

مستعمل



Transition from childhood to adulthood in classic CAH
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بلی کشت

Establishing care

- *Management of **adrenal** insufficiency .*
- *Adrenal **hyperandrogenism***
- ***Sexual** function*
- ***Fertility***
- ***complications** (abdominal obesity, adrenal rest tumors, bone loss, and impaired quality of life).*

Initial evaluation

- **Glucocorticoid and mineralocorticoid treatment regimens :**
- **All adults** with **classic 21OHD** require **continued glucocorticoid therapy**, and **most** require continued **mineralocorticoid** therapy.
- In adults, a **distinction** between "salt wasting" versus "simple virilizing" subtypes of classic 21OHD should be **avoided**.
- This distinction is important for **newborns** with classic 21OHD, but it is **irrelevant** for **adults** and often encourages withholding of vital therapies.

Glucocorticoid and mineralocorticoid treatment

- ***Glucocorticoid therapy :***
- *Hydrocortisone* therapy often achieves the goals and imparts lower risk of long-term complications than longer-acting glucocorticoids.
- ***Mineralocorticoid therapy :***
- In *virtually all* adults with classic 21OHD, continued *fludrocortisone* therapy is needed to treat mineralocorticoid deficiency.
- *Dosing* requirements are usually *lower* than in children or adolescents.

Selection of regimen

- *For adults we suggest the short-acting glucocorticoid **hydrocortisone**.*
- *hydrocortisone is the least associated with cushingoid complications.*
- *It is **less convenient** than other synthetic glucocorticoids as it is typically administered in **multiple daily doses**.*
- ***Adolescents** may be switched from hydrocortisone to longer-acting glucocorticoid regimens to promote treatment adherence.*
- *When such individuals establish adult care, we encourage **transition back to hydrocortisone** therapy.*

Selection of regimen

- *If an individual anticipates substantial difficulty adhering to **three times daily** hydrocortisone, or if adherence proves difficult after a trial of hydrocortisone therapy, we substitute a longer-acting glucocorticoid typically **prednisolone** or **methylprednisolone**.*

Selection of regimen

- *In adults with severe 21OHD who do not achieve adequate adrenal androgen suppression on hydrocortisone alone, we add a small dose of a longer-acting glucocorticoid at bedtime to suppress overnight ACTH secretion.*

Hydrocortisone (preferred glucocorticoid)

- ***Transition to adult dosing*** : For adults with classic 21OHD, a typical regimen is hydrocortisone **15 to 30 mg daily** administered in three divided doses; alternatively, a calculated daily dose of **10 to 15 mg/m²** body surface area can be used.
- *The largest dose is taken in the morning upon waking, and progressively smaller doses are taken late morning/midday and late afternoon/early evening (eg, 15, 5, and 2.5 mg).*

Hydrocortisone (preferred glucocorticoid)

- *In contrast to other types of adrenal insufficiency, adequate treatment of classic 21OHD usually requires **three rather than two daily doses** of hydrocortisone.*
- *The **third dose** helps to limit the **overnight rise in ACTH secretion** that promotes **adrenal androgen** production.*
- *Hydrocortisone administration three times daily usually provides sufficient suppression of adrenal steroids without imparting clinical manifestations of glucocorticoid excess.*

Monitoring and dose adjustment

- During the *transition* to adult care or titration of hydrocortisone therapy, adults with classic 21OHD should be evaluated *every three to four months* through both clinical and laboratory assessments.
- Adults who are on *stable* hydrocortisone regimens should be seen at least once *annually*.
- The goal of dose titration is to achieve the lowest hydrocortisone dose that provides both adequate *cortisol* replacement and sufficient suppression of adrenal *steroid* production.

Clinical assessment

- Signs and symptoms that suggest **undertreatment** include weight loss, nausea, weakness, hypotension, and fatigue.
- Signs and symptoms of **overtreatment** include body weight gain, impaired sleep, increased blood pressure, and edema.
- Signs of **chronic overtreatment** include dermal atrophy, bruising, proximal muscle weakness, purple striae, and other manifestations of Cushing syndrome.
- **females** should be assessed for signs of **androgen excess** .

