

Name: (First) (MI) (Last) DOB: (MM/DD/YY)

Lymphocyte/White Blood Cell-based Comprehensive Testing via Next-Gen Sequencing

RUSH Analysis: Testing completed within **15 working days** of receipt of sample
 (Additional **\$600 RUSH fee** applied; only available for tests on this page)

<p>NF1/Legius syndrome and Other RASopathy Related Conditions</p> <p><input type="checkbox"/> NF1-NG: NGS and Del/Dup: <i>NF1</i> only</p> <p><input type="checkbox"/> NFSP-NG: NGS and Del/Dup: <i>NF1</i> and <i>SPRED1</i></p> <p><input type="checkbox"/> NNP-NG: NGS: 17 genes (no NF1): <i>BRAF, CBL, HRAS, KRAS, LZTR1, MAP2K1, MAP2K2, NRAS, PPP1CB, PTPN11, RAF1, RASA2, RIT1, SHOC2, SOS1, SOS2, and SPRED1</i>; and Del/Dup: <i>SPRED1</i> and <i>LZTR1</i></p> <p><input type="checkbox"/> RAS-NG: NGS: 18 genes: <i>BRAF, CBL, HRAS, KRAS, LZTR1, MAP2K1, MAP2K2, NF1, NRAS, PPP1CB, PTPN11, RAF1, RASA2, RIT1, SHOC2, SOS1, SOS2, and SPRED1</i>; and Del/Dup: <i>NF1, SPRED1, and LZTR1</i></p> <p><input type="checkbox"/> CST-NG: NGS: <i>HRAS</i> only</p>	<p>NF2/Schwannomatosis/Meningiomatosis</p> <p><input type="checkbox"/> NF2-NG: NGS and Del/Dup: <i>NF2</i> only</p> <p><input type="checkbox"/> SCH-NG: NGS: 3 genes: <i>LZTR1, NF2, and SMARCB1</i>; and Del/Dup: <i>NF2, LZTR1, and SMARCB1</i></p> <p><input type="checkbox"/> MEN-NG: NGS: 4 genes: <i>NF2, SMARCB1, SMARCE1, and SUFU</i>; and Del/Dup: <i>NF2 and SMARCB1</i></p>
<p>McCune-Albright Syndrome</p> <p><input type="checkbox"/> GNAS-NG: NGS: <i>GNAS</i> exons 8 and 9 only</p>	<p>Rhabdoid Tumor Predisposition Syndrome</p> <p><input type="checkbox"/> RT-NG: NGS: <i>SMARCB1</i> and <i>SMARCA4</i>; and Del/Dup: <i>SMARCB1</i> only</p>
<p>Tuberous Sclerosis Complex</p> <p><input type="checkbox"/> TSCP-NG: NGS and Del/Dup: <i>TSC1</i> and <i>TSC2</i></p>	<p>Peripheral Nerve Sheath Tumor Testing</p> <p><input type="checkbox"/> PNT-NG: NGS: 6 genes: <i>NF1, NF2, KRAS, LZTR1, PTPN11</i> and <i>SMARCB1</i>; and Del/Dup: <i>NF1, NF2, LZTR1, and SMARCB1</i></p>
	<p>Capillary Malformation Arteriovenous Malformation Syndrome</p> <p><input type="checkbox"/> RASA-NG: NGS: <i>RASA1</i> and <i>EPHB4</i>; and Del/Dup: <i>RASA1</i> only</p>

Additional Information

<p>Test Description Key: Next Generation Sequencing (NGS) Deletion/Duplication analysis (Del/Dup)</p>	<p>For additional testing options via tumor/biopsy, please see page 3 of this order form. Please contact the lab via phone (205) 934-5562 or via email at medgenomics@uabmc.edu if you have any questions when completing this form. For additional information, visit our website at www.uab.edu/medicine/genetics/medical-genomics-laboratory</p>
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Important points of consideration for testing

The average coverage for all of our panels is >1800x. Specifically for the *NF1* gene, the NGS approach covers >98.5% of the *NF1* coding region at ≥350X and 99.9% ≥200X, allowing detection of very low level mosaicism, down to 3-5% variant allele fraction respectively. For all other genes on our panels, the NGS approach covers an average of 99% at ≥200X. Remaining regions are covered at ≥30X. However, for patients with segmental/mosaic presentation, deep coverage in lymphocyte cells may be insufficient to identify the underlying gene change. Testing the affected tissue(s) may be necessary to confirm a diagnosis. Please see page 3 for our tumor/biopsy-based testing options.

