

# Annual Research Productivity Report

equipment, and to Mr. G. E. R. Deacon and the captain and officers of the *Beagle* for their part in making the voyage.

- <sup>1</sup> Young, F. B., Gerrard, H., and Jevons, W., *Phil. Mag.*, 40, 149 (1920).
- <sup>2</sup> Longuet-Higgins, M. S., *Mon. Not. Roy. Astro. Soc., Geophys. Supp.*, 5, 285 (1949).
- <sup>3</sup> Von Arx, W. S., *J. Biol. Chem.*, 183, 33 (1950).
- <sup>4</sup> Ekman, V. W., *Arch. Biochem. Biophys.*, 2, 11 (1945).

## MOLECULAR STRUCTURE OF NUCLEIC ACIDS

### A Structure for Deoxyribose Nucleic Acid

WE wish to suggest a structure for the salt of deoxyribose nucleic acid (D.N.A.). This structure has novel features which are of considerable biological interest.

A structure for nucleic acid has already been proposed by Pauling and Corey<sup>1</sup>. They kindly made their manuscript available to us in advance of publication.

Their structure is a double helix with the phosphate groups on the outside and the bases on the inside. The two chains are held together by hydrogen bonds between the bases. The structure is rather ill-defined, and for this reason we shall not comment on it.

Another three-chain structure has also been suggested by Fraser (in the press). In his model the phosphates are on the outside and the bases on the inside, linked together by hydrogen bonds. This structure as described is rather ill-defined, and for this reason we shall not comment on it.

We wish to put forward a radically different structure for the salt of deoxyribose nucleic acid. This structure has two helical chains each coiled round the fibre axis. The phosphate groups joining the two chains (but not their bases) are related by a dyad perpendicular to the fibre axis. Both chains follow right-handed helices, but owing to the dyad the sequences of the atoms in the two chains run in opposite directions. Each chain loosely resembles Furberg's<sup>2</sup> model No. 1; that is, the bases are on the inside of the helix and the phosphates on the outside. The configuration of the sugar and the atoms near it is close to Furberg's 'standard configuration', the sugar being roughly perpendicular to the attached base.

This figure is purely diagrammatic. The two ribbons symbolize the two phosphate-sugar chains, and the horizontal rods the pairs of bases holding the chains together. The vertical line marks the fibre axis.

a residue on each chain every 3.4 Å. in the z-direction. The angle of 36° between the two chains, so that the structure repeats after 10 residues on each chain, that is, after 34 Å. The distance of a phosphorus atom from the fibre axis is 10 Å. As the phosphates are on the outside, the water content is rather high. At lower water contents we would expect the bases to tilt so that the structure could become more compact.

The novel feature of the structure is the manner in which the two chains are held together by the purine and pyrimidine bases. The planes of the bases are perpendicular to the fibre axis. They are joined together in pairs, a single base from one chain being hydrogen-bonded to a single base from the other chain, so that the two lie side by side with identical z-co-ordinates. One of the pair must be a purine and the other a pyrimidine for bonding to occur. The hydrogen bonds are made as follows: purine position 1 to pyrimidine position 1; purine position 6 to pyrimidine position 6.

If it is assumed that the bases only occur in the sequence adenine, thymine, guanine, cytosine, the number of possible sequences of bases on a chain of length n is 4<sup>n</sup>. However, if only specific pairs of bases can be formed, it follows that if the sequence of bases on one chain is given, then the sequence on the other chain is automatically determined.

It has been found experimentally<sup>3,4</sup> that the ratio of the amounts of adenine to thymine, and the ratio of guanine to cytosine, are always very close to unity for deoxyribose nucleic acid.

It is probably impossible to build this structure with a ribose sugar in place of the deoxyribose, as the extra oxygen atom would make too close a van der Waals contact. The experimental data<sup>5,6</sup> on deoxyribose nucleic acid are insufficient for a rigorous test of the structure. So far as we can tell, it is roughly compatible with the experimental data, but it must be regarded as unproved until it has been checked against the experimental data. We were not aware of the details of the results presented there when we devised our structure, which rests mainly though not entirely on published experimental data and stereochemical arguments.

It has not escaped our notice that the specific pairing we have postulated immediately suggests a possible copying mechanism for the genetic material.

Full details of the structure, including the conditions assumed in building it, together with a set of co-ordinates for the atoms, will be published elsewhere.

We are much indebted to Dr. Jerry Donohue for constant advice and criticism, especially on interatomic distances. We have also been stimulated by a knowledge of the general nature of the unpublished experimental results and ideas of Dr. M. H. F. Franklin, Dr. R. E. Franklin and their co-workers at the Cavendish Laboratory, Cambridge.



