The total weight of this sector of activity represents more than 7% of commercial production, or 674 million euros. It directly leads to 6% of imports and accounts for 8% of VAT and custom duty takings. Furthermore, it generates close to 6% of all salaries and 7% of total profits. It is responsible for 5% of total income tax earnings and 7% of corporate taxes. Finally, it generates net external earnings (tourist consumption – consecutive imports) of close to 533 million euros. It represents the primary form of export on the island and thus finances 47% of the trade deficit.

Tourism directly generates 469 million euros in production and 124 million in imports. The principal beneficiary branches are non-commercial services and construction.

It indirectly generated or induced production worth 205 million euros or 2.2% of total commercial production.

The analysis of tourism's repercussions on other branches has allowed for the identification of certain trickle-down effects, which are shown in the following table.

The branches which earn the most profit through tourism are the hotel and restaurant branch and that of other services to companies. Households rake in 215 million euros, which represents 5% of their total revenue.

We shall analyse tourism's multiplier effect which compares cumulated effects to direct effects. Direct production due to tourist expenditure estimated at 100 brings about a total global production of 144, because of indirect and induced effects.



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We shall measure the economy's dependence on the tourism sector with the use of the touristicity coefficient, which indicates the different branches in which activities are heavily linked to tourism. The proportion of tourist-related production in relation to total commercial production stands at 8.35%. The consumer goods branch registers the highest percentage (38.44%), followed by the food processing industry (37.85%), intermediate goods (34.24%) and the hotel and restaurant branch (34.11%). The potential for development through tourism is very high in these branches.

Under the hypothesis of cyclical unemployment, the job-creation generated by tourism is assessed thanks to the ensuing productivity within the economy (AV/number of jobs). These jobs are of course attributed according to branch. An estimated 7 726 jobs are created, representing 6.5% of total job creation. These jobs are created mainly as a direct result of 69% of funding. The primary employer is the hotel/restaurant branch, with 36% of jobs.

A drop in tourist expenditure would entail, with all things remaining equal, a variation of the GDP by -0.25% and a 0.29% drop in production. As the following table shows, nearly all commercial activities would be affected by this decrease, except non-commercial services, which tends to show very little variation. The most concerned branches would be the hotel/restaurant branch, with an evolution of -1.45% and the sugar/rum branch whose decrease in activity would stand at about 1.28%. Approximately 309 jobs would be lost.

The earnings of the different economic agents are also affected by this decrease. Salaries and capital returns would also show a decrease of 0.23% and 0.27% respectively. This decrease would logically be followed by a drop in household consumption, estimated at 0.19% and a 0.25% drop in imports due to a slowdown of economic activity.

Since households would have less revenue at their disposition and would reduce their consumption, tax revenues would also be decreased. Income and corporate taxes would also be modified by -0.19% and -0.27% respectively. Total VAT earnings and customs duties would also drop by 0.33%.

The multiplier effect highlights the branches that are most closely related to the tourism sector. In other words, it is possible to pinpoint the sectors that are 'boosted' by tourism. Thus, the sugar/rum branch would have a 0.64% drop in activity. This is mostly due to the souvenirs carried away by tourists when they leave the island. Production in consumer goods industries would drop by 0.41% and activities in other service to companies branches by 0.62%. Finally, the most consequential variation would be registered in the hotel/restaurant branch, whose activity would be reduced by 1.44%. This minor crisis in tourism would provoke an income shortfall for firms and households to the tune of 0.19% and 0.27% respectively.

By breaking down the total of all revenues, it can be observed that the direct multiplier generates 55 production units out of a total of 83 for the sugar/rum branch, 6 units through indirect effects and 23 with the induced multiplier. Out of 145 production units in the consumer goods industries, direct effects are responsible for 55, indirect effects 18 and induced effects 72. The hotel/restaurant branch produces 560 units, with 200 by direct effects, 73 by indirect effects and 287 by induced effects. The revenue of economic agents is also affected, as already discussed. Households incomes are reduced by 4 482 euros which is a 0.19% drop in what they would have earned had this drastic reduction not taken place. Indirect (2 092) and induced (1 480) multipliers are the major driving forces behind the generation of this revenue.

The branches which respond most rapidly are the food-processing and trade industries. Direct production in food-processing industries due to a decrease in tourist expenditure estimated at 100, results in a general drop by 688 in production, because of indirect and induced effects.

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Evaluation of intensive care in Trinidad – a comparison with the developed world

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Abstract

A therapeutic intervention scoring system (TISS-28) was applied to the intensive care units of Trinidad to evaluate the process of care, resource utilization, costs of intensive care therapy and prognosis of patients. Results showed that despite process of care and outcome of patients being comparable, the costs of intensive care were much cheaper to that of the developed world.

Introduction

Critical care has evolved as a specialty of its own in both the developed and developing countries. Intensive Care Units (ICU) becoming one of the vital areas of patient care in a hospital, they also consume a larger part of the budgetary allocations of a hospital. In recent years there has been an increase in the need for ICUs with more aggressive therapeutic procedures and/or for the increased use of adequate and invasive treatment for advanced diseases. Given the high-technology care offered in ICUs and the higher cost involved with this, proper utilization of the ICU resources should be of very high priority. This is especially true in developing countries such as ours where budgetary allocation has to be prudent to ensure minimal wastage of resources. We conducted a study to evaluate the ICU resources, their utilization and cost, and patient outcome by applying a model introduced in the Europe known as the Therapeutic Intervention Scoring System (TISS-28)

Materials and methods

TISS-28 was prospectively applied to patients consecutively admitted to the intensive care units (ICU) of three public teaching hospitals and two private hospitals in Trinidad on a daily basis for a period of eight weeks. Demographic data, diagnoses on admission, nurse-patient ratio, length of stay and hospital outcomes were recorded. Costs were calculated from data collected from various departments of the hospitals in relation to TISS score.

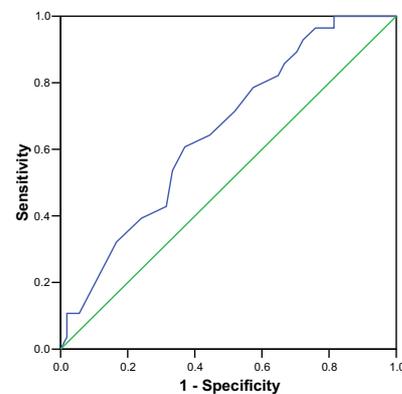


Figure 1: Receiver Operating Characteristic (ROC) curve for TISS-28

Results and Discussion

595 TISS-scored patient-days were analysed. The TISS scores in all the hospitals were comparable except Private Hospital II which had low therapeutic interventions (Table 1). The overall average TISS handled by a nurse was 26.2 per day which quantifies the nursing workload and comparable to the points reported from North America and Europe. In comparison to USA, the bed availability was very low. Also, the mean cost per patient and cost per TISS point were far less than that of USA, although the TISS score (process of care) and mortality (outcome of patients) were comparable. (Table 2). The discriminant function of TISS, which is the prognosticating ability, was fair, as shown by the area under the receiver operating characteristic (ROC) curve (0.65) (Figure 1).



INSTITUTION	Day-1 TISS* (Mean ± SD)	Last Day TISS* (Mean ± SD)	Average TISS per patient* (Mean ± SD)
Public Hospital I	28.1 ± 5.9	25.2 ± 8.1	27.1 ± 5.9
Public Hospital II	26.4 ± 10.4	25.6 ± 8.2	24.3 ± 6.2
Public Hospital III	30.2 ± 4.9	25.8 ± 5.0	28.1 ± 3.7
Private Hospital I	24.9 ± 5.5	21.0 ± 5.3	25.6 ± 1.9
Private Hospital II	20.5 ± 7.1	16.3 ± 3.8	18.2 ± 4.5

Table 1 TISS-28 scores in hospitals

Variable	T&T	U.S.A
Bed occupancy (%)	66.2	81
Bed availability per 100,000 population	2.0	30.5
Cost per patient (US \$)	\$ 5193	\$ 40, 000
Cost per TISS Point (US \$)	\$ 26	\$ 300
Mean Day-1 TISS	27.0	25.0
Standardized Mortality Ratio	0.9	0.96

Table 2 Comparison of process of care, costs

Conclusion

TISS-28 is a useful scoring system to evaluate the ICU resources, process of care, nursing workload, costs as well as to predict the prognosis of ICU patients. This assessment has allowed us to compare the performance of ICUs in Trinidad with those in the developed world. We could reasonably conclude that the resources, process of care, nursing workload in our ICUs are comparable to the developed world while costs are far less than the developed countries.