Clinical assessment

- *In males, **testicular atrophy** on examination suggests chronic gonadotropin suppression from adrenal-derived androgens and thus indicates **glucocorticoid undertreatment**.*

Laboratory assessment

Routine laboratory measurements (ideally in the morning) should include serum concentrations of the following :

- *Androstenedione (generally considered the **most relevant biomarker**)*
- *Testosterone*
- *SHBG(used to calculate free and bioavailable testosterone)*
- *FSH and LH routinely in males and in females with oligo- or amenorrhea.*

Laboratory assessment

- Serum **17 OHP** also may be useful for detecting glucocorticoid overtreatment, but **routine measurement is not essential** for treatment monitoring **in adults**.
- In undertreated males and all females with classic 21OHD, the most abundant circulating androgen is **not testosterone** but **rather 11-ketotestosterone**, which is only measured in certain reference and research laboratories .

Laboratory assessment

- **Males** : In males, glucocorticoid therapy should be titrated to maintain testicular function, which generally requires the serum **androstenedione** level **at or near the upper limit** of the normal range.
- **Normalization of 17-oh p** indicates glucocorticoid **overtreatment**.
- **FSH and LH** levels should be maintained in the **normal range**.
- **suppressed gonadotropins** and/or an **androstenedione/testosterone ratio >1** indicate inadequate suppression of adrenal androgen production.
- Such findings should prompt both consideration of **glucocorticoid therapy intensification** and additional evaluation for **TARTs** with testicular examination and/or ultrasound.

Laboratory assessment

- **Females** :The goals(normal menstrual function and unwanted hair) are usually achieved with **androgen** (androstenedione, testosterone) levels **at or near the upper limit** of the normal range.
- Testosterone and androstenedione should **not** be **suppressed** below the normal range, as this indicates overt glucocorticoid overtreatment.
- A **normalized 17-OHp** level similarly indicates glucocorticoid overtreatment.

Dose adjustment

- We adjust the hydrocortisone dose *in 2.5 to 5 mg increments as needed based on evidence of over- or undertreatment.*
- *If signs or symptoms of cortisol deficiency are evident throughout the day, we preferentially increase the morning dose.*
- *If additional suppression of adrenal androgens is needed, we empirically increase the doses throughout the day; increasing more than one dose is often necessary for sufficient adrenal steroid suppression.*

Dose adjustment

- *Impaired sleep* may limit the acceptability of increased evening doses of hydrocortisone. If impaired sleep or other evidence of glucocorticoid excess develops, or if adequate adrenal *androgen suppression* cannot be achieved on a total daily hydrocortisone *dose ≤ 30 to 35 mg*, *combination therapy* may be helpful.
- In females with *persistent signs of hyperandrogenism* despite normalized serum androgen levels, we pursue *alternative treatment* strategies.

Alternative regimens

- ***Combined regimens for persistent hyperandrogenism*** : In adults in whom adequate adrenal steroid suppression cannot be achieved with standard hydrocortisone regimens, we suggest combination therapy .
- *Combination therapy entails typical cortisol replacement doses of hydrocortisone (10 to 25 mg daily) during the day and a very small dose of a longer-acting glucocorticoid at bedtime (1 to 2 mg prednisolone or methylprednisolone) .*
- *The lowest dose of the longer-acting glucocorticoid that achieves adequate adrenal steroid suppression should be used.*
- ***Combination therapy*** is ***very effective*** for suppressing ACTH and minimizes total glucocorticoid exposure.

Alternative regimens

Combined regimens may be particularly helpful in the following settings:

- In females pursuing **pregnancy** who need additional suppression of serum progesterone.*
- In males in whom reducing **TART size** is a goal of care.*

Longer-acting glucocorticoids for adherence challenges

- **Prednisolone and methylprednisolone (preferred longer-acting agents) :** For individuals with classic 21OHD who have difficulty adhering to three daily doses of hydrocortisone **prednisolone** or **methylprednisolone** preferred.
- These longer-acting glucocorticoids are typically administered **twice a day** with a **larger dose** in the **morning** to replace the cortisol deficiency (eg, 3 to 5 mg) and a small dose at bedtime to attenuate the pre-dawn ACTH rise (eg, 1 to 2.5 mg) .
- We avoid "**inverse diurnal rhythm**" dosing, in which the larger dose is given at bedtime (eg, methylprednisolone 2 mg upon waking and 5 mg at bedtime); such regimens do not replace the **cortisol deficiency** well and **overtreat** during the night.
- Prednisolone is available as a 1 mg/mL liquid, which facilitates titration of doses <2 mg.

