<Patient 1

dateOfBirth>1934-05-15</dateOfBirth>

**Medical Conditions**

Alzheimer’s Disease

Hypercholesterolaemia

Atrial Fibrillation

**Current Medications**

Lipitor – atorvastatin 10mg once daily

Coreg – Carvedilol 6.25mg twice daily

Coumadin – Warfarin 1mg once daily (lower dose prescribed as a result of pharmacogenomic data described below - this was done on a previous consultation and was made available to the physician because of available data presented to the physician as a result of the ontology

**Diagnosis of Alzheimers Disease now made**

Patient to be started on Donepezil

**Pharmacogenomic Data relevant to patient for Personalized Prescribing**

**Vitamin K epoxide reductase (VKOR) Variant**- **(Present in this patient)**““Certain single nucleotide polymorphisms in the VKORC1 gene (especially the -1639G).A allele) have been associated with lower dose requirements for warfarin.  About 55% of the variability in warfarin dose could be explained by the combination of VKORC 1 and CYP2C9 genotypes, age, height, body weight, interacting drugs, and indication for warfarin therapy in Caucasian patients. Similar observations have been reported in Asian patients.”

**Hereditary or acquired deficiencies of protein C or its cofactor, protein S**,**(Not present in this patient)** has been associated with tissue necrosis following warfarin administration. “Not all patients with these conditions develop necrosis, and tissue necrosis occurs in patients without these deficiencies. Inherited resistance to activated protein C has been described in many patients with venous thrombosis-embolic disorders but has not yet been evaluated as a risk factor for tissue necrosis. The risk associated with these conditions, both for recurrent thrombosis and for adverse reactions, is difficult to evaluate since it does not appear to be the same for everyone. Decisions about testing and therapy must be made on an individual basis.”

**Genomic Data/Biomarker and Relevant Associations**

**http://www.alz.org/icad/documents/abstracts/abstracts\_biomarkers\_ICAD09.pdf**

**Biomarker Based Diagnosis Of Very Mild Alzheimer’s Disease: A Multicenter Study**

**Conclusion 1**: A combination of hippocampus volume and episodic memory performance shows a robust and clinically significant diagnostic accuracy of AD at a very early stage.

**Comparing predictors of conversion: Data from the Alzheimer’s Disease Neuroimaging Initiative**

**Conclusions 2**:Low baseline FDG-ROI measurements in MCI subjects reliably predict both conversion to AD and cognitive decline over a 2 year period. Hippocampal volume, ApoE4 status, and CSF biomarkers also appear to play important predictive roles. The addition of more longitudinal data will help elucidate the independent and additive contributions of these baseline measurements to the prediction of disease progression.

**Hippocampal glucose metabolism predicts cognitive decline and correlates to disease progression in the ADNI population**

**Conclusions 3**: These results demonstrate in a broad population the feasibility of achieving highly specific diagnostic accuracies by incorporating HIP rCMGlc, and provide insight to the continuum of decline through which normalcy advances to late stage dementia.

**Drug Interactions and Metabolism**

**Cytochrome P 450 Subtype**

**Subtype indicated describes the specific isoenzymes of the P450 System responsible for the metabolism of the specific drugs patient has in their profile – this data can be found in Facts and Comparisons, Micromedex, The Drug Information Handbook, and is available to prescribers – It will likely be most accurate from these sources, which are at a fee.**

**(graphs indicate data we need to figure out how to obtain from genetic profiling and Pharm GKB) and provide to the prescriber!)**

2C8

CARVEDILOL - major



2C9

WARFARIN

CARVEDILOL - major



2D6

CARVEDILOL – unclassified substrate

DONEPEZIL substrate



3A4 -

ATORVASTATIN major substrate

DONEPEZIL substrate



St John’s Wart May decrease Donepezil Levels

Use INR to adjust warfarin

Use CK blood results below to monitor for Rhabdomyolysis secondary to atorvastatin