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## **Publications 2009-2010\***

**Faculty Member, Post-Doctoral Research Fellow, Resident**

### **Books**

**Mukherjee D**, Bates ER, Roffi M, Moliterno DJ, editors. [Cardiac Catheterization, Coronary & Peripheral Angiography, and Interventional Procedures](#). London: Informa Health Care; 2010.

**Mukherjee D**, Bavry A, editors. [Interventional Cardiology: Essential Clinician Guide](#). (Oxford Cardiology Library) New York, Oxford University Press;2010.

### **Peer Review Publications**

#### **Journal Articles**

**Abbas A**, Szczepaniak LS, Tuncel M, McGavock JM, Adams-Huet B, Fadel PJ, Wang Z, Arbique D, Victor R, Vongpatanasin W. [Adiposity-Independent Sympathetic Activity in Black Men](#). *J Appl Physiol* 2010;108(6): 1613-1618.

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Camilleri M, Thorna NK, Ringel Y, Hasler WL, Kuo B, Esfandyari T, Gupta A, Scott SM, **McCallum RW**, Parkman HP, Soffer E, Wilding GE, Semler JR, Rao SS. [Wireless pH-motility Capsule for Colonic Transit: Prospective Comparison with Radiopaque Markers in Chronic Constipation](#). *Neurogastroenterol Motil.* 2010;22(8): 874-82.

**Chamberlin W**. [Networks, Emergence, Iteration and Evolution](#). *Emergence, Iteration and Evolution* 2009;11(4): 91-98.

\*Citation format – Uniform requirements for manuscripts submitted to biomedical journals: International Committee of Medical Journal Editors

**Dias A, Garcia C**, Majewski M, Wallner G, **McCallum RW**, **Sarosiek J**. Gastric Juice Prostaglandins and Peptide Growth Factors as Potential Markers of Chronic Atrophic Gastritis, Intestinal Metaplasia and Gastric Cancer: Their Potential Clinical Implications. Dig. Dis. & Sci 2010: Submitted.

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## **Abstracts**

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## **Published Case Reports**

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Porres-Aguilar M, Flavin NE, **Fleming RV**, **Lalude O**. Severe Bivalvular Pneumococcal Endocarditis and Suppurative Pericarditis in an Immunocompetent Patient. Intern Med. 2010;49(4):321-3.

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**Tolouian R**, Salameh H. Treat the patient not the lab value. NDT Plus 2010;3:81-3.

## **Book Chapters**

**Hejazi RA**, **McCallum RW**. Gastrointestinal Hormone Testing. In: Parkman HP, McCallum RW, Rao S. GI Motility Testing: A Laboratory and Office Handbook. 1st ed. Thorofare: SLACK Incorporated ; 2010. P. 279-284.

**Hejazi RA**, **McCallum RW**. Breath tests for small intestine bacterial overgrowth. In: Parkman HP, McCallum RW, Rao S. GI Motility Testing: A Laboratory and Office Handbook. 1st ed. Thorofare: SLACK Incorporated ; 2010. P. 147-152.

## **Multimedia and Other Online Publications**

**Mukherjee D** BMJ Point of Care Monograph (2008, 2010) *Preoperative cardiac risk assessment*

**Mukherjee D** BMJ Point of Care Monograph (2009, 2010) *Essential Thrombocytosis*

Miller AV, Ranatunga SM, **Francis ML**. Gout. eMedicine from WebMD. February 20, 2009. Available at: <http://www.emedicine.com/med/topic924.htm>. Updated April 20, 2010. Available at: <http://emedicine.medscape.com/article/329958-overview>.

Miller AV, Ranatunga SM, **Francis ML**. Sjogren Syndrome. eMedicine from WebMD. March 13, 2009. Updated June 09, 2010. Available at: <http://emedicine.medscape.com/article/332125-overview>.

## Resident Research Activity

(IM Resident **Bold**, **Faculty Sponsor** / **Mentor**)

### **Journal Articles**

**Dias A**, **Garcia C**, Majewski M, Wallner G, **McCallum RW**, **Sarosiek J**. Gastric Juice Prostaglandins and Peptide Growth Factors as Potential Markers of Chronic Atrophic Gastritis, Intestinal Metaplasia and Gastric Cancer: Their Potential Clinical Implications. Dig. Dis. & Sci 2010: Submitted.

**Figueroa-Casas JB**, Montoya R, **Arzabala A**, Connery SM. Comparison between automatic tube compensation and continuous positive airway pressure during spontaneous breathing trials. Respir Care. 2010;55(5):549-54.