- **Prednisone** : *Prednisone is a pro-drug that requires hepatic conversion to prednisolone to be biologically active, and interindividual variability in prednisolone exposure.*
- *Prednisone is therefore **not generally preferred** but is effective in some patients.*

Dexamethasone

- In adults with classic 21OHD, *dexamethasone* is *not preferred*. It has a *narrow therapeutic index*, and oral dose forms are designed for anti-inflammatory uses rather than cortisol replacement, which makes *dose titration* challenging.
- Dexamethasone is a *very potent* and *long-acting* glucocorticoid and effectively *suppresses ACTH* secretion. However, its long duration of action and variable interindividual metabolism may increase risk of *cushingoid features* with chronic use .
- Further, bedtime administration of *0.25 to 1 mg* does *not replace* the *cortisol deficiency* well, although this is the most effective regimen for ACTH suppression.
- Dexamethasone therapy should be of *limited duration* and reserved for specific treatment goals (eg, *TART shrinkage*).

Modified-release hydrocortisone

- ***Modified-release hydrocortisone (limited availability) :***
- *Is authorized for use in adolescents and adults with CAH in regions including the United Kingdom and Europe.*
- *In individuals with inadequate adrenal androgen suppression on immediate-release hydrocortisone, modified-release hydrocortisone is a reasonable alternative .*
- *The total daily dose is **15 to 25 mg**, administered in **two divided doses**. The first dose is taken upon waking, and the second dose is taken at night immediately prior to sleep.*
- *The **bedtime** dose should be approximately **65 to 75 percent** of the total daily dose, with the remainder taken in the morning.*

Glucocorticoid dose adjustment during acute stress :

- *Increased glucocorticoid doses are usually **not** needed during routine **psychological** stress or **exercise** .*

Crinecerfont

- ***Comorbidities due to glucocorticoid therapy :***
- *For adults with classic 21OHD and significant comorbidities or risk of comorbidities due to the chronic, **supraphysiologic** glucocorticoid treatment required for disease management, we suggest adding **crinecerfont** as adjunctive therapy (if available).*

Crinecerfont

- **Corticotropin-releasing factor (CRF) type 1 receptor antagonist (crinecerfont) :**
- *Crinecerfont*, an oral CRF type 1 receptor antagonist, has regulatory approval in the United States as adjunctive therapy for patients with classic 21OHD .
- For most adults, the initial dose is **100 mg** orally **twice** daily with meals.
- Dose adjustments might be needed for patients taking medications that induce cytochrome P450 3A4 (table 3).

Efficacy

- Crinecerfont *reduces ACTH production* and thereby attenuates adrenal steroid production, potentially enabling disease management without supraphysiologic glucocorticoid dosing.
- In a 24-week trial in 182 adults with classic 21OHD taking supraphysiologic glucocorticoid therapy (mean dose equivalent to hydrocortisone 17.6 mg/m² body surface area daily), participants who were randomly assigned to treatment with crinecerfont 100 mg twice daily (n = 122) achieved a greater glucocorticoid dose reduction, while maintaining *androstenedione* at or *below baseline* values, compared with those assigned to placebo (n = 60; 27.3 versus 10.3 percent dose reduction, respectively).

Efficacy

- *During down-titration of the glucocorticoid dose, the **fludrocortisone** dose and **stress dosing instructions** for glucocorticoid treatment might require **adjustment**.*

Adverse effects

- *In the trial described immediately above, **fatigue** and **headache** were the most common side effects.*
- *One participant in the crinecerfont group experienced **adrenal crisis**.*

Other treatments

- Although a few cases have been reported of unilateral or **bilateral adrenalectomy** for severe 21OHD, we **avoid** this intervention.
- The major benefit of adrenalectomy is the **immediate elimination of adrenal androgen** and progesterone secretion, which allows treatment with lower glucocorticoid doses.
- The reduction in adrenal androgen production may be only **temporary** with **unilateral adrenalectomy**.
- Bilateral adrenalectomy heightens the dependency on glucocorticoid and mineralocorticoid replacement therapy and therefore increases risk of adrenal crisis.
- **Adrenalectomy** does not always prevent subsequent development of **adrenal rest tumors**, even in females .