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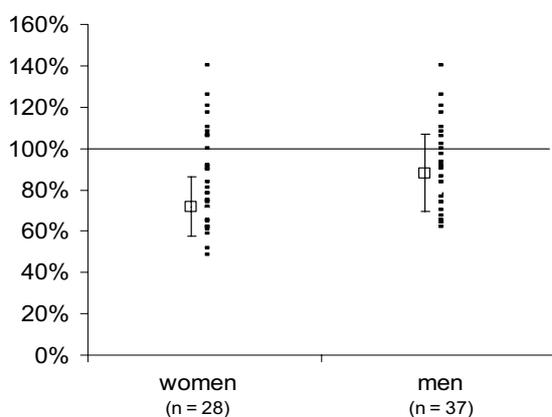
Fighting Against Sedentarity In The Caribbean Area: On The Interest Of A Pluridisciplinary Approach

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Abstract

Obesity and related metabolic/cardiovascular diseases have become a major public health concern in the Caribbean area. The main risk factors associated with these conditions are identified, but there are no data available on the prevalence of insufficient aerobic fitness, nor on the physical activity behaviours of the population.

We assessed the cardiovascular risk on the Guadeloupean campus. A sample (n=137) of young Caribbean people was recruited among students, teachers and the administrative staff. Anthropometric data were collected about the whole group. Based on the body composition data obtained through bio-impedancemetry, the proportion of overweight women reached 24.6% and 1.7% in men. When related to the body mass index, these figures suggest that many women with normal weight have a percentage of fat in excess and a lack of muscle mass. The maximal oxygen uptake was measured through an incremental cycling exercise conducted up to exhaustion.



Distribution of the individual maximal oxygen uptake, expressed in percentage of the predicted value

This index of aerobic fitness reached 73.1%(±14.2%) of the predicted value in women, and 88.0%(±18.5%) in men.

Our observation on the population we have studied, educated and quite interested in their health since they have voluntarily participated, suggests that a large exercise program focusing on women is required.

As for public health, regular exercise - yet largely underexploited - can potentially prevent many cases of metabolic or cardiovascular diseases. Confronted with the strong prevalence of diabetes in Guadeloupeans of Indian origins, traditional medical care and prevention strategies meet their limits. A description of the physical activity levels is required to be able to study later the effects of regular exercise in the prevention of diabetes in such an ethnical subgroup. Results of our laboratory suggest that this population would be more sedentary than their counterparts. It is then important to be able to take into account the contribution of culture in the determination of physical behaviors. We presented a project in process apprehending the physical habits of young Guadeloupeans through different scientific approaches.

Acknowledgements

We are grateful to J Bangou (biochemistry department of the univesitary hospital), ML Persain and P Griffard (LMDE) for their efficient technical or financial support to that project.



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Impact of Science on Gender Ideology in Society

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Abstract

Beliefs are ideological, when they are prevalent in a society not because they are true or reasonable, but because they serve to preserve or stabilise certain attributes. Historically, the *gender* ideology in society has viewed women as passive, emotional, subjective, less competent in mathematical and spatial abilities and therefore less capable of doing Science. In contrast, men have been seen as active, rational, objective and endowed with better mathematical and spatial skills, attributes purported to be better suited to being a scientist. Examples of research conducted in Biology and the Medical Sciences will be cited to demonstrate the impact of Science in maintaining this ideology and how in turn, this ideology influences the practice of modern/western science. An analysis of the current practices in certain disciplines taught at the St. Augustine campus of the University of the West Indies, which maintains this gender ideology will be explored and recommendations will be made to counteract any negative effects these may have on the participation of women in these disciplines.

Background

Historically, the *gender* ideology in society has portrayed women as passive, emotional, subjective, less competent in mathematical and spatial abilities and therefore less capable of doing Science. The perception of the way in which science is conducted is antithetical to femininity. Characteristics associated with masculinity are also associated with science viz reductionist; strategic; independent, void of interpersonal support while those associated with femininity are: holistic; seeking help; careers/nurturers; cooperative. This has been cited as a possible reason for the paucity of women in what is considered to be the 'Hard Sciences'.

Methodology

The research and materials presented are based on project reports done by students of the Gender and Science course at the University of the West Indies (U.W.I), St. Augustine and selected papers; Martin (1991), *'The Egg and the Sperm'* and Longino and Doell (1983), *'Body, Bias, Behaviour'*.

Findings

Computer Science

In Computer Science at the University of the West Indies, a discipline which was perceived to be male dominated, there was no significant difference between the numbers of female and male graduates. However, female participation was highest in the Computer Science and Management combination and decreases with increasing 'technical' combinations such as Computer Science and Electronics. This demonstrates the horizontal segregation within the discipline.

The majority of students in this discipline believed that males had a higher affinity for actual use and engagement with computers and computer technology and were also more adept at it. All of the female and some of the male students cited socialization, male domination and stereotyping as possible causes for this. 100% of the males students said they felt confident speaking up in class



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because they wanted to make sure that they understood what was being taught and they felt that they would be credited for their ideas, whereas 80% of the female students were not confident speaking up for fear that their inadequacies will be revealed. They felt that either their answers were wrong, or that they would not be given credit for ideas.

Biology and Medical Sciences

The differences observed between males and females pursuing Computer Science at UWI reflect Martin's (1991) conclusion that the degree of metaphorical content in the descriptions of the egg and the sperm emphasizes and parallels cultural stereotypes of male and female behaviour. That is, the egg is seen as large and '**passive**' whereas the 'sperms are small, 'streamlined,' and invariably '**active**'. The egg behaves 'femininely' while the behaviour of the sperm is described in very masculine terms, reinforcing this gender ideology in society.

This difference in male-female behaviour is also reinforced in the critique of research conducted in Biology by Longino and Doell (1983) when they stated: 'anthropologists' have argued that the social dominance of males is a function of hormonally determined behaviour. Such theorist credit aggression with the capacity to determine one's position in hierarchical social structures and then attribute aggressive behaviour to levels of testosterone circulating in the organism'.

The justification of the attribution of male-female behaviour to physiological (mainly hormonal) rather than environmental factors must be considered. Physiological explanations are clearly sexist in their description of assumed gender-dimorphic behaviour. For instance neuroendocrinologist describes 'tomboyism' as a preference for active outdoor play, preference for male over female play mates, greater interest in a career than housewifery, as well as less

interest in small infants and less play rehearsal of motherhood roles. This reflects an initial acceptance of social prescriptions for sex-appropriate behaviour. Thus we can conclude that environmental factors (socialization) can influence a female students' preference for 'softer' disciplines and the lack of confidence in 'harder' ones.

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**Sickle Cell Trait Carriers: are they like everyone?
From cellular biology to the cardiovascular approach.**

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Abstract

Sickle cell trait (SCT) is the heterozygous form of sickle cell anemia (SCA). Although SCT is usually considered as a benign and asymptomatic condition, SCT carriers exhibit particular physical and physiological behaviour at rest and during exercise. Although epidemiological and experimental results demonstrated either a limitation or normal responses of SCT carriers in performing in endurance exercise (i.e. involving mainly aerobic metabolism), other works reported advantages of that population in performing exercise involving mainly anaerobic metabolism. Herein, we will address the issue of the lactic response paradox in SCT carriers during exercise. Finally, the medical complications and possible mechanisms of exercise related sudden death in SCT subjects will be discussed.

Introduction

SCT is the heterozygous form of SCA which is marked by the presence of both hemoglobin (Hb) S and A. Its prevalence is between 20 and 40% in the black population of Africa, 8-10% for Afro-Americans and 10% in the Caribbean Islands. The SCT, in contrast to SCA, is usually considered a benign disorder and the longevity and morbidity of SCT carriers seems to compare favorably with subjects with HbA¹. However, exercise physiology and cardiovascular characteristics seem to differ between SCT and subjects with normal hemoglobin.

SCT carriers and aerobic metabolism

Several studies suggested that SCT is not a limiting factor to practice physical activities requiring aerobic metabolism. For example, it has been reported that 6.7% of SCT carriers were among the black football players in the National Football League¹². Besides, SCT carriers usually exhibit identical maximal aerobic ability (as assessed by maximal oxygen consumption) than control subjects². However, we recently demonstrated a one-third greater slow component amplitude in SCT carriers performing a prolonged and intense submaxi-

mal exercise compared with control subjects³. That suggests lower aerobic capacity and exercise intolerance in SCT carriers during prolonged and submaximal aerobic exercise.

SCT carriers and anaerobic metabolism

It has been hypothesized that the low affinity of HbS for O₂ within SCT carriers' red blood cells might cause repeated episodes of tissue hypoxia leading exercising muscles to develop anaerobic capacity to compensate for the hypothetical low oxidative capacity⁹. This hypothesis has been partly verified by Hue et al.⁷ who observed that SCT carriers were able to reach higher performance during a jump-and-reach test than control subjects, suggesting greater alactic anaerobic ability in SCT carriers.