Please note: For patients with an ongoing pregnancy who require comprehensive NF1 testing, "NF1-R" is recommended due to the sensitivity and fast turnaround time of this test (please see page 4 for this option).

Specimen Requirements

<p>Accepted Specimens</p> <p>Specimen requirements vary based on test requested; please see our website for more details.</p> <p>-Blood: 3-6ml EDTA (receipt within one week of collection) -Saliva: OGR-575 DNA Genotek (kits are provided upon request) -DNA: extracted from lymphocyte cells, a minimum of 25ul at 3µg, O.D. value at 260:280nm ≥1.6 (must be extracted in a CLIA or equivalent certified lab) -Fibroblast cells</p>	<p>Specimen Information:</p> <p><input type="checkbox"/> Peripheral Blood (EDTA); # Tubes: _____</p> <p><input type="checkbox"/> Extracted DNA; Source: _____</p> <p><input type="checkbox"/> Saliva (kit must be provided by MGL)</p> <p><input type="checkbox"/> Other, please describe: _____</p> <p>Please note: failure to provide a date of collection can delay release of results</p> <p>Sample Collected Date (required): _____</p>
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Name: (First) (MI) (Last) DOB: (MM/DD/YY)

Tumor/Biopsy-based Comprehensive Testing

Please check here if blood or DNA is provided for confirmation testing. Blood Collected: (MM/DD/YY)

NF1/SPRED1 on biopsied CALs and Neurofibromas

****Please contact the laboratory at least one week in advance of the biopsy before ordering this test as media must be provided in advance and special shipping instructions apply. Biopsies must arrive *within 60 hours of collection*****

NF14C: Sanger (RNA) and Del/Dup: NF1 (with automatic reflex to SPRED1) on biopsied CALs

NF14N: Sanger (RNA) and Del/Dup: NF1 on biopsied neurofibromas

NF2/Schwannomatosis

NF2-NG: Fresh/Frozen Tumor for NGS and Del/Dup: *NF2* only

SCH-NG: Fresh/Frozen Tumor for NGS and Del/Dup: *LZTR1, NF2, and SMARCB1*

NF24: Tumor Block for Sanger and Del/Dup: *NF2* only

SCHP: Tumor Block for Sanger and Del/Dup: *NF2, LZTR1, and SMARCB1*

Rhabdoid Tumor Predisposition Syndrome

RT-NG: Fresh/Frozen Tumor for NGS *SMARCB1* and *SMARCA4*; and Del/Dup: *SMARCB1* only

SB14RT: Tumor Block for Sanger and Del/Dup: *SMARCB1* only

RASopathy Related Conditions

NNP-NG: Fresh/Frozen Tumor for NGS (no *NF1*): *BRAF, CBL, HRAS, KRAS, LZTR1, MAP2K1, MAP2K2, NRAS, PPP1CB, PTPN11, RAF1, RASA2, RIT1, SHOC2, SOS1, SOS2, and SPRED1*; and Del/Dup: *SPRED1* and *LZTR1*

RAS-NG: Fresh/Frozen Tumor for NGS: *BRAF, CBL, HRAS, KRAS, LZTR1, MAP2K1, MAP2K2, NF1, NRAS, PPP1CB, PTPN11, RAF1, RASA2, RIT1, SHOC2, SOS1, SOS2, and SPRED1*; and Del/Dup: *NF1, SPRED1, and LZTR1*

Meningiomatosis

MEN-NG: Fresh/Frozen Tumor for NGS: *NF2, SMARCB1, SMARCE1, and SUFU*; and Del/Dup: *NF2* and *SMARCB1*

Peripheral Nerve Sheath Tumor Testing

PNT-NG: Fresh/Frozen Tumor for NGS: *NF1, NF2, KRAS, LZTR1, PTPN11* and *SMARCB1*; and Del/Dup: *NF1, NF2, LZTR1, and SMARCB1*

Tuberous Sclerosis Complex

TSC-NG: Fresh/Frozen Tumor for NGS and Del/Dup: *TSC1* and *TSC2*

Additional Information

Test Description Key:

Next Generation Sequencing (NGS)
 Sanger Sequencing (Sanger)
 Deletion/Duplication analysis (Del/Dup)

Please contact the lab via phone (205) 934-5562 or via email at medgenomics@uabmc.edu if you have any questions when completing this form.
 For additional information, visit our website at www.uab.edu/medicine/genetics/medical-genomics-laboratory

Important points of consideration for testing

- The MGL offers next generation sequencing testing options that provide the ability to identify variants (indels and substitutions) as low as 3% of the alleles, depending on coverage in the regions of interest.
- NF1/SPRED1 biopsy-based testing is considered the "gold standard" approach for confirming a diagnosis of mosaic/segmental NF1 or Legius Syndrome.
- A minimum of two biopsies is required for NF1 testing. Two or more tumors are suggested for our other testing options. There are no additional fees associated with testing on additional biopsy specimens.
- When proceeding with tumor-based testing for NF2, test code "SCH-NG" or "SCHP" (*NF2, SMARCB1, and LZTR1*) is suggested unless the patient has additional findings unique to NF2.

Specimen Requirements

Accepted Specimens

Specimen requirements vary based on test requested; please see our website for more details.

-**CALs or Neurofibromas**: require special media transport (kits are provided upon request, to be arranged *at least* one week in advance of procedure)

-**Fresh/Frozen Tumors**: please submit a pathology report; for additional requirements, see tumor submission checklist

-**Formalin-Fixed Paraffin-Embedded Tumors (Tumor Block)**: please submit a pathology report; blocks are preferred to curls, when available; for additional requirements, see tumor submission checklist

Specimen Information:

Frozen

Fresh

Paraffin Curls

Paraffin Block

Extracted DNA; Source: _____

Biopsy-CAL-spot; # biopsies: _____

Biopsy-Neurofibroma; # biopsies: _____

Please note: failure to provide a date of collection can delay release of results

Tumor Collection Date (required): _____



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Sanger Testing from Blood/Saliva/DNA

NF1/Legius syndrome and Other RASopathy Related Conditions <input type="checkbox"/> NF1-R: Sanger and Del/Dup: <i>NF1 (RNA)</i> <input type="checkbox"/> NFSP-R: Sanger and Del/Dup: <i>NF1 (RNA)</i> and <i>SPRED1 (gDNA)</i>	Medium Chain Acyl-CoA Dehydrogenase Deficiency (MCADD) <input type="checkbox"/> MCD1: Targeted analysis of exon 11 and, if needed, reflexive full gene sequencing by Sanger: <i>ACADM</i>
Von Hippel-Lindau <input type="checkbox"/> VHL1: Sanger and Del/Dup: <i>VHL</i>	Autosomal Recessive Polycystic Kidney Disease <input type="checkbox"/> PKDL: Linkage Analysis for informativity
PTEN-Related Disorders <input type="checkbox"/> PTEN1: Sanger and Del/Dup: <i>PTEN</i>	<input type="checkbox"/> PKDPL: Prenatal Linkage (see Prenatal Specimen Requirements)
Fragile X syndrome <input type="checkbox"/> FRX: PCR and, if needed, reflexive confirmatory testing by Southern blot analysis: <i>FMR1</i>	FATHER: Name and DOB (mm/dd/yyyy) _____ MOTHER: Name and DOB (mm/dd/yyyy) _____

Known Variant Testing

KT2: Targeted detection of a specific, previously identified known variant in any gene that is available at our lab by Sanger sequence, MLPA, and/or FISH analysis (**Complete Previous Testing History: Page 1**)

KT2-NG: Targeted testing for a known variant with deep coverage of the alleles and detection of mosaicism for a variant present in at least 3% of alleles (**Complete Previous Testing History: Page 1**)

RT2: Targeted RNA-based testing for VOUS found during Next Generation Sequencing (**Complete Previous Testing History: Page 1**)

PT2: Prenatal testing (see Prenatal Specimen Requirements; **Complete Previous Testing History: Page 1**)

MCC: Blood specimen for mother provided for maternal cell contamination studies (required if not previously tested)

Other (unlisted options, please indicate below)