Androgen excess (females)

- In females with 21OHD, additional intervention may be necessary to manage hyperandrogenic symptoms (eg, hirsutism, acne) or to regulate menstrual function.
- In such cases, **combined OCP** can be used in conjunction with glucocorticoid therapy.
- Combined oral contraceptives both regulate menstrual function and mediate **antiandrogenic effects** by **raising SHBG**.
- In females with hirsutism, **mechanical or topical hair removal** methods also can be used.
- we **avoid spironolactone** for antiandrogen treatment, as it antagonizes the effect of fludrocortisone and can cause volume depletion.

Mineralocorticoid replacement

- *Although mineralocorticoid replacement needs usually decrease in adulthood, most adults with classic 21OHD require continued mineralocorticoid therapy with fludrocortisone .*
- *The **reduced** dose requirement reflects the increases in both dietary **sodium intake** and **mineralocorticoid signaling** that occur with progression from infancy to adulthood .*

Transition to adult fludrocortisone dose

- In individuals transitioning from pediatric to adult care, the initial adult fludrocortisone dose is determined by the patient's **current dose** and assessment of seated and standing **blood pressure**, serum **potassium** concentration, and **PRA** or DRC.*
- In adults with classic 21OHD, a typical fludrocortisone dose is **0.05 to 0.2 mg** daily . This may be taken once **daily** or in **two** divided doses.*

Transition to adult fludrocortisone dose

- *Hydrocortisone* has *greater mineralocorticoid activity* than other options for glucocorticoid therapy, so adults on hydrocortisone typically require *lower fludrocortisone* doses.
- For example, hydrocortisone *20 mg* daily has mineralocorticoid activity approximately equivalent to *0.05 mg* fludrocortisone.

Monitoring and dose adjustment

- During the transition to adult care or titration of fludrocortisone therapy, adults with classic 21OHD should be **evaluated every three to six months** through both clinical and laboratory assessments, and then at least **once annually** .
- **Optimal mineralocorticoid** replacement may enable **reduction** of the **glucocorticoid** dose .

Fludrocortisone therapy

- **Clinical assessment:**

*Elevated **blood pressure** and **dependent edema** can be evidence of **overtreatment**.*

Laboratory assessment

- *The goals of fludrocortisone treatment are to normalize the serum potassium level and achieve a **PRA** or DRC in the **normal** reference range.*
- *If PRA (or DRC) remains **mildly elevated** in adults who are asymptomatic with a normal k level, the fludrocortisone dose should **not** be further increased. in this setting, an increased dose can lead to hypokalemia.*

Fludrocortisone therapy

- Laboratory assessment is *essential* and should be performed even in *asymptomatic* individuals.
- *Undertreatment* can lead to *chronic volume depletion* that may be clinically silent and evident only on laboratory testing.
- Irrespective of whether it causes symptoms, undertreatment *results* in persistent *overproduction of renin and angiotensin II*.
- Angiotensin II and volume depletion can *stimulate ACTH secretion*, leading to higher adrenal *androgen synthesis* .

Dose adjustment

- *We adjust the fludrocortisone dose as needed in **0.05 to 0.1 mg** increments based on evidence of under- or overtreatment.*
- *In adults, once a therapeutic replacement dose is established, the fludrocortisone dose generally remains **stable for years**.*
- *Further dose adjustments may be needed in the setting of increased salt losses (eg, exposure to **warm climates, vigorous exercise**) or the development of primary hypertension.*

Genetic counseling

- *Based on the incidence of classic 21OHD and an estimated carrier frequency of 2 percent of the population, an individual with classic 21OHD has an 1:120 probability of having a child with classic 21OHD .*

Normalize menstrual function

- *Glucocorticoid under- and overtreatment both can cause menstrual irregularity.*
- *If adequate adrenal steroid suppression cannot be achieved without excessive glucocorticoid exposure, **combined oral contraceptives** might help to regulate menstrual function.*
- ***Adrenal-derived progesterone**, rather than androgens, is the major cause of menstrual irregularity and infertility in females with classic 21OHD.*

Fertility

- *Prior to attempted conception :*
- *Females with classic 21OHD should have **gynecologic consultation**, ideally with a surgeon who can provide initial **genital reconstruction surgery** or modification of previous surgery if needed.*

Fertility

- *Once functional anatomy is achieved, glucocorticoid therapy is intensified to achieve greater suppression of adrenal steroid production.*
- *The goal of therapy is to achieve a **follicular-phase progesterone** $<0.6 \text{ ng/mL}$ (2 nmol/L).*
- *This intensified treatment is generally necessary for at least **several months** to achieve conception and often requires combination therapy with both immediate-release **hydrocortisone** and a **longer-acting glucocorticoid** administered at bedtime .*