SCT carriers and lactic response paradox

Freund et al.⁶ investigated the ability of SCT carriers to exchange and remove lactate from the circulation after a ramp exercise test (i.e. during recovery). Their results suggested that SCT carriers were likely to produce more lactate than controls or to have an impaired ability to clear circulating lactate⁶. However, they did not match SCT carriers and control subjects



according to physical activity. Thus, we compared the kinetics of lactate levels during and after the same kind of exercise tests between matched SCT carriers and controls¹³ and we reported a surprising lower lactate levels in SCT carriers during the submaximal stage of exercise, at VO_{2max} and during the first minutes of recovery suggesting lower lactate production by exercising muscles and/or greater ability to clear circulating lactate. The greater activity recently found by our group for the red blood cell monocarboxylate transporter, namely MCT-1, in SCT carriers could contribute to a better regulation of lactate exchange between blood and other cellular compartments¹⁴.

SCT carriers and exercise related sudden death

One of the most debated topics concerning the medical complications in SCT carriers is the exercise-related sudden death episodes¹⁰. Several authors have presented case reports of SCT carriers who have collapsed and died unexpectedly; nearly always under conditions of extreme exertion^{8,10}. Among the potential patho-physiological mechanisms involved in these complications, those involved in painful crisis in SCA patients might play a role. We recently examined blood rheology changes in SCT carriers and control subjects in response to a short and supramaximal exercise test (1 min at 110% VO_{2max})⁴. Whole blood viscosity, plasma viscosity, hematocrit and red blood cell rigidity were assessed at rest, at the end of exercise and during recovery. All hemorheologic values, except red blood cell rigidity, were increased above resting values in both groups and these values remained higher until the 15th or 30th min of recovery as compared to resting values. Although, no significant difference was observed between the two groups for plasma viscosity and hematocrit, whole blood viscosity and red blood cell rigidity were higher in the SCT carriers at any time compared with the control group. This could very well constitute increased risks for microcirculatory complications⁴. In addition, results obtained by Monchanin et al.¹¹ suggest that vascular cell adhesion molecule (VCAM-1) might also be involved in the increased risk for microcirculatory disturbances during exercise in SCT carriers. Nevertheless, their results require caution because they did not

take into account plasma volume variation occurring during exercise to correct their data. Besides, when hemoconcentration induced by exercise is used to correct raw values of VCAM-1 during exercise, no difference between SCT carriers and a control group is found (Tripette et al, unpublished data). At least, Connes et al.⁵ recently measured coagulation markers (prothrombin time, activated partial thromboplastin time, plasma fibrinogen, antithrombin III activity, hematocrit and yield stress) in SCT carriers and control subjects at rest and at the end of a maximal exercise test. No difference was observed between the two groups at rest. At the end of exercise, only plasma fibrinogen was slightly higher in SCT carriers but was in the normal range. It could therefore be implied from these results that the increased risk for clinical complications in certain SCT carriers during exercise is not an increased blood coagulation activity. Further studies are required.

Conclusion

SCT carriers are not like every one. Their genetic conditions might constitute advantage or disadvantage during exercise, depending on the kind of exercise performed and on the conditions of exercise practice.

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Comparing Physical Behaviors And Dietary Habits Of Guadeloupeans Originating And Not Originating From India: Need For A Multidimensional Approach.

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Abstract

The physical activity and the dietary intakes of Asian Indians of Guadeloupe were measured by using three consecutive 24hr-recalls.. The results confirm the hypothesis of a tendency to sedentary behaviours but does not demonstrate dietary differences. Causes of the difference observed is hypothesized to be social and or cultural so that a study focused on the determinants of physical activity in asian indians is needed.

Introduction

South Asian Indians and their descents are overexposed to non insulin-dependent diabetes mellitus (NIDDM). The prevalence of the disease among Guadeloupeans originating from India is superior to 20% whereas it equals 2-5% in most of European countries. A genetic predisposition is very probable but environmental factors, including diet and physical behaviours may be involved..

We compared physical activity and dietary habits of Guadeloupeans originating and not originating from India.

Materials and methods

Forty-four Guadeloupeans originating from India (GOI) and 56 Guadeloupeans without this ethnic background participated (age range: 17-66 y). Reported energy expenditure (EE), energy intake (EI) and macronutrient intake were assessed by three consecutive 24-h recalls. EE was calculated by using the compendium of physical activities while the dietary logs were coded and entered into profile software for Windows (version 6.7.4; 4d Engine) based on the CIQUAL 1995 food composition table. Reported EI and reported macronutrient



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	Asian Indians		Controls	
	Male (n=27)	Female (n=30)	Male (n=25)	Female (n=32)
Reported EE (kcal) ^{o++}	2615±420	2265±466	2920±608	2481±627
Physical Activity Level ^{o+}	1.47±0,14	1.63±0,23	1.64±0,33	1.74±0,34
Protein (% of EI)	15.19±1.65	15.09±1.58	15.72±1.63	14.79±2.20
Lipid (% of EI)	34.50±3.42	35.12±3.60	35.93±3.73	34.33±4.77
Carbohydrates (% of EI)	50.29±4,88	49.78±5.13	48.33±5.37	50.87±6.25
Reported EI (kcal) ⁺⁺	2520±470	2095±439	2468±343	1949±245

Table 1. Dietary intakes and energy expenditure by sex and ethnicity (n=114)

⁺significant sex effect (p<0.05)

intake were expressed in kcal/day and percentage of reported EI, respectively. The effects of sex and ethnicity were studied using ANOVA tests with two group factors.

Results and Discussion

The main result of this study was that Asian Indians exhibited significantly less daily physical activity than the rest of the population. This was evidenced by lower physical activity level, reported energy expenditure and reported EE/reported EI. (Table1)

24-hr physical activity recall - Our study was based on self-reported energy expenditure, the validity of which has been demonstrated (Lof and Forsum, 2004) against the gold standard doubly labelled water technique (Schoeller and van Santen, 1982). The mean physical activity level of the sampling, 1.63±0.29, seems quite plausible regarding the standard of 1.55.

Energy expenditure - It was revealed that Asian Indians of Guadeloupe have a tendency to sedentary behaviours. This finding agrees with several studies that demonstrated that NIDDM-overexposed subgroups are often characterized by lower physical activity (Hahn et al, 1998; Hayes et al, 2002). Moreover, sedentary behaviour is a previously reported etiological source of NIDDM (Sigal et al, 2004).

Conclusion

Asian Indians of Guadeloupe are less physically active than their island counterparts. This could contribute to their reported over exposure to type two diabetes mellitus and coronary heart disease. This finding suggests that improving physical activity in this group might be an important prevention tool.

Acknowledgements

We thank the Centre Interprofessionnel de la Médecine du Travail for its support.

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**Factors influencing food choices by secondary school children
with specific reference to health and nutrition in Trinidad, West Indies**

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Abstract

Objective: To determine the factors which influence food choices of secondary school children in Trinidad, West Indies with specific reference to health.

Methodology: The structured-administered questionnaire was comprised of 13 questions, which were based on frequency of consumption of snack/lunch, influential factors for purchase of snack/lunch, reasons for choice of particular snack/lunch, perception to the amount of money allowance, preference of nutrition/taste versus taste and demographics. The subjects (91) were between the ages of 14 - 20 yr who attended 4 secondary schools. Data were analyzed by frequencies and percentages.

Results and Discussion: Most (67.6%) students would purchase snacks from the school cafeteria. The lack of time (31.4%) for preparation of snacks was a major reason for purchase. More students (72.4%) chose a particular snack/lunch for its taste than for its nutrition and health (27.6%). When students were asked for their reaction to the following excerpt: 'Imagine the following: (1) that your mother read in a magazine that it is very bad for your health to drink soft drinks and to eat fried foods such as chicken and chips; (2) she decides to stop buying soft drinks and to buy water instead. (3) stops preparing fried foods and instead prepares vegetables and asked you to stop buying chicken and chips', some students (36.9%) would react negatively. Some (40.4%) were 'satisfied' with their money allowance for purchase of snack/lunch, while 26.3% were 'somewhat satisfied', 16.2% 'very satisfied' and 17.2% 'never satisfied'. The majority (66.7%) of responses suggest that students over-eat 'sometimes', 24.5% 'never' and 8.8% 'always'. Students took meals with family members 'sometimes' (56.6%) and 16.2% 'always'.

Implications of the study: Taste of a snack/lunch was chosen over its health benefits and nutrition which suggest the need for school education on healthy food choices.