Check Liver Function tests to monitor for Hepatotoxicity secondary to Warfarin

**Clinical biochemistry**

**This Fake Patient’s Values are in the Far Right Column**

**Electrolytes and Metabolytess**

|  |  |  |
| --- | --- | --- |
| **Test** | **Range** | **Comments** |
| [Sodium](http://july.fixedreference.org/en/20040724/wikipedia/Sodium) (Na) | 130 - 145 mmol/L | 138 |
| [Potassium](http://july.fixedreference.org/en/20040724/wikipedia/Potassium) (K) | 3.5 - 5.0 mmol/L | 3.9 |
| [Urea](http://july.fixedreference.org/en/20040724/wikipedia/Urea) | 2.6 - 6.8 mmol/L | 6 |
| [Creatinine](http://july.fixedreference.org/en/20040724/wikipedia/Creatinine) | 50 - 110 μmol/L | 80 |
| [Glucose](http://july.fixedreference.org/en/20040724/wikipedia/Glucose) (fasting) | 4.2 - 6.1 mmol/L | 6 |

**Liver function tests**

|  |  |  |
| --- | --- | --- |
| Total Protein | 60 - 80 g/L | 77 |
| [Albumin](http://july.fixedreference.org/en/20040724/wikipedia/Albumin) | 30 - 50 g/L | 40 |
| Total [Bilirubin](http://july.fixedreference.org/en/20040724/wikipedia/Bilirubin) | 2 - 14 μmol/L | 14 |
| Direct Bilirubin | 0 - 4 μmol/L | 3 |
| [Alanine transaminase](http://july.fixedreference.org/en/20040724/wikipedia/Alanine_transaminase) (ALT) | 8 - 40 U/L | 47 |
| Alkaline phosphatase (ALP) | 40 - 130 U/L | 100 |
| Gamma glutamyl transferase | < 50 U/L | 44 |

**Other enzymes and proteins**

|  |  |  |
| --- | --- | --- |
| [Creatine kinase](http://july.fixedreference.org/en/20040724/wikipedia/Creatine_kinase) (CK) | 22 - 198 U/L | 88 |
| Aspartate transaminase (AST) | 8 - 35 U/L | 33 |
| [Lactate dehydrogenase](http://july.fixedreference.org/en/20040724/wikipedia/Lactate_dehydrogenase) (LDH) | 85 - 285 U/L | 140 |
| [Amylase](http://july.fixedreference.org/en/20040724/wikipedia/Amylase) | 25 - 125 U/L | 100 |
| [C-reactive protein](http://july.fixedreference.org/en/20040724/wikipedia/C-reactive_protein) (CRP) | <8 mg/L | 15 |

**Other ions and trace metals**

|  |  |  |
| --- | --- | --- |
| Ionised [calcium](http://july.fixedreference.org/en/20040724/wikipedia/Calcium) (Ca) | 1.15 - 1.29 mmol/L | 1.00 |
| Total calcium (Ca) | 2.05 - 2.55 mmol/L | 2.44 |
| [Copper](http://july.fixedreference.org/en/20040724/wikipedia/Copper) (Cu) | 11 - 26 μmol/L |  |
| [Zinc](http://july.fixedreference.org/en/20040724/wikipedia/Zinc) (Zn) | 10 - 17 μmol/L |  |

**Lipids**

|  |  |  |
| --- | --- | --- |
| [Triglycerides](http://july.fixedreference.org/en/20040724/wikipedia/Triglyceride) | 0.4 - 2.0 mmol/L | 2.7 |
| Total [cholesterol](http://july.fixedreference.org/en/20040724/wikipedia/Cholesterol) | 3.0 - 5.5 mmol/L | 7 |
| [HDL cholesterol](http://july.fixedreference.org/en/20040724/wikipedia/High_density_lipoprotein) (male) | 0.7 - 1.9 mmol/L | 2 |
| (female) | 0.9 - 2.4 mmol/L |  |
| [LDL cholesterol](http://july.fixedreference.org/en/20040724/wikipedia/Low_density_lipoprotein) | 2.4 - 4.0 mmol/l | 5 |

**Tumour markers**

|  |  |  |
| --- | --- | --- |
| [Alpha-fetoprotein](http://july.fixedreference.org/en/20040724/wikipedia/Alpha-fetoprotein) (AFP) | 1-15 kIU/L |  |
| CA-125 | <65 kU/L |  |
| [Prostate specific antigen](http://july.fixedreference.org/en/20040724/wikipedia/Prostate_specific_antigen) (total PSA) | <2.0 μg/L | 3 |