Outcomes

- *In females with classic 21OHD, **fertility rate is reduced** .*
- *Initial studies found that only **25 percent** of females with **classic** 21OHD and **10 percent** of those with **severe** disease ever attempted to conceive .*
- *In contrast, a 2021 study from Sweden found that **40 to 42 percent** of females with either nonclassic or "simple virilizing" classic 21OHD had borne children, similar to the general population (45 percent).*
- *<**10 percent** of females with severe "salt wasting" classic disease had biological children .*
- *In individuals who receive proper treatment and have regular intercourse, pregnancy rates exceed **90 percent**.*

Outcomes

- *females with classic 21OHD have **normal fertility potential** , and the **low desire** to pursue parenthood appears restricted to those with the most severe disease.*
- *Factors that contribute to **impaired fertility** include:*
- ***Increased adrenal-derived progesterone**, which unfavorably changes cervical mucus and endometrial function, similar to progestin-only contraceptives*
- ***Anovulation***
- ***Vaginal stenosis**, from intrauterine virilization and/or sequelae from prior genital reconstructive surgery*
- ***Psychologic factors***
- ***Ovarian hyperandrogenism** secondary to chronic anovulation*
- ***Ovarian adrenal rest tumors***

No role for screening for ovarian adrenal rest tumors

- *In females with classic 21OHD, we **do not screen** for adrenal rest tumors.*
- *Ovarian adrenal rest tumors appear **uncommon** in treated females with classic 21OH.D*

ovarian adrenal rest tumors

- *As in males with testicular adrenal rest tumors, the etiology of rest tumors in females appears related to sustained elevations in ACTH due to glucocorticoid **undertreatment** or nonadherence.*
- *In females, whether glucocorticoid therapy reduces adrenal rest development and/or size is **unknown**.*
- *In females, adrenal rests may develop in the **retroperitoneum**, including the ovaries and surrounding structures.*
- *They occur primarily in the ovarian tissue and, less often, in the **paraovarian/adnexal area**.*

Screening for testicular adrenal rest tumors

- **Males**

- *Adult males with classic 21OHD are at risk for testicular adrenal rest tumors (TARTs).*
- *The **pathogenesis** of TARTs is **not known**, but they are believed to derive either from **ectopic** adrenal cortex remnants in the testis or from **reprogrammed Leydig stem** cells, which differentiate and grow under the **influence** of chronically elevated **ACTH**.*
- *TART cells express genes that encode enzymes and markers characteristic of Leydig and adrenal cells .*
- *The **mass effect** of TARTs increases the intratesticular pressure, impairs blood flow to the normal testis, and hinders outflow of semen.*
- *TARTs can cause **infertility** through multiple mechanisms.*

Screening

- *In males with classic 21OHD, testicular ultrasound screening should begin in **adolescence** to detect TARTs, including **once** at the time of **transition to adult care**.*

Screening

- *Thereafter, we perform a physical examination and/or ultrasound monitoring for TARTs at least **annually**, with additional evaluation performed whenever a period of glucocorticoid **undertreatment** is detected through laboratory monitoring.*
- *On physical examination, TARTs are **firm, irregular** masses originating near the **rete testes**.*
- *They are typically bilateral and can be **painful** when large.*
- *Masses may be **small** and not palpable on physical examination.*
- ***Ultrasonography** is the most **sensitive** method of detection*
- *Multiple studies have shown that **30 to 50 percent** of adolescent and adult males with classic 21OHD develop TARTs*

Management

- *The best approach to prevent TARTs is to provide **adequate glucocorticoid** therapy and to avoid long lapses in treatment .*
- *Intensified glucocorticoid treatment is sometimes, but not always, effective for decreasing the size of TARTs, relieving pain, and restoring fertility.*
- *Case reports have noted either a decrease in size or even disappearance of testicular masses with a course of **supraphysiologic doses** of **dexamethasone** or with **daytime hydrocortisone** plus bedtime dexamethasone.*

Management

- *TART shrinkage typically requires **several months** of treatment intensification, but **side effects** from these dexamethasone-containing regimens limits the duration of use.*
- ***Surgical removal** provides good **long-term control of TART growth** and **pain**, but as demonstrated in a series of eight patients with TART , **surgery** is **unlikely** to restore testicular **testosterone** and **sperm** production.*
- *In the presence of TART(s), an elevated follicle-stimulating hormone (**FSH**) level indicates testicular injury and is a **poor prognostic factor** for fertility .*