Introduction

According to the United Nations Food and Agriculture Organisation (UNFAO, 2002), 13% of Trinidad and Tobago population were under-nourished in 1997-1999. From among adolescents 13-19 years 4.6% were found to be overweight with a greater proportion of males than females (FAO, 2005). In the adult population 20 years and older, 16.8% are obese with the prevalence among women. Another 31.4% of this population are overweight, the prevalence being slightly higher in women than in men. Approximately 65 suffer from chronic energy deficiency. Most attention has been directed at the nutritional status of children and the need to provide meals in school to increase dietary intake in order to improve nutritional and educational outcomes (Walker *et al.*, 1998;

Gulliford *et al.*, 2002). The objectives of the study were to determine the factors which influence food choices with emphasis on health nutrition by secondary school children in Trinidad, West Indies.

Methodology

Questionnaire

A questionnaire was administered by trained interviewers to 91 (40.7% male; 59.3% female) secondary school children who were between the ages of 14-20 yrs and attended 4 secondary schools. The % of students by age category were 17 yr old (25%), 15 yr (16%), 16 yr (15%), 18 yr old (11%), 14 yr (9%), 20 yr (3%) and 19 yr (2%). The survey comprised of 12 questions which asked questions on how often they brought lunch/snack to school; where did they purchase lunch/snack; why did they



purchase lunch/snack, influential factors affecting food choices and effect of choices of meals. Four questions requested demographic data. Twenty – five questionnaires were distributed to each of the four schools during the lunch breaks. Overall 93 questionnaires were returned and 91 questionnaires were analysed. Data were computed as frequencies and percentages using Minitab (version 14, release 2003, Minitab Inc, State College, Enterprise Drive, PA, USA).

Table 1 Purchase of snack/lunch

Questions	Response, % (n=91)
How often do you bring snack/lunch to school?	
never	32.7
varies	27.6
everyday	24.5
once per week	6.1
twice per week	1.0
thrice per week	3.1
four times per week	4.1
If you purchase snack/lunch, where do you purchase?	
school cafeteria	67.6
other	13.2
vendors outside school	10.3
food outlets outside of school	8.8
Why do you purchase snack/lunch?	
no time to prepare	31.4
taste	19.3
convenience	18.6
cheap	7.9
variety	9.3
not available at home	5.0
influence of friends	4.3
nutrition	2.9
religion	1.4
What are the reasons for your choice of a particular snack/lunch that you purchased?	
taste	24.0
cost	12.5
health/nutrition	11.5
quality	10.9
food safety	11.8
accustom	9.2
availability	7.9
convenience	7.6
religion	2.6
family influence	2.0

Purchase of snacks

Table 1 shows that when students were asked how often did they bring lunch/snack to school, the highest response was ‘never’(32.7%), followed by ‘variable’(27.6%) and ‘every day’ (24.5%). Most (67.6%) students purchased their snacks from the school cafeteria and indicated that time for preparation (31.4%) was one of the major reason for purchase. Taste was the most influential factor as a reason for purchase of snack/lunch.

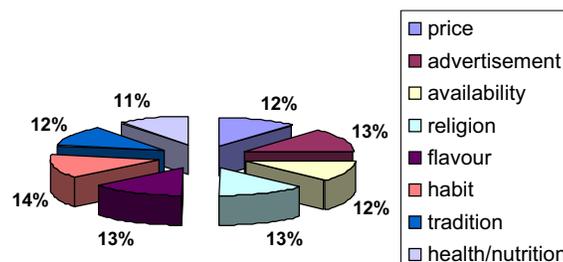


Fig 1. Factors which influence selection of a particular snack/lunch

Selection of particular snack/lunch

Fig 1 shows the % response, when students were asked to select which influential factor/s (n=357) affected their selection of a particular snack/lunch, flavour had the highest response rate (14.0%), followed by habit (13.7%), advertisement (13.2%) and religion (12.9%). In their choice of a particular snack/lunch, flavour had the highest influential response (54.9%) of which 44.0% was rated as ‘important’. Health and nutrition was the least selected factor (41.8%) of which 26.4% rated it as ‘important’ 2.2% considered as ‘not important’. Tradition was considered as ‘not important’.

Health and nutrition

When students were given the following excerpt to read: ‘Imagine the following: (1) that your mother read in a magazine that it is very bad for your health to drink soft drinks and to eat fried foods such as chicken and chips; (2) she decides to stop buying soft drinks and to buy water instead. (3) stopped preparing fried foods and instead prepares vegetables and asked you to stop buying chicken and chips’, how would you react? Most students (61.5%) reacted positively, while others were ‘negative’ (36.9%) or were ‘not sure’ (15.4%). More students (72.4%) chose a particular snack/lunch more for its taste rather than for its



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nutrition and health (27.6%). High fat food choices are common among adolescents (Dwyer, 1995, Bandini *et al.*, 1999) particularly for snacks

Perception to money allowance & overeating

The following responses were given in respect to satisfaction of money allowance given for the purchase of snack/lunch, 40.4% were 'satisfied', 26.3% 'somewhat satisfied', 16.2% 'very satisfied' and 17.2% were 'never satisfied'. When the students were asked whether they overate, the majority (66.7%) felt that did so 'sometimes', 24.5% 'never' and 8.8% 'always'. Food insecurity could lead to overeating when food becomes available or to metabolic changes that permit efficient use of energy (Alaimo *et al.*, 2001).

Family influence

When students were asked to respond to the following question: 'Last week, while you were at home with your family, how often did you have a meal together with your family?', the responses were 56.6% reported 'sometimes', 16.2% 'always; and 'infrequent; and 11.1% 'never'.

Intervention

Dietitians' efforts to educate adolescents about the benefits and healthfulness of foods would aid in intervention programs.

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An Example of Applied Underwater Archaeological Studies in the West IndiesJean-Sébastien Guibert, Bernard VicensPREPASUB organization, Chemin de Tabanon, 97170 Petit Bourg, Guadeloupe FWI
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On December 18th, 1809 under the pressure of an English fleet, two Napoleonic Period cargo ships, *corvettes de charge*, sank in Anse à la Barque on the west coast of Guadeloupe, south of the town of Bouillante. Both cargo ships navigating from France to Guadeloupe were transporting gold, money, weapons and soldiers to support Guadeloupe in its resistance against the English.

Historical context

At this period the West Indies are wasted by the consequences of the European Napoleonic wars. Guadeloupe is the last lesser island resisting the pressure of the English fleet composed by 25 ships blocking the island from any communication coming from France. On 1809, the French government decided to supply Guadeloupe by sending a squadron of two 'corvettes de charge' *la Seine* and *la Loire* escorted by two frigates. The squadron left France November 15 and reached the West Indies December 13, where it managed to force the blockade. Offshore Antigua the escorting frigates returned to France while both 'corvettes de charge' tried to go further on to Basse-Terre.

But the way to Basse-Terre was cut off by a part of the English fleet and the captain *Vincent de Comorre* decided to drop anchor at *Anse à la Barque* in order to unload both ships. On Dec. 18, still blocked in *Anse à la Barque* by more than 12 English ships the captain decided to scuttle his ships.

The discovery

In 2000, D. Cabarrus, found several canons that appeared after hurricane Lenny. He immediately alerted the Regional Council, who asked the 'Assosiation pour la Protection, Recherche et Etude du Patrimoine Subaquatique' (PREPASUB), a non profit organization studying and protecting underwater archaeological sites, to make an expertise.

PREPASUB's expertise

In 2001, PREPASUB set up a conservation project to protect the cargo ships and archaeological samples from damage caused by waves, light, taret mollusc or seaweed development that can deteriorate vestiges while waiting for authorization to excavate. The shipwrecks' site is located in an protected area very close from the shoreline.

Our first studies in historical sources strengthened our hypothesis that the ships were from the Napoleonic Period.

Several sources mentioned the shipwreck of the two Napoleonic ships, *corvettes de charge*, *La Seine* and *La Loire* [1,2]. Each ship measures 35 by 6 meters, has a bridge, an 800-barrel capacity, and three masts. This kind of ship is almost unknown, except by plans or by theoretical studies.

In 2003, The PREPASUB organized a first excavation's campaign whose goal was to confirm the historical sources and archaeological observations with DRASSM* agreement.

The completion of this campaign pointed out that the Napoleonic ships *La Seine* and *La Loire* were indeed the sunken ships in *Anse à la Barque*.

The discovery and study of archaeological samples proved the presence of such ships. Samples dating from the late 18th century and the very beginning of the 19th century have been expelled. Moreover, a great number of uniform ornaments were identified belonging to Napoleon's soldiers.



Ceramic, uniform ornaments, pipe and bullets

Our team worked on the back of *La Seine*, where we found the top keel and the bilge pump.

Currently, we are now in the process of a third campaign that took place in April 2006 under DRASSM's authorization. The objective was to localize both ships and to study ship-building more precisely.

The primary sources, mainly the captains' reports permitted us to identify both shipwrecks because they tell us that *La Seine* was northward of *La Loire* and that both starboards face the open sea [3].

