Assignment #2 Part #2

To determine the names of the gene associated with Lesch-Nyhan syndrome, I submitted a query to all databases for “Lesch-Nyhan.” From that query, I selected the results from the gene database for further analysis because our interests are the genes involved in the syndrome. There is currently consensus on one human gene associated Lesch-Nyhan syndrome. The gene can be found on the full X chromosome assembly of record accession number NC\_000023.11. This record is from Refseq’s database of curated data, indicated by the underscore in the accession number. Refseq indicates the gene name is HPRT1 ID #3251 with aliases of HGPRT and HPRT. To determine the protein that the gene codes, I narrowed the RefSeq database to only proteins and submitted a query for “HPRT1.” There are two curated amino acid sequences associated with the HPRT1 gene. There is a computer generated protein isoform containing 224 amino acids associated with accession number XP\_011529630.1 and there is an observed protein containing 218 amino acids associated with accession number NP\_000185.1.There are two curated mRNA sequences associated with the HPRT1 gene. There is a computer generated 1374 base pair computer generated linear transcript associated with accession number XM\_011531328.1 and there is an observed 1435 base pair observed mRNA sequence associated with accession number NM\_000194.2. The HPRT1 gene codes for hypoxanthine-guanine phosphoribosyltransferase, which is a transferase protein that is involved in purine generation by catalyzing hypoxanthine and guanine through phosphate and ribose transfer (Yamada Y, Goto H and Ogasawara N. “Identification of two independent Japanese mutant HPRT genes using the PCR technique,” Advanced Experimental Medical Biology). The deleterious allele causes Lesch-Nyhan as a result of a leucine to proline mutation at residue #68. The mutation codes for an isoform of the hypoxanthine-guanine phosphoribosyltransferase protein with reduced catalytic activity as a result of lessened phosphoribosylpyrophosphate affinity (Department of Metabolic Biochemistry, Hôpital Necker-Enfants Malades, AP-HP, 149 rue de Sèvres, 75015 Paris, France; School of Medicine, Paris Descartes University). Although RefSeq indicates the position of the HPRT1 gene is on the X chromosome, I submitted a query to all databases for “Lesch-Nyhan and Inheritance” to determine allele dominance. From the PubMed hits, I found that HPRT1 deficiency is an X-linked recessive trait. Heterozygous females are generally asymptomatic carriers and males are symptomatic due to possession of a single X chromosome (Division of Clinical Biochemistry, La Paz University Hospital, Madrid, Spain.). To verify homologous genes of HPRT1, I inspected the multiple sequence alignments prepared by MUSCLE found from a query submitted to the homologene database. I found the gene to be most conserved in chimpanzees (Pan troglodytes, accession number [NP\_001104287.1](http://www.ncbi.nlm.nih.gov/entrez/viewer.fcgi?db=protein&id=160961499)), dogs (Canis lupus familiaris, accession number NP\_001003357.1), and cattle (Bos Taurus, accession number XP\_002686486.1). Each organism produces a homologous protein with 18 conserved domains.