### **Abstracts**

Ragland P; Vega N; Fester A; Vasquez D; **Alhamad T**; Connery SM; Madero F; **Alfaro R**; Dahu J; Payan F; Chauvet M; Tarwater P; **Hernandez GT**. The Association Between Health Literacy And Glycemic Control Among Mexican American Diabetics With Chronic Kidney Disease: A Preliminary Report From The Paso Del Norte Kidney Disease Study (PNKDS) Ethnicity & Disease 2009;19(Autumn), S23.

**Ramirez R**, **Zuckerman MZ**, **Hejazi RA**, Chokhavatia S. Treatment of Acute Colonic Pseudo-Obstruction with Tegaserod. Am J Med Sci. 2010 Jun;339(6):575-6.

**Sarosiek J**, Jaworski T, Majewski M, **Garcia CJ**, **Sarosiek I**, Wallner G. Injurious Impact of Naproxen on the Esophageal Mucosa in Humans Could Be at Least Partly Mediated Through Its Detrimental Effect on the Protective Quality of Salivary Secretion: Its Potential Clinical Implication. Gastrointest Endosc 2010;71(10):AB174.

**Tolouian R**, **Salameh H**. Proper Assessment of a Patient Saves More than a 1,000,000\$! Iranian Journal of Kidney Diseases 2009;3(Suppl):P309, pg 73.

**Zuckerman MJ**, **Fleming RV**, Ramirez R, **Huerta A**, Lee D, Boman D, Variyam E. The varied manifestations of amebic colitis (abstr). Am J Gastroenterol 2009; 104 (Suppl 3): S340.

### **Published Case Reports**

Abdelfattah A, **Alhamad T**, **Figueroa J**. The association of unusual site of an idiopathic deep vein thrombosis and chylothorax in an adult. The Internet Journal of Internal Medicine 2010 Volume 8 Number 2

Alhamad T, Chung K, Meza A, Elsayed A, Radwan W : [Case Report: Urinary Mycobacterium Gordonae](#). The Internet Journal of Infectious Diseases. 2010 Volume 8 Number 2

Ramirez R, Zuckerman MZ, Hejazi RA, Chokhavatia S. [Treatment of Acute Colonic Pseudo-Obstruction with Tegaserod](#). Am J Med Sci. 2010 Jun;339(6):575-6.

Tolouian R, Salameh H. [Treat the patient not the lab value](#). NDT Plus 2010;3:81 - 83.



**OPEN, ACTIVE, ONGOING RESEARCH**  
**Investigator Initiated Research Studies**  
**GRANT FUNDED FY10**

- **New Diagnosis and Treatment Approaches for Patients with Gastroparesis.**
    - a. **Gastroparesis Registry (GpR) - Gastroparesis Clinical Research Consortium**
    - b. **Nortriptyline for Idiopathic Gastroparesis: A Multicenter, Randomized, Double-Masked, Placebo-Controlled Trial (NORIG)**
- PI- Richard McCallum, MD. *NIH/NIDDK*. October, 2009 – March 31, 2010. \* *Transfer*.  
**\$186,199**
- **Development of a reliable marker for *Mycobacterium paratuberculosis* bowel diseases.**  
PI- William Chamberlin, MD & Rod Chiodini, PhD. *Lizanell and Colbert Coldwell Foundation*  
January 1, 2010 – December 31, 2011. **\$68,745**
  - **Development of reliable markers for *Mycobacterium paratuberculosis* associated bowel disease.** PI – William Chamberlin, MD & Rod Chiodini, PhD. *Paul L Foster, SOM Seed Grant*  
1 October 2009 – 30 Sept 2010. **\$18,079**
  - **Are Kidneys Causing Coronary Calcification and Heart Disease?** PI- Ramin Tolouian, MD. *Lizanell and Colbert Coldwell Foundation* January 1 2010 – December 31 2011. **\$37,140**
  - **Administrative Supplement (ARRA) to New Diagnosis and Treatment Approaches for Patients with Gastroparesis.** PI – Richard McCallum, MD *NIH/NIDDK* April 01 2010 – March 31 2010 **\$149,358**
  - **Student Administrative Supplement (ARRA) to New Diagnosis and Treatment Approaches for Patients with Gastroparesis.** PI – Richard McCallum, MD *NIH/NIDDK* April 01 2010 – March 31 2010 **\$45,603**
  - **Pilot Study of the Safety, Feasibility and Potential Efficacy of Continuous Glucose Monitoring and Insulin Pump Therapy in Diabetic Gastroparesis (GLUMIT-DG)** PI – Richard McCallum, MD *NIH/NIDDK* October 01, 2009 – March 31 2011 **\$90,178**