Prospecting was made along the keels of both ships in order to find the mast foot and to confirm their orientation.

We found *La Seine*'s spanker mast foot close to its bilge pump.

The discoveries of those parts of the ship are very interesting in order to learn about the way one used to build ships, indeed spanker mast foot which is usually on the first bridge of such a ship was found on the top keel.



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Moreover we found the entire pumping system of the Loire's main mast: a wooden pipe with its strain has been expelled to be studied. Underwater excavation work consists in clearing selected areas limited by 3 meters squares with sediments aspirators. Archaeological samples found during this work are carefully expelled noticing the square from where it comes. Then archaeologists may draw a tri dimensional sketch-map of the part of the site they are working on.



Archaeologist drawing underwater

By this method, we are now able to set up a first map of the site from the surveys done in 2003 and 2006 (See below).

To our surprise, while prospecting along the keels of *La Seine*, we found the remains of an entirely different ship. This one seems to be a coal carrier dating from the mid 19th century.

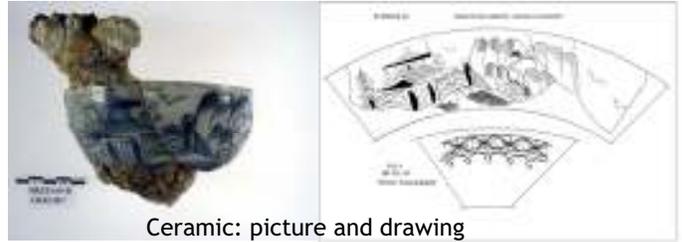
In addition, two ruins initially thought to be parts of the destroyed ships *La Seine* and *La Loire*, have turned out to be two brand new ships. One of them seems to be of local production because of its red-wood building.

The other sunk in the area of the shoreline is in very good state of conservation. This one may have been built by an English way.

Wooden samples of those ships have been extracted to be analyzed in order to determine the wood species.

Post excavation work

During both campaigns archaeological samples were expelled from the site in order to be studied in the PREPASUB's pre treatment laboratory.



Ceramic: picture and drawing

Their study is a way to confirm or to invalidate a dating.

Dating an archaeological sample may be done by comparing it with a type, or by analyzing it in laboratory.

The archaeological samples have to be cleaned up, pictured and inventoried. During its pre-treatment (they are stocked in water to be unsalted) the archaeological samples are sketched, studied in order to be recorded in a data bank.

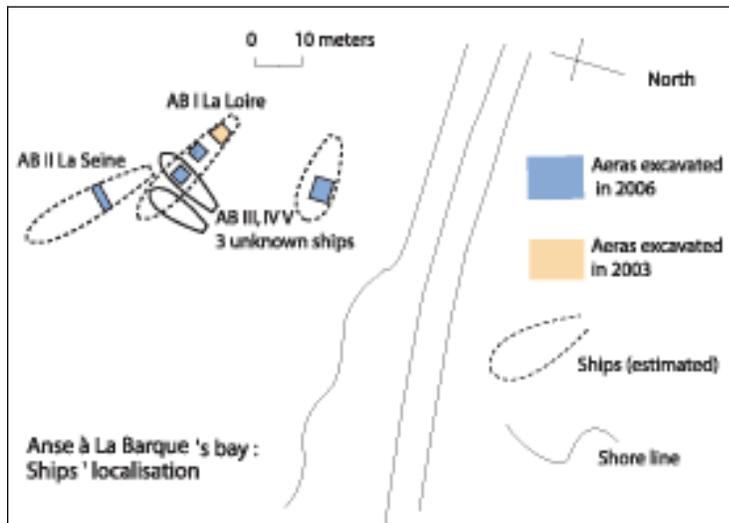
Some of them revealing a particular interest have been copied by molding.

As we are regularly trained by the DRASSM and regarding our experience we wish we worked with our Caribbean neighbors and their university concerning projects on Archaeological Researches.

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* DRASSM : Département de Recherche en Archéologie Subaquatique et Sous-Marine



Photos : Prépasub
Plan : J S Guibert
Drawing : F Bigot



HLA Alleles Distribution Among A French Caribbean Population

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Introduction

The M.H.C. (*Major Histocompatibility Complex*) is a complex of genes encoding glycoproteins that play a key role in non-self recognition, in all mammals. Human M.H.C. molecules are called *Human Leucocytes Antigens* (H.L.A.)

HLA molecules present peptide antigens to T cells, initiating immune recognition of foreign antigens.

HLA genes are located on the short arm of chromosome 6. This complex occupies a large segment of DNA, extending about 3500 kb. These genes are divided into 3 classes:

- class I with notably HLA-A, B and C genes,
- class II with HLA-DR, DP and DQ notably,
- class III: genes encoding other proteins related to the immune response. For example, genes encoding C4, C2, and B factor, components of the complement system and others encoding critical cytokines such as TNF α and B (*Tumour Necrosis Factor*).

HLA system is one of the most polymorphic protein-encoding regions of the human genome. Furthermore, there are more than 450 and 520 known HLA-A and HLA-DRB alleles respectively.

Comparative analysis of HLA alleles revealed differences in the distribution of these alleles among different ethnic groups.

HLA alleles are well investigated. Their distribution has significant implications for analyzing human migration trends throughout history. Moreover, there are applications in forensic medicine, transplantation, association HLA-diseases.

This study aimed at estimate HLA allele frequencies among a population from Guadeloupe, a French West Indies island which inhabitants have various ethnic origins such as Africa, Europe, India...

Material and methods

One-hundred-and-fifty-five unrelated individuals from Guadeloupe were HLA class I and class II typed (80 men and 75 women aged from 18 to 72 years old).

Genomic DNA was extracted from whole blood collected on EDTA using a salting out method (Miller S. et al., 1998). HLA typing (class I: A and B and class II: DRB1) was performed by polymerase chain reaction-sequence specific primer (PCR-SSP) (One Lambda, Inc).

Data analysis: Statistical analysis was performed by computer package Arlequin 3.01 (Excoffier et al. 2005). This program estimated, by maximum likelihood methods, HLA-A, B, and DR allele frequencies.

Results & Discussion

The results presented here are preliminary. All individuals have been typed at a generic level.

Tables 1 to 3 show HLA-A, -B and -DRB1 allele frequencies in a population from Guadeloupe (for this population, only frequencies >4 are presented). Comparisons are made with similar data in Caucasian and African American populations.

Table 1. HLA-A allele frequencies in the studied population: comparison with known data

Alleles	Frequencies (%)		
	Studied population	African American	Caucasian
A*02	13.15	13.9	27.9
A*30	11.53	13.9	3.7
A*23	9.95	8.4	1.8
A*03	9.21	11.9	10.7
A*68	9.03	7.9	2.2
A*01	8.93	7.4	16.5
A*74	5.81	5	2.2
A*33	5.48	5.9	2.2
A*29	4.19	5.4	4
A*24	4.19	4.4	11

Table 2. HLA-B allele frequencies in the studied population: comparison with known data

Alleles	Frequencies (%)		
	Studied population	African American	Caucasian
B*53	14.52	13.8	0.4
B*07	11.29	8.5	16.3
B*44	6.77	9	14.7
B*58	5.48	5.3	0.4
B*35	5.16	6.4	11.2
B*45	5.16	2.1	-
B*08	4.84	6.4	11.2
B*42	4.84	-	-
B*57	4.52	3.2	3.5
B*18	4.19	4.2	2.3

Table 3. HLA-DR allele frequencies in the studied population: comparison with known data

Alleles	Frequencies (%)		
	Studied population	African American	Caucasian
DRB1*15	14.74	12	9.3
DRB1*11	13.47	16.9	10.3
DRB1*13	11.88	17.6	12.1
DRB1*0301 & *0306	11.45	7	10.7
DRB1*04	7.38	7.7	15.9
DRB1*07	6.68	6.3	14.5
DRB1*01	5.75	9.8	9.6
DRB1*08	4.51	3.5	2.1



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For A locus, 21 specificities were found. The most frequent alleles found were A*02 (13.15%), A*30 (11.53%) and A*23 (9.95%).

In this population, A*02 = [A*0201, A*0250]; A*30 = A*3001, A*23 = A*2301.

For B locus, 41 specificities were found. The most frequent alleles found were B*53 (14.52%), B*07 (11.29%), and B*44 (6.77%).

In this population, B*53 = B*5301; B*07 = [B*0701, B*0702, B*0704, B*0705]; B*44 = [B*4401, 4402, 4403, 4405].

For DR locus, 27 different HLA-DRB1 alleles were found. The most frequent alleles found were DRB1*1501 (14.71%), DR11 (i.e. DRB1*1101 and DRB1*1102) (13.47%), DRB1*1301 (11.88%), DR17 (i.e. DRB1*0301 and DRB1*0306) (11.47%).