Fertility

- In males with classic 21OHD, a *normal semen analysis* is the best evidence of good disease control without overtreatment, and *sperm banking* is an option for young males who want to preserve their fertility.
- In males, both *elevated* and *suppressed FSH* levels can indicate *impaired fertility*.
- In males with TARTs, an *elevated FSH* level suggests testicular *injury*.
- *A suppressed FSH (and LH)* level reflects inadequate glucocorticoid treatment and leads to *impaired spermatogenesis*.
- In some males with gonadotropin suppression, *glucocorticoid treatment intensification* can restore sperm production.
- *Gonadotropin replacement* also has been used to treat infertility due to classic 21OHD and hypogonadotropic azoospermia.

Fertility

- *Undertreatment* leads to *impaired sperm* production for two reasons.
- First, adrenal-derived *androgens* suppress *gonadotropins*, leading to *reduced testosterone* production from Leydig cells.
- *High adrenal-derived androgens* compensate for hypogonadism and maintain male secondary sexual characteristics, creating the false impression that testicular function is normal.

Pregnancy

- **Glucocorticoid and mineralocorticoid therapy** :Females with classic 21OHD require continued glucocorticoid and mineralocorticoid therapy throughout pregnancy.
- **Hydrocortisone and/or prednisolone** should be used in combination with fludrocortisone.
- Pregnant females should **not** receive glucocorticoids that cross the placenta (eg, dexamethasone).
- During the first and second trimesters, the preconception glucocorticoid regimen is typically continued if it is well tolerated.
- If concerning glucocorticoid-related side effects occur, the dose can be moderated, primarily by **reducing or eliminating the bedtime dose**.
- During the **third trimester**, most patients require an increase in the glucocorticoid dose (**20 to 40 percent**) .

- The *fludrocortisone dose* does *not* usually *require* adjustment during pregnancy, but clinical and laboratory monitoring are needed.

Delivery

- *Cesarean section is almost always required at delivery due to vaginal inadequacy.*

Outcomes

- *Full-term pregnancies can be achieved with delivery of healthy infants who have normal growth and development .*
- *Female infants without classic 21OHD are born with typical external genitalia; even when maternal androgen production is not normalized during pregnancy.*
- *Placental aromatase activity protects the fetal genitalia and brain from excess androgen exposure .*

MONITORING FOR LONG-TERM COMPLICATIONS

- *These individuals have increased risk of **low bone density, obesity, insulin resistance, and hypertension.***
- *They also frequently report reduced **quality of life.***
- *In addition to routine clinical and laboratory assessments for adrenal hormone therapy, we monitor the following:*

MONITORING FOR LONG-TERM COMPLICATIONS

- **Cardiometabolic risk factors :**
- *Body weight* and *BP* should be measured at least annually.
- *Additional cardiometabolic screening (FBS, HbA1c, lipid panel) should be performed as for the general adult population .*

MONITORING FOR LONG-TERM COMPLICATIONS

- *One study found that females with **classic 21OHD** have an increased risk of **gestational diabetes mellitus**.*

Bone mineral density measurement by dual x-ray absorptiometry

- We perform *baseline BMD* in all patients at *age 25 years*, the approximate expected age of peak bone accrual .
- Since lifelong glucocorticoid therapy can impact bone accrual, this baseline measurement is important for interpreting subsequent BMD values.

BMD

- After baseline assessment, we *remeasure* BMD in adults who have had a *prolonged (≥12 months) exposure* to high-dose glucocorticoid treatment (>10 mg/day prednisone or equivalent), who develop *other risk factors* for bone loss, or who experience an *atraumatic fracture*.
- In the absence of these triggers for interim measurement, we remeasure BMD according to *age- and sex-based guidelines* for the *general adult population*.

- *All adults with classic 21OHD should follow lifestyle measures for optimizing bone health, including adequate intake of **calcium** and **vitamin D** and routine physical activity.*
- *Vitamin D deficiency is **common** in children and adults with classic 21OHD.*

osteoporosis

- *In adults with classic 21OHD who are diagnosed with osteoporosis based on BMD measurement or atraumatic fracture, management is the **same as for other populations** with glucocorticoid-induced osteoporosis.*

Have a wonderful spring