Please contact lab before selecting this option

Additional Information

Test Description Key: Next Generation Sequencing (NG) Sanger Sequencing (Sanger) Deletion/Duplication analysis (Del/Dup)	Please contact the lab via phone (205) 934-5562 or via email at medgenomics@uabmc.edu if you have any questions when completing this form. For additional information, visit our website at www.uab.edu/medicine/genetics/medical-genomics-laboratory
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Specimen Requirements

Accepted Prenatal Specimens Specimen requirements vary based on test requested; please see our website for more details. -Direct CVS: minimum 10 mg cleaned villi -Direct amniotic fluid: minimum 10 ml fluid -Cultured CVS: Two T25 flasks (>70% confluent) -Cultured amniocytes: Two T25 flasks (>70% confluent)	Prenatal Specimen Information: <input type="checkbox"/> Amniotic Fluid <input type="checkbox"/> Direct CVS (cleaned) <input type="checkbox"/> Cultured Amniocytes <input type="checkbox"/> Cultured Villus Cells Location of back-up culture (required): _____ Sample Collected Date (required): _____
Accepted Specimens Specimen requirements vary based on test requested; please see our website for more details. -Blood: 3-6ml EDTA (must arrive within 60-72 hours of collection for RNA-based tests) -DNA: extracted from lymphocyte cells, a minimum of 25ul at 3µg, O.D. value at 260:280nm ≥1.6 (must be extracted in a CLIA or equivalent certified lab) -Sperm (for KT2-NG only): Fresh, sterile semen collection using a local sperm bank/cryobank facility	Specimen Information: <input type="checkbox"/> Peripheral Blood (EDTA); # Tubes: _____ <input type="checkbox"/> Extracted DNA; Source: _____ <input type="checkbox"/> Other, please describe: _____ Please note: failure to provide a date of collection can delay release of results Sample Collected Date (required): _____



Name:	(First)	(MI)	(Last)	DOB: (MM/DD/YY)
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Billing

Please hold sample until further notice from the ordering facility.

Important Information

By completing this form, you **agree** that you have discussed the MGL's billing policies with your patient. Credit card information **MUST** be provided with sample submission for self-pay clients. **Please note:** If you are paying via self-payment or requesting a benefits investigation, there will be a **3-5 working day delay** on the initiation of your test. Requests for **cancellation** of ongoing testing must be submitted to the laboratory **within three working days of specimen arrival**. Individuals or institutions submitting requests after the three working day window may still incur charges for the cost of testing. Full information on the billing policies is available at www.uab.edu/medicine/genetics/medical-genomics-laboratory

Institutional Bill

Please check box if billing institution should receive report directly

Institution:	PO# (if applicable):
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Address:

City:	State:	Zip:
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Contact (Name and Title):	Preferred method of contact: <input type="checkbox"/> Email <input type="checkbox"/> Phone
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Email:	Phone:	Fax:
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Self-Payment Enclosed

Visa MasterCard Discover American Express

Name as it appears on card:

Card Number:	Expiration: (MM/YY)	3-digit Security Code:
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Cardholder's Signature:	Preferred method of contact: <input type="checkbox"/> Email <input type="checkbox"/> Phone
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Email:	Phone:
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Bill Third Party Insurance Company

Please include a copy of the pre-approval statement or provide the approval number if payment has been pre-authorized in advance of shipment.

Insurance pre-verification/authorization previously performed? Yes No **If yes, approval number is required:**

Please check box if you would **not** like insurance pre-verification/authorization to be performed by the MGL.

Please send a **legible copy** of the patient's insurance card, front and back.

ICD-10 Codes **(required):**

Important Considerations for Insurance Billing

For a list of contracted insurance companies, please visit our website or call our billing coordinator at 205-934-5523. As insurance prices are not listed, please call the billing coordinator to request a quote, if needed. The MGL will contact the insurance provider to inquire regarding the CPT code coverage for all samples submitted for insurance payment. The healthcare provider will be contacted with the copay/deductible and also in cases where the insurance provider denies coverage of the requested codes or supporting documents are required from the provider to confirm coverage. **This service is not offered for prenatal samples.** **Please note: An insurance verification is not a guarantee of payment. Out of State Medicaid is not accepted under any circumstances. All RUSH fees must be paid up front.** By completing this form, you agree that you have discussed the MGL's billing policies with your patient.



Informed Consent for Genetic Testing

This form does not need to be returned to the Medical Genomics Laboratory if Informed Consent portion of the Test Request form has been signed.