Null alleles were found at each locus which requires further investigation, as HLA-sequencing, in order to identify these alleles.

Comparison of the allelic distribution in the studied population and distribution in other populations suggests that the Guadeloupean population is the result of an extraordinary interbreeding.

Some HLA alleles are involved in association with diseases. HLA-B27 positive individuals have 90 to 100 times greater chance of developing ankylosing spondylitis than do individuals HLA-B27 negative.

Other proved associations are narcolepsy and HLA-DRB1*1501; retinopathy birdshot and HLA-A29, type I diabetes mellitus and HLA DR3 and DR4 (this illness is a major health problem in Guadeloupe).

All these alleles are present in our studied population which is relevant to clinical diagnosis: HLA-B27 (1.29%); HLA-A29 (4.19%); HLA-DR3 (11.45%); HLA-DR4 (7.38%). However, the rationale for such associations is not always clearly defined.

Conclusion

This study has been conducted in order to estimate the distribution of HLA alleles in a general population from Guadeloupe for which such information were not available. HLA allele frequencies found in this population emphasize the various ethnic origin of this population (Africa, Europe, India...).

It also open new perspectives for other pathologies such as infectious complications in sickle cell disease particularly in children, spontaneous abortion and specific kidney graft rejection in population similar to the one studied. In these pathologies, HLA associations are highly suspected.

Acknowledgements:

The authors acknowledge the Conseil Régional de la Martinique and the Fonds Social Européen for their financial support.

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Allelic frequencies in worldwide populations are available on www.allelefrequencies.net



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Neuroprotection: Activation of Novel Endogenous Pathways?

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Neurological disease continues to remain one of the major causes of morbidity and mortality worldwide, costing global society billions of dollars annually. While great strides have been made in elucidating the mechanisms behind many of these disease processes, progress on effective intervention strategies still remains limited. Many of the normal physiological pathways within the brain are designed to help prevent it from suffering injury. We have sought to examine these pathways with a view to understanding their mechanisms. In particular we have demonstrated that (i) a molecular form of learning and memory (long term potentiation) can reduce the effects of glutamate agonists and acute ischemia, (ii) activation of the endogenous cannabinoid pathway can modulate the effects of ischemia and (iii) activation of a sub-class of glutamate receptors (AMPA receptors) can induce receptor cross-talk and help attenuate epilepsy and migraine. These results suggest that activation of endogenous pathways may be critical to modulating the process of neurodegeneration and offer hope for the development of novel forms of intervention in the treatment of neurological disease.

Women in Sciences in the Caribbean: Some Data and Reflections

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Abstract

The report contains country-level data on the presence of women in different scientific fields, having scientific degrees, occupying decision positions and comparisons with other countries in the Region, in particular in the Caribbean and other countries of Latin America. The figures show that the Cuba advances have been notorious.

The social analysis of the not-so-obvious problems is done from the perspective of women doing basic sciences, in particular women in Physics.

In Cuba, in spite of having for more than 40 years, a well established political will to open opportunities for everybody, opportunities to all the talent youth, including girls, still are present the stereotypes prejudices in our culture, and still we find professional bias, troubles in getting positions of leaderships in some sectors, lack of transparency in some decision-making levels, etc.

We discuss the importance of having women in leadership positions and how they can promote and serve as a pattern role model for the next generations. Also it is important to put in first place the support of the family, including parents and husbands as a factor of the success of many women in sciences, especially in the Third World.

The activity of the Third World Organization of Women in Sciences, TWOWS-TWAS, particularly in the Caribbean also is reported.

In addition, recommendations are made on ways of overcoming existing gender stereotypes among scientists, technologists, policy-makers and the community at large in Caribbean countries.

The necessity of mobilisation, to adopt recommendations on access to scientific careers, science policies, networking, and other important topics are crucial to shape the future of women in sciences in our countries.



Health / Social Sciences

Social Sciences, an Indispensable View on West Indian Health

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Abstract

The research laboratory ACTES, which subject is motricity in the Caribbean area, is regularly confronted with the issue of differences : either external ones, resulting from the tropical environment, or internal dealing with the population and its culture built by a singular history. In our field, one question is coming out : How are the cultural and social norms determined, in particularly those hanging over the body, specifically the bruised body? This paper using several researches in the French West Indies, done or in process, wants to point out some of the certitudes on body normality that are supposed to shed light on body health. How are the differences thought ? How are they taken into account? Historically in the French West Indies, the statistical data are rare, either scattered or concentrated on few pathologies which gravity is sometimes diminished. The beginning of the military service in 1913 is a turning point insofar as health policies are set up in the French West Indies. However, even though the willingness is permanently reaffirmed, the measures are sporadic and the structures at their early stage. Moreover the validity of health indicators in effect are questioned. Could the morphological and physiological norms be used with black population, even though they are thought for white people? When we talk about pathologies their social visibility is brought out. For long, the bruised body has been hidden. The difference is a shame whether a simple step aside from the norm or a stigma. It's necessary to wait the eighties to have the society deal with handicap, pointing out the paradoxical right for difference and indifference. Physical activity can help to overcome the stigma, but can also reveal it sometimes as in the case of sickle cell disease. In today research the attention given to the genetic elements also questions the differences between populations leading somehow to a possible resurgence of the negatively connoted notion of race. Thus social sciences are indispensable for questioning health in the specific West Indian context.

Social Dialogue in Conflictual Settings : The Case of Guadeloupe

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Abstract

In this world of globalisation, the small insular economies of French West Indies are meeting specific difficulties in terms of development, due to their size, but also to the conditions that govern commercial trade between French Caribbean territories and other Caribbean states. Besides, companies suffer from a lack of efficiency which is not caused only by material factors, but which is largely influenced by economic agent's behaviours, among which employers and trade unions. Facing strong conflicting working relationships and a lack of structuring, recent studies have shown that a true and continuous social dialogue needs to be established in Guadeloupe. The heavy consequences of tensions and social conflicts on the local economy have been acknowledged by all social partners. Still, processes aimed at founding favourable conditions to create a sustainable social dialogue remain limited.



Why such conflicts? How can corporate social responsibility (CSR) initiatives, especially those related to implementing social dialogue, bring effective and relevant answers to the socio-economic problems of Guadeloupe?

The first part of the paper is dedicated to presenting the geographic, economic, social and cultural environment of Guadeloupe. The second part will analyse the causes of work conflicts. The last part of the paper focuses on the relevance of CSR initiatives- notably social dialogue- , for small companies for which institutional processes are difficult to implement. Moreover in such a context, social and cultural features have a strong impact on performance. Nevertheless, CSR initiatives seem to be a very strong lever to develop social dialogue or to change the way existing forms of dialogue are expressed.

Risk Factors of Acute Chest Syndrome in Guadeloupean Sickle Cell Anemia Children

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Abstract

Acute chest syndrome (ACS) is one of the most common causes of morbidity and mortality in sickle cell anemia (SCA) which is, as in other Caribbean islands, a major public health concern in Guadeloupe.

A prospective study was conducted on 239 SCA children followed up by the Guadeloupean sickle cell center between 1980 and 1999 (mean follow-up duration 7.8 ± 4.2 years), in order to provide information about incidence and risk factors of ACS in this population. Four hundred fifteen ACS episodes in 134 patients were analyzed. Potential predictors of first ACS were examined in a multivariate analysis and we performed a candidate gene study to identify associations between modulating genes and the occurrence of ACS. The overall incidence of this complication was 13.4/100 patients-years and ACS incidence was higher in male than in female (16.3/100 patients-years vs 10.8/100 patients-years, $p < 0.05$). A belated medical follow-up was associated with an increased risk for the first ACS [RR = 4.55 ; 95% CI (2.11 – 9.84)]. This result could be considered as a new argument for the precocious medical follow-up of SCA patients. Three other risk factors of first ACS were identified: previous history of asthma [RR = 2.76 ; 95% CI (1.01 – 7.56)], steady state reticulocytes count [RR = 1.27 ; 95% CI (1.10 – 1.46)] and homozygous state for the T8002C variant of the endothelin -1 gene [OR = 4.30 ; 95% CI (1,21 – 15.20)]. As yet, asthma has never been formally identified as an independent risk factor for ACS. In the same way, if the involvement of ET-1 in the physiopathology of SCA is well-known, it is the first time that a polymorphism of its gene is described as a risk factor of a major complication of the disease. Ours results also suggested that *ecNOS* C-786, have a protective effect on the occurrence of first ACS [OR = 0,42 ; 95% CI (0,21 – 0,84)]. Further studies are warranted to confirm these results.