## **Investigator Initiated Research Studies**

### *Unfunded*

- ❖ **Descriptive Epidemiology and Ethnic (Hispanic versus non-Hispanic) Comparison of Gastric Cancer Incidence in the State of Texas and El Paso County for the Period 1995 through 2006** - Zuber Mulla, PhD and Javier Corral, MD
- ❖ **The determination of liver and cardiac iron in patients on chronic hemodialysis by Magnetic Resonance Imaging (MRI)** – Ramin Tolouian, MD
- ❖ **A randomized, prospective, double-blind, placebo controlled, dose ranging evaluation of urine pH after 24 hr treatment with proton pump inhibitor** – Ramin Tolouian, MD
- ❖ **Streptococcus bovis and gastrointestinal disease in a U.S.- Mexico border city.** – Marc Zuckerman, MD
- ❖ **Changing patterns of Microbe Resistance in a Public Hospital (Robert Ewing Thomason Hospital)** – Armando Meza, MD
- ❖ **Optimizing the Continuity Clinic Experience for Internal Medicine Residents and their Patients** – M Francis, MD
- ❖ **Urine PH in patients taking Proton Pump Inhibitors (PPIs)** – Ramin Tolouian, MD
- ❖ **Epidemiological profile of coccidioidomycosis infection in a predominantly Hispanic population** – Armando Meza, MD
- ❖ **PEEP titration in Acute Lung Injury** – Juan Figueroa-Casas, MD
- ❖ **Case Control Study Of West Nile Virus Encephalitis in a border town Hospital** – Armando Meza, MD
- ❖ **Comparing Individual Teaching of Geriatrics versus Self Study for Residents In Internal Medicine** – Paul Casner, MD, PhD
- ❖ **The Relationship Between Restorative Impact of Rabeprazole on Salivary and Gastric Mucus and Mucin Production Impairment during Naproxen Administration and Salivary and Gastric Epidermal Growth Factor (EGF) Secretion and EGF Gene Polymorphism: Its Potential Clinical Significance.** Jerzy Sarosiek, MD, PhD
- ❖ **Review of a series of renal biopsies presenting crescentic glomerulonephritis in a hispanic based population at the US - Mexico border.** – German Hernandez, MD
- ❖ **HLA Antigen frequencies in Mexican-American and Caucasian populations** – Ramin Tolouian, MD
- ❖ **Application of Appropriateness Criteria to Single-Photon Emission Computed Tomography (SPECT) Myocardial perfusion imaging in a University Medical Center** – Omosalewa Lalude, M.D

- ❖ **Risk of Pulmonary Embolism in Specific Subgroups of Patients with Distal Deep Vein Thrombosis** – Harold Hughes, MD
- ❖ **Retrospective surveillance of the Incidence, clinical features and complications of Clostridium Difficile Associated Disease (CDAD) in a predominant Hispanic population review during the period of 2006-2008. A Texas Tech University Health Science Center - El Paso Campus- and Thomason General Hospital Study** – Armando Meza, MD
- ❖ **Evaluation of correlation between hyponatremia and prevalence of falls and fractures** – Ramin Tolouian, MD.
- ❖ **Prospective study to compare demographic characteristics, signs and symptoms of influenza and influenza-like illness, and outcomes of patients of all ages presenting with influenza-like conditions for the development of diagnostic and prognostic tools** – Todd Bell, MD and Rhonda Fleming, MD

