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**STUDIES OF MALNUTRITION IN PATIENTS
WITH INFLAMMATORY BOWEL DISEASE**

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MD THESIS MAY 1990

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ABSTRACT

Patients suffering from Inflammatory Bowel Disease (IBD) as a group uniformly suffer from nutritional problems. Nevertheless the extent, severity and clinical significance of Protein Energy Malnutrition (PEM) in the various clinical presentations of these diseases remains unclear. In particular little is known of the nutritional status of the ambulatory patient with IBD. Confusion still exists over the long term nutritional changes following colectomy for colitis. Whether intravenous nutrition (IVN) should be prescribed in patients admitted to hospital for acute exacerbations of IBD still remains contentious.

Recent work suggests that the significance of PEM relates to the associated impairments seen in various organ systems eg., impaired respiratory muscle function. Furthermore, there is other data to suggest that nutritional therapy may result in improvement in some of these physiological functions long before there is any measured change in the patient's nutritional status.

Through direct measurements of Body Composition (by neutron activation analysis in conjunction with tritium dilution) together with tests of physiological function (hepatosecretory proteins, skeletal muscle function, respiratory muscle function, wound healing and psychological function) work has been directed to clarify the following clinical questions:-

1. How extensive is the problem of protein depletion in the various clinical presentations of IBD?
2. What are the long term changes in body composition following

surgery for colitis? and what is the nature of this restorative process. Is there a return to normal body composition? and if so, what is the duration of this recovery process?

3. What are the effects of a short course of IVN in patients suffering severe exacerbations

of IBD?

The results of these clinical studies have reaffirmed the high incidence of PEM in patients suffering from acute exacerbations of IBD, furthermore this work has established the existence of persisting protein deficits in the ambulatory patient with IBD who is in clinical remission. Contrary to previous reports, fully convalescent patients following surgery for colitis, were found to have normal body stores of protein and water. The timing of this restorative process was found however to take many months.

A 2 week course of IVN was found not only to prevent further loss of body protein in a group of patients presenting with severe exacerbations of IBD, but also within a few days (4 days) lead to a significant improvement in hepatosecretory function, respiratory muscle function, skeletal muscle function, wound healing and psychological function. The magnitudes of these improvements although not complete was probably significant clinically. Following these early improvements, subsequent improvement was slow over many months and was dependent on an increase in body stores of protein.

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LIST OF COLOUR PLATES

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ACKNOWLEDGEMENTS

I would like to acknowledge Professor Graham Hill who provided me with the opportunity to conduct this clinical research. In addition he provided strong guidance, encouragement, support, discipline and above all, a critical analysis of my data.

I would like to also acknowledge my wife, Nichola for support, helpful editing and accepting my persistent absence during the time of preparation of this thesis.

Most importantly I am indebted to all the young brave patients of Professor Hill who generously gave their time, effort and encouragement often during periods of pain and worry. It is my hope that through their help and effort some aspects of this work may lead to a greater understanding of their difficult nutritional problems.

PREFACE

The clinical studies reported in this thesis were performed over the two year period (1986-1988) during which time I held the position of Temporary Lecturer in Surgery, University of Auckland.

During this time I was actively involved in the clinical assessment and management of patients with complex fluid, electrolyte, and nutritional problems, many of whom were suffering from acute exacerbations of IBD.

It was through this early clinical experience that I became interested in examining the problem of Protein Energy Malnutrition in this clinical group of patients and examining the efficacy of IVN.

All studies included in this thesis had ethical approval by the Auckland Hospital Ethical Committee and all raw data may be found at the end of each respective chapter.

Subsequently and over the period of this clinical research, the clinical studies described in this thesis have culminated in the following publications and presentations;

PUBLICATIONS

1. Christie P.M. Hill G.L.
Early improvement in skeletal muscle function following a short course of intravenous nutrition.
Aust NZJ Surg 58: 230-231 1988 (Abstract)

2. Christie P.M. Hill G.L.
Restoration of normal body composition in the months following J-pouch for ulcerative colitis
Aust NZJ Surg 59: 268, 1989 (abstract)

3. Christie P.M. Hill G.L.
Metabolism of body water and electrolytes after surgery for ulcerative colitis - Brooke ileostomy versus J-pouch
Aust NZJ Surg. 59: 268 (abstract)