Sickle Red Cells Dynamic Behavior Under Venular Blood Flow

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Sickle Cell Disease (SCD) is a genetic vasculopathy caused by a mutation in the beta-globin gene (Glu6Val). Sickle hemoglobin molecules (HbS) have the property to polymerize when deoxygenated, forming sickle red blood cells. This polymerization initiates a cascade of events leading to vaso-occlusion, endothelial and inflammatory abnormalities and increased adhesive reactions. Vaso-occlusive crisis are initiated by the adhesion reaction between the activated blood vessel endothelium and sickle red cells (Walmet, 2003).

Hydroxyurea (HU) is a ribonucleotide reductase inhibitor that improves hematologic parameters and decreases adverse effects in patients with SCD. Currently, HU is the approved drug in the treatment of moderate and severe SCD. Recent studies showed that, under static conditions, HU affects the adhesion protein profile of the endothelial cells and decreases the adhesion of the sickle red cells onto the vessel endothelium (Brun, 2003; Conran, 2004).

The present study focuses on the adhesion between endothelial cells and sickle red cells, under venular flow conditions, using a human endothelial cell line, TrHBMEC. Our results show a difference in the dynamic behavior of the sickle red cells under various conditions such as 1°) TNF α and IFN γ ; 2°) HU; and 3°) TNF α , IFN γ and HU.

These preliminary observations indicate that the dynamic behavior of the red blood cells, which is different between normal and SCD patients, might play a central role in the vaso-occlusive crisis.

Sport and Sickle Cell Disease in 12-19 Years Old Adolescents in Guadeloupe: Best Enemies

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Abstract

In the Caribbean area, the Sickle cell disease is the most frequent genetic disease. In Guadeloupe, ten per cent of the population has the sickle cell trait (gene A and gene S), it means that 40000 people may transmit this disease to their child without being aware of it. From a strictly medical meaning, the disease can be managed via adapted care, since sickle cell disease is recognized as a priority of public health in France (1990). However, this disease affects not only the body of the patient but also its social identity. Then, the understanding of the disease calls upon an anthropological vision of human being, refusing to dissociate the man from its body and its sociocultural context.

Nevertheless, few anthropological studies have investigated the sickle cell disease (Benoit, 2004; Lainé, 2004). In addition, no study has focused on the relation between the anthropological aspects of this disease and physical activity. A possible explanation would be that physical practice is one of the principal factors of the sickle cell crisis onset. As a result, doctors caution against physical activity and it is often forbidden at school.

The aim of the present socio-anthropological study was therefore to investigate whether the adolescents suffering from this disease practiced a physical activity in spite of the doctor's contraindications. The main results showed that they practiced at school when physical activity was adapted and authorized by the administrative regulations. Moreover, adolescents practiced outside school even if it was proscribed, especially those who had the least serious form of the disease.

The results of the present socio-anthropological study question the problematic of physical activity and its interest in relation to this disease. Beyond the medical aspect, they suggest a new approach in terms of health for these adolescents to some extent: an adapted physical practice.



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The Effect of Tropical Environment on Sports Performances

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Abstract

It is well known that environmental factors can have impacts on physiological and psychological performances. Studies conducted in the FWI have showed three majors results.

Firstly/ In native to tropical climate, intensive and prolonged endurance exercise induces an overload regarding thermoregulatory and cardiac responses. In well-trained endurance athletes who trial acclimatization process, 14 days of exposure led to changes positives adaptations in physiological parameters such central temperature, sweat rate, body mass loss, heart rate and endurance performance, but were still insufficient to ensure complete acclimatization. Thus, the hot/wet climate induced impairment of physiological responses and constitute a limiting factor for aerobic performance.

Secondly/ When focused on anaerobic performances, it is well known that in temperate climate, short-term performances (cycle-sprint, jumps) varies throughout the day, and maximal anaerobic power is generally increased by the end of the afternoon, following the peak of the circadian temperature curve. Several studies conducted in the french Caribbean environment failed to show any daytime variation in maximal anaerobic performances which suggests that a hot and humid environment may have blunted the time-of-day effect by a passive warm-up effect. Thus, the warm exposure and the diurnal increase in body temperature influence muscle strength. However, the improvement in muscle contractility after these two passive warm-ups cannot be combined in order to improve force to a greater level. In conclusion, the tropical moderately warm and humid conditions does not affect anaerobic performance and permit in the opposite a stabilization of the performance whatever the time-of-day when compared to temperate climate.

Thirdly/ Cognitive studies in psychology showed a decrease of cognitive performance at hot room temperature for people living in temperate climate. This decrease in performance depends on the nature of the task (simple or complex cognitive tasks) and on the change of core temperature. The complex cognitive processes being the most vulnerable to hot and wet conditions (climate present in Guadeloupe), the aim of our studies was to determine the effects of heat stress on cognitive performance in native or not native people living in tropical climate.

Modern Biotechnology and Biosafety Policy Issues for Guyana

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Abstract

Agenda 21 and the *Convention on Biological Diversity* both recognise biotechnology can provide an important means by which biological diversity can be sustainably used. However, the techniques employed and/or the products derived therefrom may potentially pose risks to biological diversity. The basic product from modern biotechnology is transgenic, because the products are in the main derived from recombinant DNA technologies. In some arguments, the principles of genetics, reproductive biology and ecology have been used to indicate high probabilities of gene transfer reciprocity between transgenics and conventional or wild-type organisms. While the advent of the biotechnology age and



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its attendant bioeconomy-driven development has been heralded as an important construct in the new-age development ethos, major international instruments, the *Convention on Biological Diversity* and the *Cartagena Protocol on Biosafety* recognize the need for ensuring the safety of biotechnology. Admittedly, the risks posed by biotechnology to biodiversity are best analysed on a case-by-case basis. However, the precautionary approach has been widely accepted as a plausible means for averting potentially unknown risks when there is lack of scientific certainty. Guyana, like many developing countries, is confronted with major policy issues regarding the potential and promise of biotechnology in alleviating hunger, disease and poverty as against the potential risks and how best to engage the twin issues of biotechnology development and biosafety. Guyana has been predominantly an agrarian economy with sugar and rice as the bedrock. The European Union's preferential market restructuring necessitates innovative policy engineering. Issues of policy framework for leveraging safe biotechnologies as a developmental strategy, while sustainably using and safeguarding Guyana's relatively rich biodiversity wealth and assuring ecosystem health are highlighted and some suggestions advanced. As a small economy, a strategic regional collaborative approach may be more meaningful vis-à-vis the nations' biotechnology assimilation and exploitation capacity.

Eléments de Prospective et l'Environnement

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Abstract

Les études sur la prospective, ses antécédents, ses définitions, ses conceptions basiques, les outils de sa mise en œuvre et ses très nombreuses applications, sont relativement aisées à recenser (*). Le travail ci-après présentera dans une première partie un bref récapitulatif relatif au champ de la prospective et en illustrera un aspect peut abordé, concernant la relation de la prospective à l'environnement.

Les thématiques abordées ici peuvent être approfondies en se référant aux ouvrages de la collection "Economie et environnement", dus à l'auteur de la présente étude. Les deux premiers, "Nouvelles approches, réflexions et expériences actuelles", et "Introduction à la problématique de la valorisation économique - environnementale", traitent des bases conceptuelles et méthodologiques qui sont aujourd'hui celles de l'économie et de l'environnement.

Le troisième, "Applications relatives à la prospective et à la valorisation économique - environnementale", est un ouvrage collectif, regroupant 14 contributions sous la forme d'études pédagogiques et d'études de cas. Y ont participé 19 auteurs et 12 centres de recherches, dont l'U.A.G. et l'InsTEC.

(*) Godet (1994), Ortega (2003), Lugari (2003), Castellanos (2005), etc



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**Climate Change and Caribbean Economic Development:
an Opportunity for Convergence of the Sciences**

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Abstract

Climate change has emerged as a significant challenge to sustainable development given its likely impacts on ecosystems. That Climate Change is a consequence of global warming due in large measure to anthropogenic factors is no longer an issue. The debate that remains is whether Caribbean socio-economic policy, at both the national and regional levels, should factor mitigation of GHGs and adaptation to climate change impacts into decision-making. That debate is guided, in part, by the paucity of solid national and regional scientific data to inform decision-making.

Decisions on whether to invest in GHG mitigation or adaptation strategies for Climate Change impacts ought to be based on specific triggers signalled by the national and regional scientific community. While there is consensus that the implementation of mitigation or adaptation policy should not necessarily be delayed until there is absolute certainty about the potentially negative impacts, there is concurrence that more research on “what is at risk” is needed at the regional and sub regional levels.

This paper focuses on the role of the “Sciences” in articulating climate change policy for sustainable national and regional economic development. The conclusion drawn in the paper is that effective policy to meet the challenges posed by climate change should begin with a convergence of the sciences.