I hereby consent for:

Name:	DOB:	Gender:
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To participate in genetic testing for the following RNA/DNA-based cascade of tests ordered by my physician at the University of Alabama at Birmingham (UAB) Medical Genomics Laboratory (MGL):

Genetic Tests:

I understand that:

1. Any biological samples submitted for genetic testing (e.g., blood, cheek cells, saliva, amniotic fluid, chorionic villi, tumor, and/or tissue) will be removed from me and/or my minor child(ren) using standard techniques which carry their associated risks.

2. Any samples obtained will be used for the purpose of attempting to determine if I and/or members of my family carry genetic changes in the disease genes ordered by my physician.

3. The genetic tests performed at the MGL are the most sensitive developed and are highly specific. However, sensitivity and specificity are test-dependent. Additional testing details and the specific detection rates of each test can be found at www.genetics.uab.edu/medgenomics.

4. The following are possible outcomes for the specific tests listed above:

Positive	Unknown Significance	Negative
This is an indication that I may be predisposed to or have the specific disease, or condition tested. Further testing may be needed to confirm the diagnosis.	There may be a possibility that the laboratory findings will be ambiguous or of unknown significance. This may require additional testing from me or my family members. In rare circumstances, findings may be suggestive of a condition different than the diagnosis that was originally made.	There is a chance that I will still have this genetic condition even though the genetic test results are negative. Due to limitations in technology and incomplete knowledge of genes, some changes in RNA/DNA or protein products that cause disease may not be detected by this test.

5. In other cases, the RNA/DNA test is unable to identify an abnormality although the abnormality may still exist. This event may be due to incomplete knowledge of the gene structure or an inability of current technology to identify certain types of mutations in the gene. When clinically necessary, the MGL may use a method called linkage analysis. This method is not a direct test, but will report the probability that you and/or family members have an inherited disease or disorder. In some families, the markers used in linkage analysis may be uninformative. If so, linkage testing cannot provide results for the family members in question.

6. The RNA/DNA analysis performed by the MGL is specific for the genetic test listed above and in no way guarantees my health or the health of my living or unborn children. The MGL cannot be responsible for an erroneous clinic diagnosis made elsewhere.

7. The tests performed at the MGL are expanded and improved continuously. The tests offered are not considered research but are considered the best and newest laboratory service that can be offered. Genetic testing is complex and utilizes specialized materials so there is always some very small possibility that the test will not work properly or that an error will occur. There is a low error rate (perhaps 1 in 1000 samples) even in the best laboratories. Additionally, in very rare instances, this test may reveal an important genetic change that is not directly related to the clinical reason for ordering this test. This would be considered an incidental finding. The MGL reserves the right to report these incidental findings if they are clinically relevant to the patients and/or their families. In such instances, these results will be discussed with my healthcare provider and additional testing may be recommended. My signature acknowledges my voluntary participation in this test, but in no way releases the laboratory and staff from the MGL from their professional or ethical responsibility to me.

8. The MGL does not return DNA samples to individuals or physicians. While the MGL is not a specimen banking facility, in some cases it may be possible for the laboratory to reanalyze my remaining DNA upon request. The request for additional studies must be ordered by my referring physician/counselor and there will be an additional fee.



MEDICAL GENOMICS LABORATORY: TSC1/TSC2 PHENOTYPIC CHECKLIST FORM



Patient Name: _____ Male Female Date of Birth ___/___/___
Referring Physician: _____ Date of Exam ___/___/___

Thank you for completing this form; phenotypic information may improve our ability to interpret your results.

DEMOGRAPHIC INFORMATION

Ethnicity: White Black Native American Hispanic Asian Other:

DIAGNOSIS

2012 International TSC Consensus Conference Clinical Criteria: (Northrup et al. *Pediatric Neurology*. 2013 Oct;49(4):243-54.)
(Criteria are listed below with major criteria marked by # and minor criteria marked by *.)

- Definite TSC (2 major or 1 major plus 2 minor features)
- Possible TSC (1 major or 2 or more minor features)
- Does not meet TSC Criteria

Clinical Concern for Mosaicism: No Yes
Family history: Sporadic Familial Unknown

Known Familial Mutation: No Yes (provide information: _____)

Familial cases: Please provide pedigree and details on the affection status of family members on a separate page. Attach prior mutational analysis if available.