**Pharmaceutically Sponsored Clinical Research Studies**  
***Open, Active Clinical Trials (As of August 2010)***

- **An Open-label, Long-term Safety Study of Oral Linaclotide Administered to Patients with Chronic Constipation or Irritable Bowel Syndrome with Constipation.** – Marc Zuckerman, MD. Ironwood Pharmaceuticals. *Oct 2008 – Current.*
- **A Phase 3b Multicenter, Single-Blind Trial to Evaluate the Efficacy of Dexlansoprazole MR 30 mg in Maintaining Control of Gastroesophageal Reflux Disease Symptoms in Subjects on Prior Twice Daily Proton Pump Inhibitor Therapy.** Marc Zuckerman, MD. Takeda Global Research and Development Center, Inc. *March 2009 - Current*
- **A Multicenter, Randomized, Double-Blind, Placebo-Controlled, Parallel-Group, Phase 2 Evaluation of the Safety and Efficacy of Once-Daily Administrations of TZP 102 for the Treatment of Symptomatic Gastroparesis in Patients with Diabetes Mellitus** – Marc Zuckerman, MD. Tranzyme Inc. *March 2009 - Current*
- **A Phase 3, Randomized, Double-blind, Placebo-controlled, Parallel-group Trial of Linaclotide Administered Orally for 26 Weeks in Patients with Irritable Bowel Syndrome with Constipation** – Marc Zuckerman, MD. Ironwood Pharmaceuticals. *July 2009 - Current*
- **A Phase IIIb, Double-blind, Randomised, Placebo-controlled, Multi centre, Dose-finding Efficacy and Safety Study of a Range of Doses of A3309 in Patients with Chronic Idiopathic Constipation** - Marc Zuckerman, MD. Albireo AB. *November 2009 - current*
- **A 6-Month, Phase 3, Randomized, Double-Blind, Parallel-Group, Controlled, Multi-Center Study to Evaluate the Incidence of Gastric Ulcers Following Administration of Either PA32540 or Enteric Coated Aspirin 325 mg in Subjects Who Are at Risk for Developing Aspirin-Associated Ulcers.** Marc Zuckerman, MD. POZEN, Inc. *December 2009 - current*
- **A 12-Week, Randomized, Double-Blind, Placebo-Controlled Study of Asimadoline in Subjects With Diarrhea-Predominant Irritable Bowel Syndrome** - Marc Zuckerman, MD. Tioga Pharmaceuticals, Inc. *February 2010 – current*
- **MGAWN1 A Phase 2, Stratified, Randomized, Double-Blind Placebo-Controlled Study to Evaluate the Safety and Efficacy of MGAWN1 in Subjects with Laboratory-documented West Nile Fever or Suspected Central Nervous System Infection Due to West Nile Virus** - Armando Meza, MD. Macrogenics, Inc. *July 2009 - Current*
- **Therapies for Resistant Focal Segmental Glomerulosclerosis (FSGS) A Phase II Clinical Trial** - German Hernandez, MD, NIH/NIDDK. *March 2009 – Current*
- **Focal segmental glomerulosclerosis (FSGS) Clinical Trial (FSGS-CT): Bridge to Cohort Long Term Follow Up Study** – German Hernandez, MD, NIH Sponsored, *Aug 2010 - Current*

## **Pharmaceutically Sponsored Clinical Research Studies**

### ***Completed Clinical Trials***

*(close date between 1 Sept 2009 – 31 Aug 2010)*

- **A 26-week randomised, controlled, open label, multicentre, multinational trial comparing efficacy and safety of SIBA with sitagliptin as add on to current oral antidiabetic treatment in insulin-naïve subjects with type 2 diabetes mellitus inadequately controlled with 1-2 oral antidiabetic drugs (metformin, sulphonylurea, glinides or pioglitazone). Short Title: A trial comparing efficacy and safety of NN1250 with sitagliptin in insulin naïve subjects with type 2 diabetes.** Tamis Bright, MD Novo Nordisk Nov 2009 – Aug 2010
  
- **A Phase II, Double Blind, Randomized, Placebo-Controlled Study of the Safety, Tolerance and Activity of HE3286 When Administered Orally for 12 Weeks to Adult Patients with Type 2 Diabetes Mellitus** – Tamis Bright, MD Hollis-Eden Pharmaceuticals, Sept 2008 – Oct 2009
  
- **A Multicenter, Randomized, Double-Blind, Placebo-Controlled, Parallel-Group, Phase 2 Evaluation of the Safety and Efficacy of Once-Daily Administrations of TZP 102 for the Treatment of Symptomatic Gastroparesis in Patients with Diabetes Mellitus** – Marc Zuckerman, MD Tranzyme Inc March 2009 – Aug 2010.
  
- **A Randomised, Double-Blind, Placebo Controlled, Parallel-Group, Multicenter Study To Evaluate The Efficacy and Safety of Two Doses of Ocrelizumab in Patients With WHO or ISN Class III or IV Nephritis Due To Systemic Lupus Erythematosus** - German Hernandez, MD. Hoffman La Roche and Genentech Pharmaceuticals, March 2008 - July 2010
  
- **A multi-center, randomized, double-blind, active-controlled clinical trial to evaluate the safety and tolerability of 24 weeks treatment with vildagliptin (50 mg qd) versus sitagliptin (25 mg qd) in patients with type 2 diabetes and severe renal insufficiency** . Dinorah Nutis, M.D. (initially German Hernandez, MD) Novartis Pharmaceuticals, Oct 2007 – Jan 2010