4. Christie P.M. Schroeder D. Hill G.L.
Persisting superior, mesenteric artery syndrome following ileoanal J-pouch anastomosis
Br. J. Surg. 1988; Vol 75: Oct 1036

5. Schroeder D. Christie P.M. Hill G.L.
Bioelectrical impedance analysis for body composition ; clinical evaluation in general surgical patients
JPEN (in press)

6. Christie P.M. Knight G.S. Hill G.L.
Metabolism of body water and electrolytes after surgery
for ulcerative colitis - Brooke ileostomy versus J-pouch
Br. J. Surg. 1990: 77; 149-151

7. Christie P.M. Hill G.L.
Improved respiratory muscle function following a short
course of Intravenous Nutrition
Br. J. Surg. (in press)

8. Hill G.L. Witney G.B. Christie P.M. Church J.M.
Nutritional Syndromes and the effect of Intravenous
Nutrition (IVN) on Protein Nutriture - A prospective
study of surgical patients with gastrointestinal disease
Lancet (in press)

9. Christie P.M. Knight G.S. Hill G.L.
Risk of Urinary stone formation following surgery for
ulcerative colitis ileostomy versus J-pouch
Br. J. Surg. (Submitted)

10. Christie P.M. Hill G.L.
Return to normal body composition after ileo-anal J-pouch
for ulcerative colitis
Diseases of Colon and Rectum (in press)

11. Christie P.M. Hill G.L.

Effect of intravenous nutrition on nutrition and function
in acute attacks of inflammatory bowel disease.

Gastroenterology (in press).

PRESENTATIONS

1. Surgical Research Society of Australasia annual meeting
1987 (Dunedin NZ): Early Improvement in Skeletal Muscle
Function following a short course of Intravenous Nutrition.
2. RACS Scientific Meeting 1988 (Palmerston North NZ)
Metabolism of Body Water and Electrolytes after surgery
for ulcerative colitis - Brooke Ileostomy versus J-pouch
3. Surgical Research Society of Australasia 1988 (Sydney,
Australia): Restoration of normal body composition in the
months following J-pouch for ulcerative colitis
4. Surgical Research Society of Australasia 1988 (Sydney,
Australia): Metabolism of body water and electrolytes
after surgery for ulcerative colitis - Brook Ileostomy
versus J-pouch.
5. Surgical Research Society of England, 1989 (Newcastle,UK)
Improved Respiratory Muscle Function following a short
course of intravenous nutrition.

LIST OF ABBREVIATIONS

BMM	Bone Mineral Mass
BCM	Body Cell Mass
CDAI	Crohn's Disease Activity Index
Ci	Curie per litre
CT	Computerised Tomography
ECW	Extracellular Water
EN	Enteral Nutrition
FEV1	Forced Expiratory Volume in 1 second
FFM	Fat Free Body Mass
Fig.,	Figure
GAGS	Glycosamino Glycan Inhibitors
GI	Grip Strength Index
GS	Grip Strength
GSI	Global Severity Index
IBD	Inflammatory Bowel Disease
IVN	Intravenous Nutrition
IVNAA	In Vivo Neutron Activation Analysis
J-P	J-pouch
K	Potassium
MEP	Maximal Static Expiratory Pressure
MEV	Milli Electron Volt
MIP	Maximal Static Inspiratory Pressure
MMV	Maximal Minute Ventilation
MSV	Maximal Sustainable Ventilation
MVV	Maximal Voluntary Ventilation

N	Nitrogen
NaBr	Sodium Bromide
Na I	Sodium Iodide
PEFR	Peaked Expiratory Flow Rate
PEM	Protein Energy Malnutrition
POMS	Profile of Mood States
PPN	Partial Parenteral Nutrition
PSDI	Positive Symptom Distress Index
PST	Positive Symptom Total
Pu-Be	Plutonium-Beryllium
REE	Resting Energy Expenditure
RME	Resting Metabolic Expenditure
RQ	Respiratory Quotion
SCL	Symptom Check List
SD	Standard Deviation
SEE	Standard Error of the Estimate
SEM	Standard Error of the Mean
TBF	Total Body Fat
TBK	Total Body Potassium
TBM	Total Body Minerals
TBN	Total Body Nitrogen
TBP	Total Body Protein
TBW	Total Body Water
THO	Tritiated Water
TOBEC	Total Body Electrical Conductivity
VC	Vital Capacity
X	Mean