A New Recombinant Geminivirus Infecting *Sida* in Jamaica

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Abstract

Geminiviridae is the second largest group of plant viruses, with at least thirty-five new members being identified each year that are responsible for diseases that result in multi-billion dollar crop losses in the tropical and sub-tropical regions (Varma & Malathi, 2003). The genus Begomovirus contains the viruses which are most prevalent in the Western Hemisphere and most members of this genus are bipartite with the total genome represented by two separate DNA molecules designated DNA-A and DNA-B (Morales & Anderson, 2001). Weeds are known to act as reservoirs of geminiviral inoculum in the absence of crop hosts and some weed viruses also infect crops (Roye et al, 2003). Samples of the ubiquitous weed *Sida* which were exhibiting symptoms of golden mosaic typical of geminivirus infection were collected from agricultural areas in Jamaica. DNA was extracted and the degenerate geminivirus specific primers PAC1v1978/ PAV1c715 and PBC1v2039/ PBV1c800 used to amplify the DNA-A and DNA-B of the begomoviruses present respectively. Amplicons from a sample collected in Buckup, Manchester were cloned and sequenced. Multiple alignment with the DNA-A of Jamaican viruses as well as other viruses from this hemisphere revealed nucleotide similarity well below the 89 % threshold set by the International Committee on the Taxonomy of Viruses (ICTV) which makes this viral isolate a newly identified geminivirus. Nucleotide homology between this Buckup virus and other Jamaican *Sida* viruses ranged from 49 to 79 %. Pairwise comparison of the DNA-B of this virus with the *Macroptilium* golden mosaic virus Jamaica strain 2 (MGMV-[JM2])



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revealed that the intergenic region (IR), hypervariable region and the nuclear shuttle protein (NSP) shared very high homology, with the IR of these viruses sharing a 96.8% identity. Additionally, the Backup DNA-A IR shares an identity with MGMV-[JM2] of 93.3 % as well sharing the conserved Rep binding sites found in MGMV-[JM2] (Roye et al, 1999)

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Setting up of a Pet - Ct Center in Martinique: Interest and Feasibility

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Abstract

Nowadays, Position Emission Tomography (TEP) is fully established in almost all the french regions including the island of "Réunion". Its setting up in Martinique will allow to medically covering the inter-region "Antilles-Guyane" (Guadeloupe, Guyane and Martinique). On the basis of medical territorial continuity, this will provide equal access to medical care in the French overseas territories in the Caribbean (DOM). An optimal use of this technique is already insured by the mean of a local cancer organisation which meets government requirements in the "plan cancer" set up in 2002. This structure, established several years ago, is multi-disciplinary and manages a cancer registry. For a long time, all its efforts were focused on medical care particularly radiotherapy (linear accelerators and curie therapy) of prostate cancers. Based on the registry data and the recognized standards related to different cancers, we have evaluated that the setting up of such apparatus is fully justified in order to respond to the needs of the french Caribbean islands not only on the medical care side but also in the field of research of novel biomarkers molecules (different from FDG-F18) and of abnormalities in cellular exchanges during oncogenesis. The presence of a cyclotron next to the TEP apparatus is essential, because of the short live (less than 2 hours) of the positrons used. Different collaborative research work will be possible with other institutions such as the "Université des Antilles et de la Guyane" in order to optimise such a highly sophisticated equipment.

Keywords: TEP-CT, Cyclotron, Tumor register, French West Indies



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**Revitalizing Science and Technology Policy for Sustainable Development in Guyana:
Leveraging Lessons from the Developing World**

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Abstract

The crucial roles of science and technology as important constructs in all facets of development can no longer be disputed. Most developing countries have recognized this imperative but the institutional frameworks needed to harness S&T as an engine for growth has not been adequately addressed. A case study on Guyana is presented.

Guyana, the only English-speaking country in South America has been touted as the gateway to the continent. However, this dream is yet to be realized. S&T has been recognized as an important cross-cutting instrument in Guyana's *National Development Strategy* and there is a draft *National Science and Technology Policy*. The Head of State, as Executive President, holds the Cabinet portfolio for S&T and there is a National Science Research Council. In principle, S&T has been given a high profile on the government agenda but actual outputs from a well structured framework is less than expected possibly due to other socio-economic demands and imperatives. This paper proposes to examine how some developing world experiences can be leveraged in re-establishing, strengthening and implementing the existing/emerging policy framework and developing the required capacity for reinforcing the national S&T agenda as a serious cross-cutting policy instrument for sustainable national development. The re-positioning of the University of Guyana as a strategic player in Guyana's S&T is advocated. The main thesis is that the transformation of articulated policy into active S&T enterprise as per other developing world paradigms is crucial to Guyana's regional and international competitiveness and national development in the epoch of globalisation.

Low Brain Cytochrome C Oxidase Activity in two Rabbit Models of Alzheimer's Disease

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Abstract

Alzheimer's disease (AD), a debilitating neurodegenerative brain disorder, has in recent decades emerged as a major cause of death in the elderly, fueling the search for good animal models: One characteristic of this disease is low activity of brain cytochrome c oxidase (COX). In this study we evaluated two AD rabbit models, the Klatzo model and the Sparks model. Specifically, we isolated brain mitochondria and investigated the activity of brain COX for the two models; we also evaluated the spectral properties and protein composition of the brain mitochondria. Polarographic assay revealed that for the Klatzo model there was no significant change in K_m but the V_{max} of COX fell by between 25-68%: In some instances the well documented characteristic biphasic kinetics of the enzyme was replaced by a single phase. For the Sparks model 66% of the rabbits showed a decrease in COX activity. For this model the maximum decrease in V_{max} was 43%. For the Sparks but not the Klatzo model, the brain mitochondria displayed decreased absorbance at 434nm further suggesting either a deficiency or decreased activity of COX. These results suggest that in so far as COX activity is concerned, both models are satisfactory AD models.



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**The effect of *Apium graveolens* and *Momordica charantia*
on plasma lipids and blood pressure in laboratory rats**

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Abstract

Apium graveolens (celery) and *Momordica charantia* (karela) are known to have both hypotensive and hypocholesterolemic effect but comparison of the 2 plants have not been examined. 40 laboratory rats were isolated and placed into 4 groups. 2 rats from each of the groups were sacrificed in order to obtain baseline data. Initial measurements included body weight, blood pressure, blood glucose and the plasma lipids (Total cholesterol, LDL, HDL and Triglycerides). 3 groups were then fed a high fat diet for 3 weeks. 4 rats from the each from the 4 groups were sacrificed and blood taken and the measurements were repeated. One of the groups was treated with water soluble extracts of celery another with karela (0.1 g/ml) for 3 weeks, the other 2 groups acted as normal control and high diet non treatment control. After 6 weeks the remaining rats were sacrificed and the above mentioned test were done. The results showed that the Karela supplemented rats recorded significant lower body weight ($P < 0.05$), lower blood pressure BP ($P < 0.05$) and increase HDL ($P < 0.05$). non significant lower Total cholesterol (TC), Triglycerides (TG) and Low density lipid Celery treated rats also recorded statistical significant decrease in body weight and blood pressure ($P < 0.05$). Non statistical significance decreases were observed for triglyceride, LDL, and increase in HDL. The study reveals for the first time that Celery is more effective in lowering BW while Karela is more effective in lowering BP

**The Effects of *Apium Graveolens* and *Trigonella Foenumgraecum* on Plasmolipids
in Laboratory Rats**

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Abstract

This study was carried out to determine the effects of the water soluble extracts of two plants, *Apium Graveolens* (celery) and *Trigonella foenum graecum* (fenugreek/methi) on Plasma Lipids in laboratory rats. The research was done in an attempt to find an affordable and effective and readily available treatment for persons suffering from hypercholesterolemia and related complications such as obesity and coronary artery disease.

Over a period of 7 weeks, 28 laboratory rats were isolated and placed into 3 groups. (A B&C). Group C was used as control while groups B and C were treated with an oral dose of methi and celery respectively after being fed with a high fat diet for a period of 3 weeks. Blood pressure body weight, blood glucose and plasma lipids (Total cholesterol, LDL, HDL and Triglycerides) were measured for obtain baseline data. These measurements were also done at the end of 3 weeks and at the end of 7 weeks.

The results showed that both *celery s* and *methi had* positive effects in lowering some of the plasma lipids. In the case of the rats that were fed celery there was a significant reduction in blood pressure, blood glucose and LDL. The reduction in total cholesterol, triglycerides and body weight these were not significant. In the case of the rats that were fed with *methi* there were statistically significant decreases in blood pressure, blood glucose, triglycerides, total cholesterol and LDL while the body weight decreased but not significantly. The results obtain in this study correlates with those obtain by other researchers.

The overall results suggest that both *ThA. graveolens* and *T. graecum* can exert favorable responses to the high levels for blood pressure, blood glucose a LDL, total cholesterol, triglycerides and body weight.