SIGNS AND SYMPTOMS (Major criteria marked by # and minor criteria marked by *.)

Dermatological

- 1) Hypomelanotic Macules: 0 1-2 ≥3# Unknown
- 2) "Confetti" skin lesions: None Present* Unknown
- 3) Facial Angiofibromas: None 1-3 >3# Unknown
- 4) Shagreen Patch: None Present# Unknown
- 5) Cephalic Fibrotic Plaque: None Present# Unknown
- 6) Ungal/Periungal fibromas: None 1-2 >2# Unknown
- 7) Hyperpigmented Macules: 0 1-2 ≥3 Unknown

Please provide detail on size and location of the dermatological findings on page 3.
A digital picture of the skin findings would be very helpful.

Neurological (Imaging)

- 8) Cortical Dysplasia:
 - Cortical Tubers: None Present# Unknown
 - Cerebral White Matter Radial Migration Lines: None Present# Unknown
- 9) Subependymal nodule (SEN): None Present# Unknown
- 10) Subependymal Giant Cell Astrocytoma (SEGA): None Present# Unknown
Histopathologically Confirmed? No Yes

Neurological/Psychiatric (Clinical)

- 11) Seizures: None Present (Describe type, if known: _____) Unknown
- 12) Developmental/Intellectual Disabilities: None Present Unknown
- 13) Behavioral/Psychiatric Diagnoses: None ADHD Isolated hyperactivity Aggression
 Autism unknown Other (_____)

Renal

- 14) Angiomyolipomas: None 1-2 >2# Unknown
Histopathologically Confirmed? No Yes
Is a malignant angiomyolipoma present? No Yes
- 15) Renal Cell Carcinoma: None Present Unknown
- 16) Renal Epithelial Cysts: None 1-2 >2* Unknown
- 17) Polycystic Kidney Disease Features: None Present Unknown

Note: If present, there may be increased concern for TSC-PKD contiguous deletion.

MEDICAL GENOMICS LABORATORY: TSC1/TSC2 PHENOTYPIC CHECKLIST FORM



Patient Name: _____ Date of Birth ____/____/____
(Criteria are listed below with major criteria marked by # and minor criteria marked by *.)

Pulmonary

18) Lymphangioleiomyomatosis (LAM): None Present# Unknown
 Histopathologically Confirmed? No Yes

Cardiac

19) Rhabdomyomas: None Present# Formerly/Prenatally present, but regressed Unknown

Dental

20) Dental Enamel Pits: None 1-3 >3* Unknown
 21) Intraoral Fibromas: None 1-2 >2* (Location: _____) Unknown

Ophthalmological

22) Retinal Hamartomas: None Single Multiple# Unknown
 23) Retinal Achromic Patch: None Present* Unknown
 24) Retinal Astrocytic Hamartomas: None Present Unknown

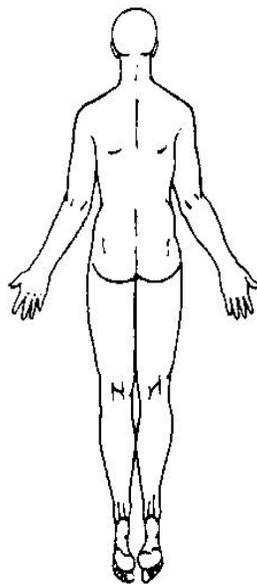
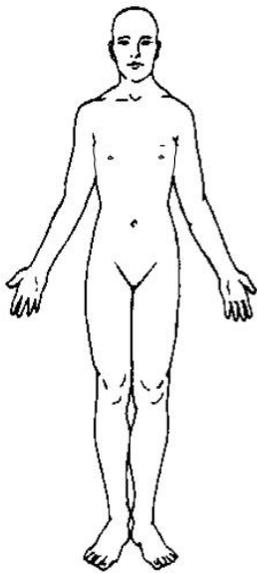
Neuroendocrine

25) Neuroendocrine Tumors: None Unknown Yes (Specify type: _____)

Other

26) Nonrenal Hamartomas: None Present* Unknown
 27) Additional Phenotypic Information:

Indicate location/size of hypomelanotic macules or other dermatological lesions ↓



- Hypopigmented lesions
- Hyperpigmented lesions
- Shagreen patch
- "Confetti" lesions