**Hormones**

|  |  |  |
| --- | --- | --- |
| [Thyroid stimulating hormone](http://july.fixedreference.org/en/20040724/wikipedia/Thyroid-stimulating_hormone) (TSH) | 0.5 - 4.7 mIU/L | 4 |
| Free [thyroxine](http://july.fixedreference.org/en/20040724/wikipedia/Thyroid_hormone) (FT4) | 9.0 - 24 pmol/L | 20 |
| Free [triiodothyronine](http://july.fixedreference.org/en/20040724/wikipedia/Thyroid_hormone) (FT3) | 2.5 - 5.3 pmol/L | 5 |
| [Adrenocorticotropic hormone](http://july.fixedreference.org/en/20040724/wikipedia/Adrenocorticotropic_hormone) (ACTH) | 1.3 - 15 pmol/L | 7 |
| [Cortisol](http://july.fixedreference.org/en/20040724/wikipedia/Cortisol) (0830 h) | 250 - 850 nmol/L | 400 |
| Cortisol (1630 h) | 110 - 390 nmol/L |  |
| [Prolactin](http://july.fixedreference.org/en/20040724/wikipedia/Prolactin) (male) | <450 mIU/L |  |
| (female) | <580 mIU/L |  |
| [Testosterone](http://july.fixedreference.org/en/20040724/wikipedia/Testosterone) (male) | 8 - 38 nmol/L |  |
| (male prepuberty) | 0.1 - 0.5 nmol/L |  |
| (female) | 0.3 - 2.5 nmol/L |  |

**Haematology**

**Red blood cells**

|  |  |  |
| --- | --- | --- |
| [Haemoglobin](http://july.fixedreference.org/en/20040724/wikipedia/Hemoglobin) (Hb) (male) | 130 - 180 g/L | 140 |
| (female) | 115 - 160 g/L | Sex difference negligible until adulthood. |
| [Haematocrit](http://july.fixedreference.org/en/20040724/wikipedia/Hematocrit) (Hct) (male) | 0.38 - 0.52 |  |
| (female) | 0.35 - 0.47 |  |
| Mean cell volume (MCV) | 80 - 98 fL | 85 |
| Mean cell haemoglobin (MCH) | 26 - 34 pg | 30 |
| Red cell count (male) | 4.5 - 6.5 x1012/L | 6 |
| (female) | 3.8 - 5.8 x1012/L |  |
| Reticulocytes | 10 - 100 x109/L | 40 |
| [Erythrocyte](http://july.fixedreference.org/en/20040724/wikipedia/Erythrocyte_sedimentation_rate) [sedimentation rate](http://july.fixedreference.org/en/20040724/wikipedia/Erythrocyte_sedimentation_rate) (ESR) |  | 9 |

**White blood cells**

|  |  |  |
| --- | --- | --- |
| Total white blood cells | 4.0 - 11.0 x109/L | 7 |
| Neutrophil granulocytes | 2.0 - 7.5 x109/L | 5 |
| [Lymphocytes](http://july.fixedreference.org/en/20040724/wikipedia/Lymphocyte) | 1.0 - 4.0 x109/L | 3 |
| Monocytes | 0.0 - 0.8 x109/L | 0.5 |
| Eosinophil granulocytes | 0.0 - 0.5 x109/L | 0.4 |
| Basophil granulocytes | 0.0 - 0.2 x109/L | 0.1 |

**Coagulation**

|  |  |  |
| --- | --- | --- |
| [Prothrombin time](http://july.fixedreference.org/en/20040724/wikipedia/International_normalized_ratio) (PT) | 7 - 10 s | 30 |
| [INR](http://july.fixedreference.org/en/20040724/wikipedia/International_normalized_ratio) | 0.8 - 1.2 | 2.5 |
| Activated partial thromboplastin time (APTT) | 29 - 41 s |  |
| Thrombin clotting time (TCT) | 11 - 18 s |  |
| [Fibrinogen](http://july.fixedreference.org/en/20040724/wikipedia/Fibrin) | 1.8 - 4.0 g/L | 3 |
| [Bleeding time](http://july.fixedreference.org/en/20040724/wikipedia/Bleeding_time) | 2 - 8 minutes | 6 |

**Immunology**

|  |  |  |
| --- | --- | --- |
| Antinuclear antibodies (ANA) |  | Not Indicated |
| Extractable nuclear antigen (ENA) |  | Not Indicated |